Appendix 1: Program Reflects University Mission

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Appendix 1.1 WCU Mission and Vision Statement

Our Mission:

Western Carolina University creates learning opportunities that incorporate teaching, research, service, and engagement through on campus, off campus, on-line and international experiences. The university focuses its undergraduate, master’s and three doctoral programs, educational outreach, research, creative, and cultural activities to sustain and improve individual lives and enhance economic and community development in Western Carolina and beyond.

Our Core Values and Guiding Principles:

- Excellence, Scholarship, Teaching and Learning
- Collaboration with and Respect for our Communities
- Free and Open Interchange of Ideas
- Responsible Stewardship and Organizational Effectiveness
- Organizational and Environmental Sustainability
- Cultural Diversity and Equal Opportunity

Our Vision:

To be a national model for student learning and engagement that embraces its responsibilities as a regionally engaged university.
Appendix 1.2: College of Arts & Sciences Mission

College of Arts & Sciences

Strategic Plan

Mission:
The College of Arts and Sciences provides students with a liberal arts foundation where they are taught to think critically, grow academically, and communicate effectively. We prepare our students to be intellectually, socially, culturally, and professionally engaged citizens and leaders who contribute to and promote the sustainability of local and global communities.

Vision:
The College of Arts and Sciences will be a national model among colleges of arts and sciences for student-centered teaching and learning, engagement, and collaboration.
Appendix 2: Program Engages in Ongoing, Systematic Planning

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## Appendix 2.1: GNR Strategic Planning Table – Vision 2020 Link

### Departmental Strategic Planning Table

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<th>Strategic Ends</th>
<th>Ways</th>
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<td>For all activities, recognize the significant investment of faculty time required to complete these tasks effectively, and adjust work assignments and seek additional resources where necessary.</td>
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<td>1.1.2</td>
<td>Contribute to university leadership in the study of the environment, environmental/earth science education, and environmental outreach</td>
<td>1. Examine the feasibility of developing an interdisciplinary graduate program 2. Explore feasibility of increasing collaboration and/or merging Forest Stewards and the Institute for Watershed Research and Management, into a more comprehensive regional partnership 3. Continue strengthening student engagement opportunities 4. Better document student activities 5. Intentionally expand science engagement opportunities for science education majors to make it a hallmark of the program. 6. Better document the benefits of our outreach and engagement activities to the region</td>
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<td>1.1.3</td>
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<td>• Network with other departments, university offices, and external partners to assess graduate program potential and activities of centers. • Establish targets and create an annual summary of the engagement activities of students in GNR and, with collaboration other sciences, in science education. • Formalize long-term partnerships with federal, state and other environmental and education agencies and professionals.</td>
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<td>1.1.6</td>
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<th>2020 Link</th>
<th>Strategic Ends</th>
<th>Ways</th>
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| 1.6.3     | Increase money available for scholarships and paid student internships, and document student benefits | 1. Increase fundraising efforts to build both the Yurkovich and Kolenbrander endowed scholarships, such as newsletters and special events | • Commit some of the funds earned through program of excellence award  
• Organize special fund-raising events, such as alumni celebrations  
• Establish and maintain regular contact with alumni and partners, perhaps through GNR Student Affairs Committee.  
• Explore mechanisms for matching department funds with other funding sources (for example QEP, International Programs) to subsidize high-quality student experiences that could serve as recruitment opportunities.  
• Work with the Honors College, Admissions, and Coulter Center to facilitate recruiting between the Honors College and the STEM disciplines. |
| 1.6.5     | Increase recruitment and retention of high quality students and under-represented populations | 2. Explore opportunities to develop additional scholarships or stipends to recruit high quality students | |
| 1.6.6     | Expand experiential and service learning opportunities by increasing the number of internships, research experiences, and interactions between students and professionals. | 1. Increase financial support for these endeavors (see above)  
2. [NRCM] Build out final 2 legs of QEP – experiential learning requirement and professional practitioner series  
3. [GEOL] Develop mid-level outreach activity (Sophomore level QEP goal) | • Develop QEP experiential learning and outreach requirements and implementation strategies.  
• Explore development of formal/semi formal partnerships with federal, state and other environmental agencies to create experiential and engaged student learning opportunities.  
• Explore opportunities for faculty to secure summer salary to support activities that bridge between scholarship, teaching, and engaging regional entities. |
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<th>2020 Link</th>
<th>Strategic Ends</th>
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<tr>
<td>1.1</td>
<td>Address challenges created by increasing enrollments and associated increases in class-sizes and the number of sections being taught</td>
<td>1. Pursue additional staffing opportunities, initially focusing on a departmental technician and lecturers or instructors &lt;br&gt; 2. Explore options for increasing the frequency of course offerings and the number of lab sections &lt;br&gt; 3. Explore options for changing the timing of course offerings</td>
<td>• Adjust staffing plans and budget requests to reflect additional needs &lt;br&gt; • Review students’ progress through the curriculum and look for course bottlenecks and other recurring problems and investigate possible solutions, including the use of summer.</td>
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<tr>
<td>1.1.2</td>
<td>Increase opportunities to provide continuing education credits for teachers and to provide smoother transition for junior college transfer students</td>
<td>1. Investigate CE needs and develop promotional materials to publicize what we can offer &lt;br&gt; 2. Update articulation agreements with unique programs, such as Natural Resources Programs at HCC &lt;br&gt; 3. Investigate possible recruitment activities</td>
<td>• Work with CEAP and others to identify CE need &lt;br&gt; • Work with Admissions to identify appropriate recruiting strategies.</td>
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<td>1.4.2</td>
<td></td>
<td>1. Explore the need for additional liberal studies courses in our areas &lt;br&gt; 2. Explore possibility of developing distance ed courses – particularly as needed for online programs &lt;br&gt; 3. Explore potential to move some courses from regular year to summer</td>
<td>• Work with Provost and other university offices to identify specific course needs and resources available to support their development and offering.</td>
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<td>1.5.2</td>
<td>Increase number of summer residence course offerings and online course offerings</td>
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<td>2020 Link</td>
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| **Misc. Strategic Ends (and some Ways)** | • Continue increasing majors, though in context of enrollment management in light of available resources  
• Promote study abroad through increased faculty-led trips  
• Update and overhaul website to better promote ourselves  
• Generally better publicize our capabilities and accomplishments  
• Explore digital-measures-like database development to monitor engagement activities  
• Increase course offerings at Biltmore Park campus | | |
Appendix 2.2: External Review Reports for NRMC

Natural Resource Conservation & Management Program
External Review Report

April 17, 2008

Prepared By:

James Cook, Professor of Forestry, College of Natural Resources,
Univ. of Wisc. @ Stevens Point

Scott Torreano, Professor and Chair, Dept. of Forestry and Geology,
Univ. of the South, Sewanee Tennessee

Jane Eastman, Asst. Prof. of Anthropology & Sociology
W. Carolina Univ.
I. Introduction

The team of external reviewers arrived at Western Carolina University on the evening of Thursday, February 14th and conducted interviews throughout the following day. The off-campus members of the external review team were greeted by Peter Bates, Program Director, at Madison Hall on WCU’s campus at 5pm on Thursday. The entire team, including the on-campus external reviewer, met for dinner with three of the program’s faculty. The last review team meeting occurred over dinner with Peter Bates and Laura DeWald on Friday, February 15; the team dispersed after dinner.

The review team attended meetings throughout the day on Friday, beginning with a brief team meeting in Madison, then breakfast with Mark Lord, Head of the Geosciences/Natural Resources Department. At 8:45 the team assembled in Stillwell 338 and participated in a series of five meetings over the next five hours. The first meeting was with Peter Bates. The second meeting was a teleconference with Wendy Ford, the Dean of Arts and Sciences, who was at home due to illness. Niall Michelsen, an Associate Dean for the college, was present at this meeting. Beginning at 11:00 Beth Tyson-Loftquist, the Associate Vice Chancellor of Academic Affairs, met with the committee as the Provost, Kyle Carter, was out of town and unable to attend. Following that meeting box lunches were served in Stillwell 338 and the review team met with 3 alumni and 8 students of the Natural Resource Conservation and Management (NRCM) Program. The final meeting in Stillwell was with the faculty and included Peter Bates, Larry Kolenbrander, Ron Davis, and Laura DeWald. Joni Bugden-Storie was out due to illness. Following this, Peter Bates took the review team on a tour of the Facilities in Stillwell.

The review team then convened around 3:30 in a conference room in Madison Hall, where we were met by Melissa Wargo, Director of Assessment. She answered the committee’s procedural questions and then left the team to plan for writing the report. Peter Bates arrived at Madison Hall before 6:00 and took the team to dinner at Balsam Mountain Inn. We were met there by Laura DeWald.

II. Analysis of the Program

a. Undergraduate Program

Synopsis of the Curriculum

Each student earns a BS in Natural Resources which requires 72 hours in the major (48 hours in core courses and a 21-hour concentration), in addition to 42 hours in Liberal Studies. There are 3 concentrations: Forest Resources (FR), Soil and Water Resources (SW), and the newer Landscape Analysis (LA). The
partitioning of hours in the major, concentration, and core, or Liberal Studies, is similar to many of leading, traditional programs in natural resources. The present program exposes students to a solid and well-balanced mix of foundational natural, social, and applied sciences. A few institutions are experimenting with providing more choices (less prescription) in the courses taken in the major. Naturally, such a structure can result in students missing an appropriate balance of theory and application in their coursework. In its present form, we feel that the Natural Resources Management program and the associated concentrations strikes the right balance. If an expansion position were available, we think that a slightly different set of choices would serve the students better (see Suggestions, below), given the careers most commonly followed by the graduates. We recognize that the limited number of elective credits within their concentration is severely constrained by university policy, and the short list of courses to choose from is a function of the number of faculty in the program and their teaching loads.

**Suggested Changes for Curriculum**

1. Drop GEOG 402 from the core and add NRM 330 (Intro. Wildlife). The possible downside to this is that it would force a significant reallocation of the work load of Ron Davis.

2. If staff could be found, add two courses to the elective pool for Forest Resources: i) Fire Management, ii) Forest Products.

3. Require NRM 351 or BIOL 304 in Landscape Analysis (LA) concentration. There is a conflict of information presented on this – this course is listed as part of the core for all concentrations, but it is NOT in the Curriculum Guide for LA.

4. Shift NRM 320 (Soil Conserv.) from elective pool to required for the SWC concentration, and move either MGT 300 or GEOG 300 or CHEM 133 to elective pool. We believe that it would be advisable to maintain a year of chemistry in this Option.

**Rationale for Suggestions**

1. Based on the catalog description, GEOG 402 does not seem to be an effective use of credits. The description reads: “Quantity, quality and distribution of resources in the U.S.; and the dilemma of increasing demand on dwindling resource base.” The students should get a good dose of this view and dilemma for many of the specific resources (timber, soil, water) in other classes. The largest gap in the core is a lack of training in wildlife management. Wildlife populations, both game, non-game and ‘species of concern’ (e.g., endangered, threatened) are a very important part of the objectives we have on all public lands, and on many private lands. Hence it is important enough to require of all majors. Admittedly it has less relevance, overall, to the SWC and LA concentrations. However, this is a prime example of an area of investigation that would be great to include in NRM 371 or NRM 444.

2. The primary employers are US Forest Service, the state forest service and sawmills in western N. Carolina (according to input from NRCM staff). For the first two, fire management (this course would complement the training the
students get in fire suppression by focusing on prescribed burning, fuel inventory and fuel management) is extremely important and students interested in either of these career paths could take this elective to make themselves more ‘employable’. On the other hand, students wanting to work for the forest products side of forestry have no formal training in many aspects of Forest Products. They undoubtedly get some relevant background in NRM 352 and NRM 451, but there is a lot more in this topical area that they could benefit from. Even one course would probably make the student more well qualified in the eyes of employers.  
3. One of these two courses is essential for the students to be prepared for the Landscape Ecology class (NRM 371) required in the LA option. 

4. This course is the true heart of the concentration, and thus the assessment team could not figure out why it is not required.

Students should be able to fulfill their degree requirements on time provided they enter the program early (as sophomores) and required courses are available. Some of the students we met raised concern over the ability of students to graduate on time. They noted that this was a particular concern for transfer students, depending on the institution, and for students who had to take a hiatus in their studies. When asked whether this had been a serious problem, one student noted that it had been for a few students, and that it usually meant delaying graduation. There was widespread praise for the faculty concerning their advising. Excellent advising has helped to keep graduation delays to a minimum.

We consider the range of courses offered and prerequisites to be appropriate, with the exceptions noted above. We were impressed by the ability of the faculty to track majors through their studies such that they approached upper level courses with the requisite background.

The NRCM faculty were especially interested in our views on recruitment and retention. Our comments are based on the points related to Standard 5 (WCU Program Review Standards). Despite the general drop in students majoring in the NRCM Program since 2004, enrollment appears to be stabilizing. There have been cycles in enrollment in natural resources for decades. Factors that appear to influence this pattern are the general economy, job availability and generational trends, among others. The enrollment at a particular institution also reflects the image and efforts [recruiting] of the University and the Program, as well as local conditions. Given that nationwide trends in enrollment appear to be the norm, and that the state, and sequentially WCU, are re-focusing their recruitment efforts, conclusions seem unwarranted at this point. However, it is important to NRCM enrollment that the local region continue to receive adequate attention as changes are made.

Broadening diversity is a very hard goal to meet in the natural resources, agricultural, and environmental sciences disciplines. At the University of Wisconsin-Steven Point (a peer institution) College of Natural Resources (CNR),
the percent females in the program has never risen above ~ 22%. It has gone up and down over time more or less independently of staff efforts. Currently, the percentage is lower than the NRCM despite the fact that the CNR has a large environmental education major which is female dominated. Hence, NRCM is doing quite well if it can maintain a 20-25% female population. The percent of non-white students in the CNR at UWSP is also equal to slightly less than at NRCM. Due to a national decline in enrollments in science programs, especially in natural resources and environmental science, increasing diversity, in a broad sense, is an especially challenging goal. This challenge is further complicated by the demographics of the population in the region. We encourage efforts at recruiting in nontraditional markets (i.e., outside of Western North Carolina) if this does not reduce resources towards maintaining the traditional market base. Consideration of reciprocity agreements with other states should be considered.

Some scholars and administrators claim that the ‘quality’ of the incoming student plays an important role in retaining students. Though it is easy to see how there could be some influence, the magnitude of the influence is very difficult to pin down. Retention rates are low at WCU and thus are a valid concern. In a comparison between WCU and UWSP, the ‘quality’ of the incoming student appears to be a little lower, as measured by high school performance (average high school GPA for UWSP is 3.4), but equivalent as indicated by ACT scores (23 at WCU vs. 22.8 at UWSP). Thus, we tentatively conclude that the quality of the student population is not the primary cause of the low retention rates. Further study is required to determine why retention rates are low. Given the feedback we received from students and alumni, we are confident it is not a lack of ‘investment’ or student-focus by faculty.

The NRCM faculty and University Administration asked our opinion on metrics and standards for learning assessment. Indeed, the faculty want to improve the methods of student assessment (see ‘Response to Program Review Standards, 1-4-08, P. Bates). We used the language in Standard 3 (Office of Assessment) as a guide. As the NRCM Program is so field-oriented, practical field skills are best assessed in class exercises. The written assessment metrics used by NRCM are consistent with some peer undergraduate programs. They currently use student GPA in selected, upper level courses to indicate if the graduate has demonstrated adequate attainment of appropriate “knowledge” and “problem solving skills”. This manner of measurement is problematic for at least two reasons: 1) A grade in a course (or courses) is based on a variety of evaluation instruments and reflects performance in a number of areas (i.e., often in areas other than ‘knowledge’ or ‘problem solving’), and thus is imprecise. This becomes more likely as the amount of group work increases. 2) A student could be quite deficient in a particular skill or knowledge area and still earn a C or higher for the course; thus, the grade is not a consistent or reliable indicator. However, a grade is not an inherently incorrect indicator; it simply needs to reflect the attainment of a specific skill or content area. A grade at a course-level is too broad and ambiguous. One approach that could be taken is to set more specific goals for
the program first, and then in addition to that, goals by concentration. This will provide a framework to judge how the content area(s) and/or skills in each course feeds into or satisfies, the program and concentration goals. Assessing if students have achieved the outcomes/goals is a thornier issue, but can be done within the framework of classes if there is direct assessment (graded in some way) of each knowledge topic and problem solving skill.

An alternative approach is used by some other institutions (e.g., The University of the South, The University of Georgia). They employ oral and written comprehensive exams during the senior year to gauge the learning outcomes and the effectiveness and consistency of curriculum. Comprehensive exams are administered by faculty within the major. Barring major turnover in faculty, these exams provide an internal metric for departments and programs which can be made consistent, but with reasonable levels of flexibility. The disadvantage to this approach is that it can be a significant time investment for faculty. The significant advantage is that they so comprehensive in coverage.

A third alternative is essentially a blend of the two described above. In this approach, the assessment is done by ‘year’ in the curriculum (i.e., sophomore, junior, senior). As suggested above, a complete of specific goals [outcomes] is needed for each year, and then suitable evaluation methods (test, demonstration, etc.) devised for each. This alternative falls between the other two in its breadth and costs.

One could make the case that the ‘assessments’ made by employers is the ultimate assessment. Undoubtedly, their evaluations are a valid input. However, they are neither complete nor unbiased. Each sector, if not each supervisor, has a different set of needs and expectations; and these can change over a relatively short time frame (the national forest system is clear example of this). No program can produce a product that is perfectly trained for all jobs, and not even for a particular job sector. We suggest that the NRCM faculty work on and improve what they have in place, and merge that with what employers and alumni tell them, to provide the broadest based assessment possible. A formal, well-designed survey of alumni could provide valuable information/insight on this topic.

b. Not applicable

III. Analysis of Faculty
a. Qualifications

Generally, we believe the academic program is strong, and the present composition of the faculty meets the needs of the curriculum reasonably well. The faculty are motivated individuals, and have a strong interest in working with undergraduate students on research projects, independent studies, etc. They all are versatile enough to teach effectively in areas that are somewhat outside of their core areas of training. We were impressed by the uniformly positive appraisal of
the faculty by current NRCM students and alumni. The Program and faculty are
well respected within the University administration.

Resource management (Res. Mngt.) is an extremely broad discipline that draws on bodies of knowledge in the biological, physical, economic, management and social arenas. Even though Res. Mngt. Programs draw extensively on departments such as biology and geography, it takes a relatively large number of faculty to cover all courses that fall within the domain of resource management. We think the NRCM faculty at WCU cover an impressive breadth of content, given the size of the staff. It is clear they have chosen to focus more on breadth as opposed to depth in a few areas (e.g., forestry, soils). One of the newer faculty (J. Budgen-Storie, hired in 2005) is trained in geography and remote sensing. Unlike the other faculty who serve a core traditional area in Res. Mngt. (forestry, wildlife, soil+watershed), the expertise of Ms. Budgen-Storie is at the periphery or interface between Res. Mngt. and geography.

The Program is faced with the impending retirement of Professor Kolenbrander. To maintain the current courses and breadth in the program will require a broadly trained person with depth in soils, watershed management, and general resource management. Dr. Kolenbrander also teaches in the areas of policy and planning. Finding a person with some expertise in all of these areas will be a challenge.

b. Resources and Support
This is a strongly field-based program that relies on good transportation to field sites. Good transportation and easy logistics is also essential to get students and faculty to professional meetings. The university vans currently available for use are inadequate to transport some classes to off-campus field experiences because each van is limited to 8 passengers. Larger vans or buses are needed to ensure that critical field experiences are regularly available to NRCM students. The importance of field exercises and field experience to the professional training of forestry, soils and water resource management cannot be overstated.

Tenure and Ranking Procedures
The Faculty Senate recently passed, overwhelmingly, the Boyer-Model for academic tenure and promotion. The Dean supports this but wants to see the G/NR draft document (response) before she comments further. The review team feels that the current method and priorities for judging progress toward tenure and promotion are appropriate for a program like NRCM which focuses on undergraduates seeking intimate relationships with an excellent teaching faculty and significant field and laboratory experience.

The department is to be commended on the manner in which they evaluate teaching quality and effectiveness (Appendix 4.6). The information that each faculty member must provide is comprehensive (well beyond evaluation by students and peers) and reasonable. The scope of the information is impressive and should provide a complete indication of the time invested by the faculty in
his/her teaching-related activities. The 7 dimensions by which a faculty are evaluated is an admirable effort to fully capture all the aspects that feed into ‘effective teaching.’

The assessment team does have one concern – there are no full professors despite having two faculty who have been in tenure track positions for at least 15 years. Neither of these has applied for promotion to full professor. This suggested to us that what the university (administration and/or faculty collectively) says and what it does, with regard to TRC decisions, are not the same. It appears as if neither the acquisition of outside money nor involvement in projects (that benefit the students immensely) count as equivalent to peer-reviewed publications. Thus, the faculty in NRCM are at a distinct disadvantage with regards to tenure and promotion decisions. At the very least, there is certainly the perception among some faculty that this is the reality. We urge the administration to address this issue as soon as possible to make sure that the Boyer model is indeed being applied.

c. Teaching, Research/Creative Activity and Service

All faculty are fully engaged in the undergraduate program and shoulder a rather large teaching load. In the past few years, the NRCM faculty have offered, on a more-or-less rotating basis, a liberal studies course (NRM 140). Though the motivation behind this is partially practical, it shows the breadth of the NRCM faculty as a whole and their focus on undergraduate teaching. Due to program staffing levels, the faculty also must do all academic and career advising of NRCM majors. This represents a significant investment of time, and is a dimension of ‘teaching’ that can be quite important to student success; yet, it often goes under-recognized. Based on student/alumni input, it is clear that the faculty of the NRCM program go well beyond the typical advising role. They are readily and regularly available to the students, and this is a major reason why the students can develop a full, ‘intimate’ [their word] relationship with the faculty.

All faculty members are professionally active, as shown by their participation in professional meetings, both national and regional, service to professional organizations, and project involvement. In many of these roles, the faculty involve undergraduate students. The number of students presenting at professional meetings (Appendix 4.8) is indeed impressive for the size of the student body. This involves significant input from a mentor, and is yet further evidence of the devotion of the faculty to the professional development of their students. We were struck by the enthusiasm with which faculty members discussed these aspects of their professional activity and impressed that faculty were finding and pursuing new professional problems of interest. The level of faculty success in securing extramural research funds is outstanding for some faculty, given their heavy teaching load and involvement in projects that serve the region and students. Two faculty were hired since 2005 and it is to early to assess their scholarship productivity within the framework of their appointments at WCU. The overall scholarly productivity of the faculty is commendable, though
their productivity in the form of peer-reviewed publications in the last 5 years is slightly below average; we believe this largely reflects the heavy teaching load and development of projects. It is important to note that a substantial number of the projects set up by faculty, which often involve students, are quite complex. By this we mean that a wide array of factors (e.g., social, political, economic, ecological) must be considered and evaluated as the management plan is developed. Furthermore, the implementation of the plan is typically multi-faceted, and single activities may be very technical and delicate. Management plans for resource management objectives are usually long-term endeavors; hence, the ecological and non-ecological constraints may change mid-stream. For these reasons, among others, these projects often do readily equate to scholarship as defined in the Boyer model.

IV. Analysis of Operational Facilities and Budget
   a. Adequacy of facilities
      The combination of the existing facilities and the almost completed science wing will adequately support a vibrant program, even with planned growth in the College. However, excellent facilities and equipment require a dedicated staff member to ensure that operations run efficient, safely and smoothly. This staff person would a) provide students with adequate safety training and instruction in use of equipment, b) complete regular set-up and take-down of labs, c) assemble necessary equipment for field trips and d) do routine maintenance of equipment. It is clear to the assessment team that the NRCM program needs a technician-level staff position to assist in its daily operations. In a field-based program, the lack of a technician means too much faculty time is spent on logistics.

   b. Adequacy of budget
      The travel and instructional (equipment) budgets are far too low compared with those for similar programs (accounting for FTE's and student numbers) with which the reviewers are familiar. The budget for library materials is very good. We would recommend doubling the budgets for teaching and transportation. At the very least, the addition of new facilities to Stillwell will require a greater budget. The students and faculty acknowledged a need for updates to the GIS-related equipment such as new and faster computers; current machines fail frequently.

V. Summary of Strengths and Areas of Improvement
   The greatest strengths of the program are two: the breadth of academic training provided and the dedication of the faculty. Student development is at a high level due to the breadth of opportunities and frequent, regular input from faculty.

   Curricular improvement can be made by requiring NRM 330 of all majors, making NRM a required course in the SW option, and providing a few more forestry electives for the FR option.
Assessment of student growth can be improved by elaborating more completely the goals of the program/options and by identifying current activities, or devising new ones, that provide direct and suitable modes of assessment for each goal.

VI. Summary of Recommendations

The greatest challenges the review team found were:

1. Inadequate transportation (vans) for academic trips and outings;
2. The lack of technical assistance for the faculty and students. Lack of dept. technical assistant and seeming lack of help from the University IT division;
3. Extraordinarily inadequate Dept. budget, especially for instruction and travel;
4. Falling numbers of majors relative to previous 10 years. Admissions and Public Information Office must work with faculty on producing colorful, engaging admission materials and having an appropriate recruitment strategy for the population (region) they have served historically; and
5. Finding replacement faculty with sufficient breadth to cover all courses previously taught and who also have the requisite devotion to undergraduate education and student development.

The review team recommends:

1. The program, with support from the appropriate offices, conduct a formal survey of alumni.
2. The administration examine the TRC process to insure consistency between the stated criteria and those actually applied.
3. NRCM faculty make some minor changes in the required courses.
Appendix 2.3: External Review Reports for Geology

External Review

Geology Program
Department of Geosciences and Natural Resources
College of Arts and Sciences
Western Carolina University

February 8, 2008

Reviewers

Joseph Klerlein
Department of Mathematics and Computer Science
Western Carolina University

Dallas D. Rhodes
Department of Geology and Geography
Georgia Southern University

Patricia E. Videtich
Department of Geology
Grand Valley State University
I. Introduction

a. Visit by the Review Team

The external members of the review team arrived late Thursday afternoon, February 7, and departed Saturday morning, February 9.

b. Meetings Conducted by the Review Team

Thursday evening:
- Dinner with several members of the geology faculty

Friday:
- Brief meeting with Mark Lord, Head of Geosciences and Natural Resources
- Breakfast meeting with Provost Carter
- Meeting with the geology faculty
- Meeting with Dean Ford and Associate Deans Butcher and Michelsen
- Tour of facilities conducted by Mark Lord
- Lunch meeting with students and alumni of the Geology Program
- Meeting with untenured geology faculty
- Meeting with the entire geology faculty
- Meeting with Melissa Margo, Director of Office of Assessment
- Work meeting for members of the review committee
- Dinner meeting with several members of the geology faculty
- After dinner work meeting for members of the review committee

II. Analysis of Program

The courses and requirements of the geology program are traditional. However, other geology programs at different universities commonly have more requirements, such as attendance at a summer field camp, and a year of chemistry, a year of physics, and a year of mathematics beyond college algebra and trigonometry. Clearly the WCU Geology Program has reduced the required hours relative to many other programs. This reduction in requirements may cause problems for students when applying for graduate school, but is beneficial for recruiting geology majors, student scheduling, graduation rates, and timely graduate for students.

The exceptional teacher/scholars who constitute the geology faculty are the program’s major asset. They are active researchers who are committed to the teacher-scholar model and engagement with their students. The opportunities for student research range from the required capstone course to individual faculty members encouraging students to join them on their research projects. Students remarked that they enjoyed reading research papers, doing research, and making presentations.

Class sizes, from introductory courses to courses for majors, are small, and students commented that they enjoy the small classes and the individual attention they receive.
from the faculty. The students feel that the faculty truly care about them. Due to infrequency of course offerings or inadequate advising, on some occasions students took courses without the proper prerequisite courses. But even then, students remarked that the faculty gave them extra help so that they could make it through the courses. Because most of the majors’ courses have few prerequisites and faculty are willing to help students who enroll in their courses without adequate prior coursework, students are able to graduate in a timely manner. Most of the students who graduate from the department successfully enroll in graduate school or obtain employment in the field. Overall, the program seems to be right on target with the mission and goals of the university.

III. Analysis of Faculty

a. Qualifications

The members of the Western Carolina University geology faculty are exceptionally well qualified for their positions. Unlike some regional universities, Western Carolina’s geology faculty members have diverse educational backgrounds and experiences. The institutions represented by the doctorates are geographically extensive, represent a range of sizes, and include both public and private universities. When degrees at all levels are considered, the 8 tenure-track faculty members hold degrees from 16 different institutions. At least five faculty members have professional experience outside of academia. They have worked for state and federal geological surveys, with the petroleum industry, in national government laboratories, for the military, and in private business. Members of the faculty have worked on projects throughout the country and in a number of places around the world. This range of experiences can only have a positive impact on their teaching.

b. Resources and Support

Processes and procedures for rank, tenure, and promotion decisions - The Department of Geosciences and Natural Resources Management has produced a set of guidelines and procedures for the annual evaluation of faculty, their tenure, promotion, and reappointment. Although we find these guidelines clear, the program’s untenured faculty members expressed concern about both the expectations of them and the process. These concerns appear to be linked to a recent case in which an untenured person was not reappointed. In addition, they sense a change in priorities at the institutional level and are uncertain about how these changes will be implemented. Furthermore, no tenure decision has been made in the Department during the time that any of the currently untenured professors have been on the faculty. A level of apprehension is always present for untenured faculty and the concerns expressed by the geology faculty do not appear to be particularly acute.

The two outside reviewers do observe that having two formal reviews each year seems excessive and does little to quiet the untenured faculty’s concerns. With an annual
review and a formal reappointment review every 12 months, personnel policies and practices are never far from their minds.

**Library holding and access** - The number of journal subscriptions for the discipline is minimal. Major sub-disciplines are unrepresented (e.g., sedimentology) and several major journals (e.g., the Transactions of the American Geophysical Union) are missing. The absence of such journals would be of greater concern if the geologists had a graduate program. In addition, some of the shortcomings are addressed by electronic access to journals and interlibrary loan, both of which are said to be excellent. These resources allow the faculty necessary access to current research sufficient to pursue their own scholarship.

**Access to lab space and technological and other resources** - When the newly renovated space is opened the Geology Program will have truly excellent laboratory space, far better than all but a few undergraduate programs and equal to many programs offering master’s degrees.

Control over use of the space is an issue. Apparently a number of the new laboratories can be assigned to classes outside the Department by the registrar. Geological research typically involves samples of earth materials, maps, images, and other graphical material that cannot be gathered up at the end of each day without sacrificing efficiency. Furthermore, research laboratories often contain instruments and other apparatus that should not be disturbed.

The only space deficiency noted was the lack of a room for use as an undergraduate workspace. Few undergraduate students spend the amount of time in their departments that geology students do. Whether studying mineralogy or petrology specimens or collaborating on structural geology assignments, good geology students spend many hours in their department. This is not only where they work on their projects, but also where they bond to their major, the faculty, and to each other.

The possibility of a graduate program was a topic in nearly every discussion the reviewers had with the programs faculty, students, and college and university administrators. Whether the graduate degree was in geology or included several programs under the general umbrella of environmental science, the new facilities available to the geology faculty will be one of the program’s major assets. No doubt some space would need to be reconfigured somewhat for graduate student offices and research labs, but that should not be a significant problem.

One area of the university’s operations that is seen as a problem for the faculty’s research effort is the Office of Research Administration. The general sentiment seemed to be that the ORA provides little in the way of service and frequently was more of a stumbling block. PIs report that they must recreate internally the records that should be maintained by this office in order to have accurate budget data. The external reviewers are aware of similar complaints at other institutions where research has not been historically a major part of the campus culture. Given how active the geology faculty has been in securing
external funding, they have had a greater opportunity than many faculty members to encounter problems.

c. Teaching, Research/Creative Activity, and Service

**Teaching** - The most valuable evidence of quality teaching was found in what the students and alumni had to say about their professors. Without exception, those who met with the external reviewers were pleased with their educational experiences within the Geology Program. They praised the faculty for the extraordinary amount of time they are willing to spend with students.

The close connection between faculty and students is in some part a result of the small size of most of the upper division classes. None of these classes had an average enrollment larger than 22 students in Fall 2006. Classes of this size are essential for the faculty to conduct the goal of using research projects and inquiry based learning.

The untenured faculty expressed some concern about the course load distribution. The data provided in Appendix 4.3 show, for example, that during the most recent semester reported (Fall 2006) the student credit hour production was distributed as follows:

<table>
<thead>
<tr>
<th>Faculty Type</th>
<th>SCH</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenured faculty (4)</td>
<td>304</td>
<td>19%</td>
</tr>
<tr>
<td>Untenured faculty (4)</td>
<td>731</td>
<td>46%</td>
</tr>
<tr>
<td>Not tenure track (1)</td>
<td>546</td>
<td>35%</td>
</tr>
</tbody>
</table>

These figures must, however, be considered in light of the fact that three of the four tenured professors have significant administrative assignments.

An issue for every member of the faculty is the lack of recognition for the time devoted to directing undergraduate research.

**Research/Creative Activity** - The faculty members’ professional competence is attested to by their record of publication and their ability to attract external funding to support their research programs. The eight members of the faculty have produced more than 130 peer reviewed journal articles, books, and monographs. Papers presented at professional meetings number in the 100s. Data in Appendix 4.2 documents nearly $2,000,000 in awards since 2002. A quick review of the faculty CV’s indicates that during their careers, the total amount of grant funding probably exceeds $5,000,000. Furthermore, with the single exception of the newest member of the faculty, every one has received some externally funded support for their research.

**Service** - A review of the CVs included in the appendix produced an impressive list of service activities distributed among the geology faculty. Service activity occurs at the department, college, and university levels. All members of the faculty serve as academic and research advisors for their majors. Professional service accomplishments are scattered throughout the faculty.
IV. Analysis of Operational Facilities and Budget.

As noted above the facilities that the program has to meet its educational mission are exceptional! On the other hand the budget is woefully low in its support of the program. By way of comparison, the budgets for the Department of Geosciences and Natural Resources at Western Carolina University, the Department of Geology and Geography at Georgia Southern University, and the Department of Geology at Grand Valley State University, all strictly undergraduate departments, are shown below.

<table>
<thead>
<tr>
<th></th>
<th>WCU</th>
<th>GSU</th>
<th>GVSU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>14 faculty*</td>
<td>13 faculty*</td>
<td>10 faculty*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 lab coordinator</td>
<td>3 staff**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 part-time adjunct</td>
<td>2 part-time adjunct</td>
</tr>
<tr>
<td>Operational</td>
<td>$15,851</td>
<td>$38,715</td>
<td>$41,804</td>
</tr>
<tr>
<td>Faculty Travel</td>
<td>4,000</td>
<td>7,800</td>
<td>9,500</td>
</tr>
<tr>
<td>Student Support</td>
<td>1,700</td>
<td>6,240</td>
<td>13,928</td>
</tr>
<tr>
<td>Equipment</td>
<td>9,000</td>
<td></td>
<td>4,500</td>
</tr>
<tr>
<td>Total</td>
<td>$21,551</td>
<td>$61,755</td>
<td>$69,732</td>
</tr>
</tbody>
</table>

* tenure track
** affiliate faculty, lab coordinator, visiting faculty

V. Summary of Program Strengths and Suggestions for Improvement

a. General Impressions of the Program

The Geology Program is an outstanding program in which the faculty have developed a teacher-scholar model with a research capstone requirement for all students. This is an excellent fit for the QEP. The faculty have developed a strategy of teaching/research that emphasizes environmental geology and surficial processes, have helped establish the recently-founded “Institute of Watershed Research and Management”, have very successfully obtained large amounts of external funding, and have a superb publication record, all in part because of this strategy. This, in turn, has allowed the faculty to work very successfully with undergraduate students involving them in meaningful research projects that result in most students presenting at professional meetings and, ultimately, obtaining employment in the field.
The success of this time-intensive, teacher-scholar model hinges on the dedicated, dynamic faculty who spend countless hours working with the students on investigative projects in the classroom, laboratory, and field. These efforts have paid off as evidenced not only by the success of their students and alumni, but also by the high esteem in which they hold the faculty.

b. Areas of Strength

• Excellent, energetic faculty who are very involved in investigative teaching and research with students.

• Faculty have an outstanding publication record, especially for an undergraduate program.

• Faculty have been very successful in obtaining external funding, especially for an undergraduate program.

• Faculty have an excellent rapport with students.

• Outstanding facilities, especially in terms of teaching and research laboratories, but also in terms of equipment and instruments.

• All students do research as their capstone experience and most give presentations at professional meetings.

• Students obtain in-depth training in environmental geology/hydrology.

• Engaged, successful students, most of whom attend graduate school or obtain employment in the field.

• Loyal, successful alumni.

• A strategy in which the faculty have specialized in environmental geology/surficial processes, allowing them to accomplish much of the above.

• WCU is in an excellent location for a geology program with abundant field opportunities at its doorstep.

c. Suggestions for Improvements

Recruiting More Majors - Although the faculty have made great progress in increasing their majors, they may be able to improve the numbers by trying a number of initiatives:
• Increasing the number of students in stimulating, introductory courses

• Making titles of introductory geology courses sound more exciting rather than descriptive, especially for the "Methods" course

• Consistently sending a young, dynamic" recruiter" into introductory courses

• Encouraging (via extra credit?) introductory students to attend talks given by alumni or other dynamic speakers during Earth Science Week or other appropriate times

• Using geology majors as recruiters

• Developing an AP exam and working with local earth science teachers (preferably alumni) who will funnel students to the WCU Geology Program

• Providing a small scholarship to high school students who enroll at WCU and major in geology.

Curricular Changes – Although the faculty have developed a strong curriculum, it could be strengthened in a number of ways to more closely match that of the majority of geology departments across the nation (see attached paper):

• Work to educate the administration that geology is by its very nature an encumbered major requiring many credits of mathematics and cognate sciences in order to properly prepare students for admission to graduate school and for a professional career in geology.

• Work to educate the administration in regards to typically low student/faculty ratios in elective geology courses nationwide. For example, at Grand Valley State University elective courses like geochemistry and geophysics typically have 4-5 students in them.

• Either require a year of mathematics beyond college algebra and trigonometry, a year of chemistry, and a year of physics, or more strongly and clearly recommend each for graduate-school-bound students. Although this recommendation is stated on the degree check sheets, students report that they do not understand their importance until they apply for graduate admissions.

• GIS should be emphasized as an important skill for all geology majors. GIS should be listed as a suggestive elective in the geology concentrations. The university should consider creating a formal minor in GIS, a program that would be worthwhile for students in many disciplines.

• Require a field geology course (of the kind typically taught during the summer), at least for the Solid Earth Concentration. This would not only strengthen that concentration, but it would also help differentiate it from the Environmental Hydrology Concentration. Currently there is no real difference between the two. If the field geology course is not
required for both of these concentrations, it should be more strongly and clearly
recommended for graduate-school-bound students.

• In order to help finance students to go to field camp and provide other scholarships, endured scholarship funds should be established. However, even without such funding, we note that WCU tuition is very low and that most of the students graduate with little to no debt compared to the majority of university students across the country. If the students must take out a student loan to pay for a field geology course, that is not too much to ask since it is an investment in their future.

• Require students taking courses without the proper prerequisites to do remedial study rather than take time out of courses to review materials.

• Work with registrar to assure that students are not allowed to take courses for which they do not have the appropriate prerequisites.

• Make students aware of summer research opportunities, internships, field camps, graduate school, and job opportunities using as many venues as possible (website, e-mail, postings in area where students congregate, class announcements). Repeatedly encourage them to apply.

• A graduate (master’s level) program in environmental science should be seriously considered. The geology program has the facilities and most (but certainly not all) of the faculty needed to contribute to such a program. If a M.S. degree is developed, assure that all faculty are comfortable with the decision. Consider carefully the effects of a M.S. program on the undergraduate program.

Additional Resources – The faculty have done an outstanding job obtaining external funding, but some areas of the program warrant additional resources.

• To facilitate support of the QEP, the budget needs to be increased dramatically for this department of 14 active faculty members. Increased funding for travel to professional meetings and transportation for student field trips is especially needed.

• The geology program needs a technician to care for the field equipment, instrumentation, and laboratory supplies. These are essential functions that are now performed by faculty with no reward and at a real cost to the time available for instruction and scholarship.

• Find new transportation arrangements (a bus) to permit field trips. Current restrictions on van use impose a significant burden on personnel to have enough qualified drivers for field trips.
• Work with administration to obtain funding to pay undergraduate teaching assistants to help in labs and keep specimens and equipment organized. This is excellent experience for the students and will help free up valuable faculty time for other tasks.
• Work with the administration to establish funding that provides summer stipends for undergraduate researchers.

• Provide a centrally located room where geology students can congregate; post graduate school, field camp, internship, and summer research opportunity announcements; keep their belongings such as research project materials and books; and study and work on class projects together.

• In order to better support the teacher-scholar model, provide geology majors access via key cards to the building, student work space, and necessary laboratories so that the students can do their course work and research after hours.

• IT needs improvement - faculty should receive new computers on a three-year rotation.

• Work with the administration to develop a system by which faculty receive credit or compensation for the substantial amount of time they spend advising undergraduates doing research projects, a fundamental part of the program's curriculum. Guidelines that other schools use may be obtainable from surveys made by members of the Council on Undergraduate Research (CUR).

• Especially the untenured faculty should investigate the benefits of becoming active in CUR as it can be an excellent aid for obtaining funding and other resources.

Outreach and Assessment – Although the faculty do utilized their alumni somewhat and have an assessment plan in place, these areas could be strengthened in a number of ways:

• Maintain closer contact with alumni (newsletters, picnics, conferences, e-mails, website) and make better use of them (fund raising, advisory committee, internships, guest speakers/recruiters, assessment).

• Add a Senior Survey for graduating students to the assessment plan already in place.

• Assess research capstone with before and after questions/survey on research methodology and professional goals, as well as surveys of alumni 2, 5, and 10 years out.

• Take advantage of the "Building Strong Departments in the Geosciences Program" operated by the Science and Education Resource Center at Carleton College. This program is a particularly valuable source of information about what other programs are doing with assessment issues.

VI. Summary of Recommendations

Although we listed numerous items the faculty could undertake in order to make an already strong program even stronger, we have four major recommendations:
(1) increase the number of majors, which will allow the offering of upper-level courses more frequently and remove most of the problems students now face in planning a logical path through the curriculum and still graduating in a timely manner; (2) for at least graduate-school-bound students, increase required cognate mathematics and science courses and require field camp in order to alleviate some of the students’ problems in applying to graduate schools; (3) increase funding, mostly from the administration, but also tap funding sources such as alumni to set up endowed scholarship funds; and (4) better utilize alumni for a variety of purposes and strengthen the assessment plan.
### Program Name
Natural Resource Conservation & Management

### Department
Geosciences and Natural Resources

### College
Arts & Sciences

### Department Mission Statement
The Natural Resource Conservation and Management (NRCM) program offers a BS degree with concentrations in Forest Resources and Soil and Water Conservation. We also offer an 18 credit minor. The primary goal of the NRCM program is to provide students with an interdisciplinary education focused on the conservation and sustainable use of natural resources. Our curriculum includes traditional classroom and laboratory instruction, seminars, team projects, and experiential learning opportunities designed to train students in the equipment and technical skills they will need to function in their chosen discipline. We believe in challenging our students to hone their skills in critical thinking, oral and written communication, and interacting with diverse individuals. In short, our goal is to help students become effective natural resource managers, and also to become productive members of society.

### Statement on Alignment of Program Mission w/ University and College Mission
As a regional, comprehensive university, WCU and the College of Arts and Sciences strive to educate their students and to serve the region. These goals are clearly articulated in the final report of the UNC-T commission and 20/20 strategic plan, and are implemented through programs such as the Quality Enhancement Plan and adoption of the Boyer model of scholarship both of which support experiential student learning, regional service, and stewardship of place. The NRCM program is fully aligned with the College and University’s missions of professional engagement, regional involvement, environmental stewardship, and interdisciplinary collaboration.

### Program Goals/Objectives
The overarching learning goal of our program is one where students will synthesize knowledge and skills from their academic and co-curricular experiences to become intentional participants in their own learning. Specifically, students will:

1. Identify their aptitudes, abilities, and interests and articulate their future goals, and
2. Recognize the synthesis of their university experiences and evaluate those experiences relative to their future education and career goals, and
3. Become proficient in critical thinking, problem solving, team work, and the processes required to identify, assess, and ultimately solve problems related to the conservation and management of natural resources.
### Student Learning Outcome (SLO)

What will students know or be able to do upon completion of the program?

### Curricular and/or Co-Curricular Experiences

Where will students acquire the skills and/or knowledge identified in the outcome?

### Method(s) of Assessment

How will you determine that the students know or can do what you expect? Who will be assessed, when, and how often?

### Standards of Comparison / Target Level

What is the performance standard?

<table>
<thead>
<tr>
<th>Student Learning Outcome (SLO)</th>
<th>Curricular and/or Co-Curricular Experiences</th>
<th>Method(s) of Assessment</th>
<th>Standards of Comparison / Target Level</th>
<th>Institutional SLOs*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The primary desired outcomes and abilities for students in the NRCM program include: 1. Demonstrate and utilize knowledge from core courses 2. Communicate effectively and responsibly using the scientific method 3. Integrate information comfortably from a variety of contexts 4. Solve complex problems using critical thinking 5. Practice civic engagement by way of an internship and integrated resources experience</td>
<td>The NRCM program requires students to complete 54 core program credits and 18 credits in one of two areas of concentration (forest resources or soil and water conservation) in addition to the general and liberal studies requirements. Courses are designed to provide students with both in-class and experiential learning opportunities. Our curriculum is bounded by two key experiences. The first is 3-day field trip in western North and South Carolina will be included as part of NRM 210. Students will meet with resource managers from a variety of agencies and visit project sites that represent all of our concentrations. The second is NRM-440, which serves as the capstone course for the program. The course require students to work in a group setting to develop a management plan to address natural resource concerns for a cooperating landowner or partner.</td>
<td>Students will be assessed by individual instructors regarding core learning outcomes. These will be assessed by test, exams, lab reports, and other standard class assessment techniques. In addition, faculty will observe and evaluate student performance while they are completing their capstone course project.</td>
<td>Our performance standard is for students to become proficient in skills that will allow them to become productive members of society, as well as, to identify and solve natural resource problems.</td>
</tr>
</tbody>
</table>

*Institutional Student Learning Outcomes –

**IVC**  
*Integrate information from a variety of contexts* – Students will make connections between personal interest and abilities, general education, programs of study, general electives, experiential learning opportunities, and other co-curricular activities; and relate the implications/value of these connections to “real world” scenarios.

**SCP**  
*Solve Complex Problems* – Students will identify the dimensions of complex issues or problems; analyze and evaluate multiple sources of information/data; apply knowledge and decision-making processes to new questions or issues; and reflect on the implications of their solution/decision.
Western Carolina University
Academic Program Assessment Plan

CER  Communicate effectively and responsibly – Students will convey complex information in a variety of formats and contexts; identify intended audience and communicate appropriately and respectfully.

PCE  Practice civic engagement – Students will identify their roles and responsibilities as engaged citizens by considering the public policies that affect their choices and actions; by recognizing commonalities and interdependence of diverse views/values; and by acting responsibly to positively affect public policy.

APV  Clarify and act on purpose and values – Students will examine the values that influence their own decision-making processes; take responsibility for their own learning and development in a manner consistent with academic integrity and their own goals and aspirations; intentionally use knowledge gained from learning experiences to make informed judgments about their future plans; and bring those plans into action.
## Program Name: Natural Resource Conservation & Management
### Department: Geosciences and Natural Resources
### College: Arts & Sciences
### Contact Name: Peter Bates & Phone: 227-3914

<table>
<thead>
<tr>
<th>Student Learning Outcome (SLO)</th>
<th>Method(s) of Assessment</th>
<th>Results of Assessment</th>
<th>Implementation Plan</th>
</tr>
</thead>
</table>
| What will students know or be able to do upon completion of the program? | Our methodology will be based on student performance throughout the capstone course experience. All 23 students enrolled in the course were evaluated, though our focus was on overall trends observed for this population of students. Students were evaluated throughout the semester, though more robust assessments coincided with three benchmark reports – (1) the resource condition assessment report, (2) the initial resource management recommendations report, and (3) the final written report, which included both resource assessments and management recommendations. | Areas where students were proficient:  
- Students were able to design and conduct basic resource assessments using techniques employed throughout the curriculum.  
- Students developed logical and well-reasoned resource management recommendations for addressing some of the more common resource management issues in the region.  
- The class worked as a team to complete a complex project on time.  
- The class effectively communicated results to multiple audiences in oral presentation settings. | At this point we do not identified specific program changes. We will share these results with program faculty during the coming year and identify strategies for addressing specific issues. |
| | | Areas where students were not proficient:  
- Assessment results needed to be presented more quantitatively (descriptive statistics, simple statistical analyses)  
- Assessment results should have been interpreted more completely.  
- Students had a hard time moving beyond their disciplinary silos. We would have liked to see more integration across all resources.  
- Students had a hard time considering the assigned property within the context of the larger landscape.  
- Additional concerns of a more specific nature are also noted in assessment documents. | |
| | | | |

This year we chose a holistic assessment of all of our learning outcomes, which include:

1. Demonstrate and utilize knowledge from core courses
2. Communicate effectively and responsibly using the scientific method
3. Integrate information comfortably from a variety of contexts
4. Solve complex problems using critical thinking
Department Mission Statement

Geology is a science built upon the direct observation of nature, governed by the physical laws of the universe, and advanced by techniques of inquiry unique to the discipline, as well as those rooted in other natural and physical sciences. An understanding of the processes active within the Earth and on the Earth’s surface is critical to meeting many of our societal needs: water resources, natural hazard evaluation and mitigation, waste disposal, energy and mineral resources evaluation and extraction, and environmental protection. A thorough understanding of the field of Geology and Earth history also allows us a deeper admiration for the natural beauty of the WCU area and thousands of other places to which we travel during our lives.

The mission of the Geology program is to impart a sound understanding of the forces and processes that shape the planet to our students. Understanding Earth’s composition, structure, evolution, geologic resources, and surficial processes is crucial to any understanding of our society’s environmental problems. Our geology students will leave Western with a unique, interdisciplinary perspective that should allow them to become leaders on environmental issues within their communities. Geology majors receive an education that will set them on the courses to becoming competent professional geologists, environmental scientists, or academicians. Upon graduation, our students should be prepared to enter the professional work force or graduate school.

The Geology program accomplishes this mission through its formal course offerings, which serve undergraduate geology majors, liberal studies students, and majors in associated disciplines, as well as through numerous field and laboratory experiences inside and outside the organized course structure. We strive to introduce students to the field and laboratory investigative methods used by earth scientists to address environmental and geological problems and research topics. In addition to on-campus instruction, the program provides regional and statewide service to public schools, community organizations, private and governmental agencies, and geological professional organizations. The geology faculty actively pursues research and scholarly activities. These efforts benefit instruction and service functions, enhance professional development and intellectual vigor, and enrich our understanding of the earth.

Statement on Alignment of Program Mission w/ University and College Mission

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Geology already helps the University meet 2020 goals, particularly those related to the environment, and is poised for increased contributions and leadership (Initiative 1.1.1). Our program provides knowledge and scientific reasoning skills relevant to understanding the earth and climate systems. Soil, wetland, groundwater, and water quality courses directly address the initiative. We are regional leaders in studying the human impacts on the environment with research and educational partnerships including NCDENR (groundwater/surface water availability), Waynesville (water quality), NC Geological Survey (landslides), the Haywood Schools (science education), and the U.S. Forest Service (regional climate history).

**Program Goals/Objectives** (several brief statements of the core skills and/or knowledge that students will have upon completion of the program)

Our higher-level learning goal is for students to be able to use the knowledge and skills they have developed through course requirements and apply them towards understanding complex geologic problems as well as to develop a deeper understanding of the foundational goals. This goal encompasses four intended learning outcomes:

1. Students have effective written, oral, and graphic communication skills in general and within geology.

2. Students are able to carry out geological research, including problem definition, study design, analytical procedures, analysis of results, and communication of results.

3. Students have broad understanding of geological knowledge and supporting field, laboratory, and computer skills.

4. Students have the confidence to solve problems independently in the field and in the lab.

<table>
<thead>
<tr>
<th>Student Learning Outcome (SLO)</th>
<th>Curricular and/or Co-Curricular Experiences</th>
<th>Method(s) of Assessment</th>
<th>Standards of Comparison / Target Level</th>
<th>Institutional SLOs*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Students have effective written, oral, and graphic communication skills in</td>
<td>The high-level SLOs, as well as more specific learning encapsulated by the general outcomes,</td>
<td>Objectives are tested through participation in the Group or Individual Capstone Project (Geology)</td>
<td>Objective 1 is tested through a formal research presentation to the department. The entire</td>
<td>IVC SCP CER PCE APV</td>
</tr>
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<td>yes yes yes sometimes yes</td>
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Western Carolina University  
Academic Program Assessment Plan

<table>
<thead>
<tr>
<th>Objective</th>
<th>Description</th>
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<td>2.</td>
<td>Students are able to carry out geological research, including problem definition, study design, analytical procedures, analysis of results, and communication of results. Students gain experience relevant to all learning goals in the introductory course to the major, Geol 150. By curricular design, each geology graduate will have experiences targeted to the individual SLOs from 3 to 10 times. The geology research capstone is designed explicitly to support the major SLOs. 495 or Geology 499). The research experiences permit assessment communication, problem solving, geological expertise, and student ability/confidence to address new problems in the geosciences. Faculty and an audience of peers attend. The written communication option is evaluated by writing a scientific report, either individually or a group. The product is evaluated by the instructor/mentor and a second reader to assure quality. Objective 2 is satisfied by completing a thesis. Each individual or group must complete a research project. The capstone instructor makes sure that all students complete this requirement. The second reader and department can also intervene if the project has not met all requirements. Objective 3 is also assessed by the instructor of record and is a necessary step to 1-2. Objective 4 is assessed largely by the capstone instructors/mentors by observations, peer...</td>
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assessments, and student reflections.

In addition to capstone experience, we assess the success recent graduates to achieve their immediate career objective, most commonly graduate school or employment in the geosciences. This is completed on a multi-year cycle.

*Institutional Student Learning Outcomes –

**IVC**  *Integrate information from a variety of contexts* – Students will make connections between personal interest and abilities, general education, programs of study, general electives, experiential learning opportunities, and other co-curricular activities; and relate the implications/value of these connections to “real world” scenarios.

**SCP**  *Solve Complex Problems* – Students will identify the dimensions of complex issues or problems; analyze and evaluate multiple sources of information/data; apply knowledge and decision-making processes to new questions or issues; and reflect on the implications of their solution/decision.

**CER**  *Communicate effectively and responsibly* – Students will convey complex information in a variety of formats and contexts; identify intended audience and communicate appropriately and respectfully.

**PCE**  *Practice civic engagement* – Students will identify their roles and responsibilities as engaged citizens by considering the public policies that affect their choices and actions; by recognizing commonalities and interdependence of diverse views/values; and by acting responsibly to positively affect public policy.

**APV**  *Clarify and act on purpose and values* – Students will examine the values that influence their own decision-making processes; take responsibility for their own learning and development in a manner consistent with academic integrity and their own goals and aspirations; intentionally use knowledge gained from learning experiences to make informed judgments about their future plans; and bring those plans into action.
<table>
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<tr>
<th>Student Learning Outcome (SLO)</th>
<th>Method(s) of Assessment</th>
<th>Results of Assessment</th>
<th>Implementation Plan</th>
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<tr>
<td><strong>What will students know or be able to do upon completion of the program?</strong></td>
<td><strong>Objectives are tested through participation in the Group or Individual Capstone Project (Geology 495 or Geology 499). The research experiences permit assessment communication, problem solving, geological expertise, and student ability/confidence to address new problems in the geosciences.</strong></td>
<td><strong>During 2014-15, 7 geology students attempted the senior research capstone. Four students did individual theses and 3 students a group capstone. One of the graduates will be in graduate school next year and two more plan to apply for the following year. The others planned to join the workforce. Capstone-based assessment of goals:</strong></td>
<td><strong>It would be valuable to for the program to revisit the SLOs to assure that the student experience includes the necessary skills, experiences, and content for them to be successful upon graduation. Likewise, as all current faculty have taught their courses at least once, it would be important to ‘remap’ SLOs to course activities, experiences, and content. Similarly, this would enable us to assess whether course goals are consistent/support program and university goals.</strong></td>
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<td>Our higher-level learning goal is for students to be able to use the knowledge and skills they have developed through course requirements and apply them towards understanding complex geologic problems as well as to develop a deeper understanding of the foundational goals. This goal encompasses four intended learning outcomes:</td>
<td></td>
<td>Six of the students met or exceeded all expectations in oral, written, and graphic communication, carried out geologic research (analytical ability, grapple with complex ideas, time management), and demonstrated a broad understanding of geology and geologic skills (for personal reasons, one student was not able to complete the requirement). The three students in the research seminar did have difficulty grappling with a large,</td>
<td>A recent NSF sponsored summit on Geoscience education put out a white paper suggesting the broad directions and experiences that should be in all geoscience programs. This could provide good context for our evaluation.</td>
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<td>1. Students have effective written, oral, and graphic communication skills in general and within geology.</td>
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<tr>
<td>2. Students are able to carry out geological</td>
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<td>Research, including problem definition, study design, analytical procedures, analysis of results, and communication of results.</td>
<td>Diverse data set. Increase experience with how to set up spreadsheets and analysis of such data sets would have been valuable. In addition to an oral presentation of their research at the Geology Research Seminar, all students completed a presentation of their research at a professional geology conference (national and/or sectional Geological Society of America). Students demonstrated a sophisticated understanding of geoscientific knowledge and the ability to effectively communicate their ideas. Senior seminar students, as is common in the past, have a more diverse research experiences than students who complete senior theses. Also, senior thesis students tend to have a greater depth of knowledge in their research, likely reflecting the topic being narrower.</td>
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I. Overview
The purpose of this document is to describe the policies, procedures, and criteria for faculty performance evaluation in the Department of Geosciences and Natural Resources. The document is guided at the highest level by *The Code* of the UNC system and by the Faculty Handbook of Western Carolina University. We recognize that faculty vary in their teaching, scholarly, and service activities, and that there is not a single model that defines success. We feel it is important to provide faculty with guidelines to help them and the University assess their productivity; however determination of whether faculty are meeting expectations in our department is not solely gauged by the sum of selected accomplishments. Instead, faculty evaluation at all levels is best assessed through consideration of the cumulative past record, and evidence for continued growth.

The central mission of the GNR faculty is to provide high quality education to students. We seek to actively engage students in learning using a teacher-scholar model that develops critical thinking, effective communication, and disciplinary-specific knowledge. A teacher-scholar model is one that integrates teaching with scholarship in a manner that best serves the mission of the Department. Fundamental to student engagement are enrichment experiences outside of the classroom involving hands-on learning, scholarship, or service. We recognize that scholarship, teaching, and service are often intertwined, and that all are important in preparing students to excel in their chosen careers and to contribute to societal issues.

This document describes the evaluation of all faculty with an appointment in the GNR Department, with some exceptions. These exceptions are only for faculty with a special or joint appointment, whose evaluation process is described in other documents that are also approved by the Department, Dean, and Provost.

II. Domains of Evaluation
A. Teaching (Faculty Handbook Section 4.04 & 4.05)
   1. Teaching effectiveness is evaluated according to the following 3 dimensions:
      a. **Pedagogical Content Knowledge**---Effective teachers remain current in their fields, know how students learn, and recognize what prior information, including misconceptions, students bring to their courses. Most important, they know how to combine these three kinds of knowledge to create teaching acts that lead to student learning. Shulman (1987) has called this combination “pedagogical content knowledge” to distinguish it from content knowledge alone or pedagogy alone. Using their pedagogical content knowledge, scholars restructure their expertise in forms that are understandable and useable by their students.
An instructor’s pedagogical content knowledge is reflected in the teaching acts that represent a discipline’s central concepts, skills and recent advances through a variety of means, including classroom explanations, assignments, and other course requirements. Teachers become more effective as they repeatedly engage in these teaching acts and find out what is easiest and most difficult for their students and modify their teaching accordingly.

b. Professional Aspects of Teaching--- Effective teaching relies upon the ability to perform well the required administrative and professional functions associated with instruction. While good teaching relies upon disciplinary expertise – and different disciplines often approach teaching differently – teaching is also a profession that requires common duties regardless of area. Such functions include, for example, providing appropriate and timely feedback to students, providing clear instructions, providing regular information regarding progress, responding appropriately and in a timely manner to students, making materials available, holding classes and making suitable use of class time. Highly effective teaching is more than class management; it is class management that relies upon an instructor’s ability to perform the duties associated with the job.

c. Student Response to Instruction---Students have a unique and important perspective on certain components of teaching effectiveness. They value intellectual engagement, enthusiasm, and passion for course content. Course organization and clarity, two aspects that relate to student success, are validly rated by students. Effective teachers are available to the students. The extent to which the student feels respected and shares a sense of rapport with the instructor correlates with teaching effectiveness.

2. Methods of evaluation and sources of evidence
   a) Self-evaluation of teaching, addressing the 3 dimensions of effective teaching, especially pedagogical content knowledge. (4.05A)
   b) Peer review of teaching materials --including syllabi, examinations, study guides, handouts, assignments, etc. (4.05B2b)
   c) Direct observation of instruction using the departmental protocol. (4.3.1.1)
   d) Student assessment of instruction, using a form of the university-wide SAI instrument--required of all sections of all courses taught by untenured faculty. (4.05A)

3. General comments –
In order to “meet expectations” in the area of teaching, the faculty member must recognize that knowledge of the natural and technological worlds and of how students learn, is changing and expanding rapidly. To achieve the teaching mission and aspirations of WCU, and the strategic goals of the GNR department, the GNR faculty have expectations of how and what we teach. We
expect that in addition to satisfactorily meeting University definitions of load and the three dimensions of teaching, faculty must prepare students to contribute to society, be able to understand science, and be able to communicate in this changing world. To achieve these goals, we expect the cumulative record of individuals will reflect that:

- Their courses promote critical thinking in addition to content knowledge
- They provide learning experiences for our students that include opportunities outside of the classroom such as fieldwork, research, applied training, and service
- They teach a variety of courses as needed by the program that may include lower and upper level majors courses, liberal studies courses and graduate level courses
- They will engage in activities to promote ongoing innovation and improvement in their ability to meet the above goals

**Evaluation of Pedagogical Content Knowledge**

Faculty members should be able to evaluate the current state of their pedagogical content knowledge for a particular course by responding to the questions: “What am I doing to help my students understand the most important material in my field?”; and “How have I changed my teaching practices to help students understand the central concepts, skills and advancements for the courses I teach?”.

Peer evaluators should be able to see evidence of pedagogical content knowledge in the portfolios of materials faculty members submit, including their syllabi, assignments, exams, classroom exercises, and self evaluations. Peer observation reports may include categories that reflect how instructors have used pedagogical content knowledge in the design of their instruction.

- Statement (by faculty member) discussing how instruction has changed or developed in relation to his/her discipline.
- Peer evaluation of the extent to which a faculty member’s pedagogy is appropriate to the discipline

**Evaluation of Professional Aspects of Teaching**

These workaday aspects of teaching are separate from, but related to, both academic expertise and student perception of learning, and they may be assessed by peers and students. Direct observation by peers of instruction, as well as peer review and evaluation of materials, can provide evaluation of a faculty member’s organizational and administrative performance in their classes. Student feedback (on SAIs for example) may reflect performance in this area.

- Feedback from direct observation of teaching
- Peer review of teaching materials by the AFE Peer Review Committee
- SAI responses on relevant items, such as:
  - My instructor is well prepared for class meetings or
Feedback from the instructor clearly indicates my standing in this course.

**Evaluation of Student Response to Instruction**

- Feedback from direct observation of teaching. Evaluation by peers of teaching materials
- SAI responses.

  **a) Professional Development**
  Documentation of professional development to enhance teaching includes activities such as participation in pedagogy related conferences, workshops, opportunities, and courses, as well as observing of other faculty teaching, especially within the GNR Department.

**B. Scholarship and Creative Works (4.05C)**

1. WCU recognizes as legitimate forms of scholarly activity the 4 types described by Boyer. Specific departmental perspectives on these categories, relative valuations of various forms of scholarly activity, and department-specific examples of each, are described below.
   - a) Scholarship of discovery – Original research that advances knowledge. Also includes creative activities such as artistic products, performances, musical, or literary works.
   - b) Scholarship of integration – Synthesis of information across disciplines, across topics, or across time.
   - c) Scholarship of application – Application of disciplinary expertise with results that can be shared with and/or evaluated by peers.
   - d) Scholarship of teaching and learning – Systematic study of teaching and learning processes.

2. Methods of evaluation and sources of evidence—including acceptable processes for peer review –

To meet expectations in the area of scholarship, the faculty member must show productivity in the scholarship of discovery prior to obtaining tenure. Scholarship of application, integration, and teaching and learning are also recognized and valued by the GNR Department. However, productivity in these other areas must not be the sole source of scholarship for the granting of tenure.

All scholarship must be peer reviewed. We define peer review as the evaluation of scholarly work by people external to Western Carolina University with knowledge and expertise in the discipline in order to determine the quality of the work; and where the results of that assessment are made known to the faculty member and others, as appropriate for the work being evaluated. Scholarly work also must be disseminated to a broad audience so that knowledge is advanced.

Traditional examples of scholarly products include peer-reviewed publications and funded, competitive, peer-reviewed grants. Non-traditional scholarly products, on topics ranging from pedagogical research to unique applications of the discipline to leading professional field trips, will also be considered scholarship provided they meet our definition of peer review. When
there is no traditional peer review process, the faculty member must document how the work will advance the discipline, how the work has been reviewed, and how it will be disseminated.

Scholarly Activity---The GNR Department also values and expects productive scholarly activity from faculty members in addition to the scholarly products described above that have gone through a more rigorous peer review process. Typical examples of such activities include conference presentations, research involving students, and organizing or leading professional field trips.

3. General comments –

We expect our faculty to be active scholars to maintain currency in their field, to help advance their discipline, to improve as educators, and to provide opportunities for students. Scholarship is expected of all permanent faculty in the GNR Department, though the type, amount, and role of scholarship may vary between faculty members due to expertise, interests, needs of the Department and University, and stage of career. We value scholarship that advances understanding of a discipline, as well as, scholarship that advances teaching.

a) Grant proposals and awards –(see Section B2 above)

b) Professional development –

Professional development is important for faculty to grow as productive scholars, effective educators, and good ambassadors to Western and their disciplines. There are a myriad of activities that can contribute to professional development; some typical examples are listed below.

- Participation in activities such as grant writing workshops and short courses that demonstrate that develop research, teaching, or service skills.
- Collaborative arrangements or partnerships with colleagues at other institutions or agencies.
- Development and conducting research, writing and submitting grant proposals.
- Organizing or leading field trips for professionals, which is a standard practice for dissemination of knowledge in field-based disciplines common in the GNR Department. Typically, these field trips are conducted in collaboration with professional organizations, such as, the Geological Society of America, Carolina Geological Society, Society of American Foresters, or Ecological Society of America.
- Leading, and/or participating in discipline-related professional organizations or outreach activities to the general or educational community.

C. Service (4.04C3 & 4.05D)

1. Types of service

   a) Institutional service –

The following items will be considered:

a. Membership and offices held in Department, College, or University Committees
b. Administrative duties

c. Special assignments in Department, College, or University

d. Other information a faculty member wishes to submit

b) **Community engagement** –

The following items will be considered:

a. Community outreach related to the discipline
b. Workshops related to the discipline
c. Presentations to non-professional organizations
d. Off-campus instruction and regional service
e. Other information a faculty member wishes to submit

c) **Special expertise, unusual time commitments, or exceptional leadership** –

a. Offices held in professional organizations
b. Peer review of grants, manuscripts, and programs
c. Other information a faculty member wishes to submit

d) **Advising** –

The following items will be considered:

a. Number of advisees
b. Availability to students
c. Quality of academic advising and counseling
d. Faculty advisement to student organizations
e. Other information a faculty member wishes to submit

2. **Methods of evaluation and sources of evidence** –

The faculty member’s listing of service and engagement activities will be examined and evaluated with regard to time and energy requirements, level of expertise involved, and other indicators of effort, quantity, or quality that the faculty member wishes to include in their file.

3. **General comments** –

Faculty members must show meaningful participation in program and departmental activities. This participation is required of all faculty; especially where the faculty member can make substantive contributions (e.g. curriculum, advising, etc.). It is expected that prior to the granting of tenure and promotion to Associate Professor that faculty will have engaged in service beyond the department. The promotion from Associate to Full Professor should reflect a further broadening of the faculty member’s service contribution, and should reflect clear evidence of a superior performance in service. Such evidence would include the evolution of the faculty member from a participant to a leader in service activities.

a) **Professional development** –
Professional development for service may be enhanced by participation in activities that improve leadership, advising, or engagement skills (e.g., workshops, conferences, training sessions, formal courses).

III. Specific Procedures for Review Events
   A. Annual Faculty Evaluation (4.05)
      1. Overview –
      The AFE Peer Review Committee will assess individuals in light of the central mission of the GNR faculty, which is to provide high quality education to students. We seek to actively engage students in learning using a teacher-scholar model that develops critical thinking, effective communication, and disciplinary-specific knowledge. A teacher-scholar model is one that integrates teaching with scholarship in a manner that best serves the mission of the Department. Fundamental to student engagement are enrichment experiences outside of the classroom involving hands-on learning, scholarship, or service. We recognize that scholarship, teaching, and service are often intertwined, and that all are important in preparing students to excel in their chosen careers and to contribute to societal issues. Faculty will be evaluated on their
      - Effectiveness to educate students using the teacher-scholar (or similar) model
      - Contributions to scholarship in their disciplines
      - Engagement in university and external service

      The AFE Peer Review Committee will evaluate and write a report for all faculty members covered by this document, and that report will initially be given to the Department Head. The Department Head will then write a separate report for all faculty members covered by this document. The evaluation reports written by both the AFE Peer Review Committee and the Department Head will be given to each faculty member before the end of spring semester.

Consultation with the faculty member about the AFE results
- The faculty member has one week to study and respond to the Committee and Department Head reports. The Department Head will offer to consult with each member of the faculty to review his/her evaluation and discuss ways to improve performance. The faculty member must sign the reports to indicate receipt, but has the right to add a written statement of acceptance, clarification, or rebuttal to be included with the Department Head’s report. The Head shall, following the meeting with the individual and receipt of any additional written statement from the faculty member, reconsider his/her report and either change, amend, or forward it as previously written.

- In the case of the AFE Peer Review Committee report on the Department Head, the Chair of the Committee will submit the evaluation to the Head for review. The Chair will subsequently meet with the Head to discuss the Committee evaluation.

A summary of the year's departmental AFE results from the Department Head, the AFE Peer Review Committee, and any written statements by the faculty member shall be prepared and submitted to the Dean by the deadline established by the Dean.
2. Composition of review committee –

a. The AFE peer review committee will be composed of four (4) tenured persons who are also members of the GNR TPR committee plus one (1) untenured person. When possible, the committee will include at least one tenured person from each of the degree granting programs.

b. If four (4) tenured persons from the GNR department are not available, the committee membership will be reduced to three (3) tenured persons from the GNR TPR committee.

c. The untenured person must be in a tenure-track position and must have completed at least two years of full-time employment in the GNR Department. The untenured member shall not be either the committee chair or secretary. If no untenured person is eligible, then the committee will consist of only the tenured persons.

d. The Department Head shall not be a member or an observer of this committee.

e. The committee shall be appointed by the Department Head in consultation with the faculty.

f. The length of service for tenured faculty is three years with staggered appointments. A tenured faculty member may be appointed for successive terms. The length of service for untenured faculty is one year.

g. Members of the committee will be excused while their files are being reviewed.

h. The expectation is that all faculty in permanent positions within the Department shall serve on this committee on a rotating basis.

3. Procedures and preparation of documentation

a. All full-time faculty members must prepare an AFE document that includes (1) a self-statement, not to exceed 3 pages, that summarizes and evaluates their performance in the areas of teaching (including assessment of the 3 dimensions), scholarship, and service, (2) the completed GNR Annual Report of Faculty Activities table distributed by the Department Head each fall semester, and (3) the following materials:

1) Teaching

a) as part of the self-statement described in 3a (above), a self-evaluation addressing the 3 dimensions of teaching, especially pedagogical content knowledge (as outlined in Section II.A.1. above), a statement of teaching philosophy, a description of goals, methods, and strategies used; and selected teaching materials for courses taught during the period of review. Selected teaching materials should include, but are not limited to syllabi, the final exam, and 1 or 2 selected examples of materials that exemplify the course learning environment.

b) direct observation of classroom teaching (if required)

Arrange to have a tenured member of the Department observe and write an evaluative report at least one class per year (one class per semester for full time lecturers in their first year of employment).
c) Student Assessment of Instruction

2) Scholarship and Creative Activity –
Criteria for evaluating scholarship are described under Section II B of this document (Domains of Evaluation). These products and activities will be summarized in the GNR Annual Report of Faculty Activities table distributed by the Department Head each fall semester.

3) Service –
Criteria for evaluating service are described under Section II C of this document (Domains of Evaluation). These products and activities will be summarized in the GNR Annual Report of Faculty Activities.

b. Specific guidelines for preparation of the AFE document -
a. Faculty will compile their AFE materials in a single, 3-ring binder, and submit those materials to the Department Head for review by the AFE Peer Review Committee. The deadline for submission will be in the middle of February, on a date that will be specified by the department head.
b. The materials to be submitted will include the information described above plus the previous year’s AFE statements from both the Department Head and the AFE Peer Review Committee.
c. The Committee will examine the current year’s AFE document plus the previous year’s AFE statements to provide a time frame to better assess faculty contributions to the University, especially in the area of scholarship and service where productivity and activity are likely to be variable.
d. The Committee will review the AFE materials and make comments regarding teaching, scholarship, and service. A single written statement will be prepared by the committee and forwarded to the Department Head. The letter will be signed by the tenured Chairperson of the Committee.
e. The Department Head will use both the information provided in the faculty member’s AFE document plus the AFE Peer Review Committee’s statement in preparing his/her letter.
f. After a faculty member has completed 3 years towards tenure, the Department Head’s statement will include a cumulative assessment of the faculty member’s progress toward tenure in teaching, scholarship, and service. This will be continued in subsequent years until the faculty member has achieved tenure.

c. Evaluation of part-time/non tenure-track faculty (4.05 F) -

1) Procedures for Lecturers and Instructors.
a) Materials for Annual Review:
Lecturers and Instructors are to submit a file folder that includes the materials in the following list to the Department Head no later than March 1st of each year. The quality and effectiveness of teaching, and any service responsibilities, will be evaluated based on the following materials. The philosophy and self-evaluation statements should not exceed three pages in length.
a. A self-statement, not to exceed three pages, that summarizes and evaluates their teaching philosophy, performance, and three dimensions of teaching, especially pedagogical content knowledge, over the review period. Instructors should also include a summary and self-evaluation of their service responsibilities as part of their three pages.
b. Student evaluations of teaching for all course sections over review period.
c. Reports from peer observers of teaching (a minimum of one per calendar year)
d. Course materials to include examples of syllabi, classroom activities, creative use of technology in teaching, etc.
e. Instructors Only: Annual Report of Service Activities Table. This table should document service consistent with the expectations of instructor position responsibilities.
f. A current CV
g. Other: e.g., workshops on teaching and learning, presentations/papers related to teaching, etc.

b) Classroom Visits:

Lecturers in their first year of employment should have a classroom observation at least once per semester while those in their 2nd year or later should be observed at least once per academic year. Classroom observations must be conducted by a tenured faculty member in the department who will write an evaluative report that includes a review of course materials. The written report must be submitted to the Department Head. Any concerns will be addressed to the Lecturer/Instructor in a timely manner, as feasible, to provide time to correct problems appropriately.

c) Annual Evaluation:

Lecturers and Instructors will be evaluated by the AFE committee established annually by the department as outlined in Section III, A., 2. A meeting with the Department Head will be offered and shall follow the procedure outlined in Section III, A., 1. Criteria for this review are the following: (1) Clarity of syllabus, assignments, philosophy, and self-assessment; and (2) evidence of coherence with the curriculum; and (3) for instructors, quality of service contributions. The Department Head will consider the evaluation of the AFE committee in his/her review of the AFE file.

2) Procedures for part-time instructors

a) The materials for review include four items. The sum of these materials must address the three dimensions of teaching.
(1) Submit copies of syllabi, final exams, and selected examples of materials that exemplify the course learning environment to the department's office assistant each term for each different course taught. These are kept on file.

(2) Arrange to have a tenured member of the Department observe and write an evaluative report of at least one class per academic year. When possible, this observation should be completed by a faculty member within the Department who is not the Department Head. The written report must be submitted to the Department Head.

(3) Submit to the Department Head a brief (one page) teaching self-report to include statements on teaching philosophy, a description of how the philosophy is reflected in their courses, and an assessment of teaching effectiveness, especially pedagogical content knowledge.

(4) Participate in the departmental student evaluation survey in each course section.

b) Process of Evaluation
For individuals hired for a semester, the above materials must be submitted by the last day of classes for the teaching assignment. For those hired to teach both terms for the academic year, this AFE procedure must be completed April 1st. It is the instructor’s responsibility to be sure the steps outlined above are completed by the deadlines.

Each part time faculty member will receive a written AFE from the Department Head. The student evaluations, the teaching observation letter, and the Department Head’s evaluation will be presented to each Faculty member (in writing). If desired or necessary, the Department Head will meet with each Faculty member individually to review the documents, and both will sign to verify the meeting.

B. Reappointment, Tenure, and Promotion (4.06 & 4.07)
1. Overview —
The Office of the Provost will generate an annual list of faculty eligible for reappointment, tenure, and promotion.

2. Composition of review committee (4.07D1) —
The Department, College, and University review committees shall be composed in the manner specified by the Faculty Handbook.

3. Procedures and preparation of documentation — The candidate list for each college is prepared by the Office of the Provost and distributed to the deans for review. The list is finalized by the Office of the Provost in conjunction with the Dean’s office. Detailed instructions for preparing the dossier are issued annually from the Office of the Provost including the
TPR schedule for when documents are due and decisions are made at the various review levels.

C. Post-Tenure Review (4.08)
   1. Overview –
The Geosciences and Natural Resources Department will conduct a post-tenure review (PTR) on all tenured faculty covered by this document. Each faculty member shall be evaluated by the same criteria and by the same processes. The purpose of the evaluation “is to support continuing faculty development, to promote faculty vitality, and to encourage excellence among tenured faculty.” The review will be consistent with the Western Carolina University Post Tenure Review Policies and Procedures: these criteria, guidelines and procedures are supplementary to that document. The criteria by which a faculty member will be evaluated are outlined in section II of this document. These criteria include quality and effectiveness of teaching, research and scholarly activities, and service.

Criteria for acceptable faculty performance include professional competence; conscientious discharge of duties, taking into account distribution of workload as developed by the department head; and efforts to improve performance. Exemplary faculty performance, as determined by the department, involves sustained excellence in teaching, scholarly achievement, and service.

2. Composition of review committee –
The Department Head assigns three tenured faculty, excluding her/himself, to the PTR review team, who then conduct the review and write the report. If three tenured colleagues are unavailable for the review the Department Head, in consultation with the Dean and faculty member being reviewed, will select tenured faculty from similar departments to make up the remaining positions of the committee.

3. Procedures and preparation of documentation-
a. Faculty members affected by this policy include all tenured faculty covered by this document in the Geology and Natural Resources department. Formal PTR reviews must occur no later than the fifth year following the awarding of tenure and/or promotion and a PTR review must occur at least once every five years.

b. Faculty on leave will not have that leave period count as part of the five years between review events; faculty temporarily assigned away from Cullowhee or Asheville at the time a review is scheduled will be reviewed the next academic year they resume responsibilities in the area.

c. PTR reviews are based on the work completed over the previous four years and include: (a) the four most recent AFE evaluations and supporting materials, (b) a current vitae, and (c) a brief self-statement.

d. Peer reviewers will present a copy of their evaluation to the Department Head. Peer reviews are to be completed in accord with a calendar established by the University and Department Head.
Responsibility of Each Tenured Faculty Member
a. Each tenured faculty member is responsible for maintaining documents that support their activities for the previous four years. The items to be included are those presented for the Annual Faculty Evaluation process.

b. Each tenured faculty member is responsible for including the previous four Annual Faculty Evaluation summary statements. They must also include a self-statement, not to exceed three pages, that summarizes and evaluates their performance in the areas of teaching, research, and service over the review period.

Responsibility of the Department Head
a. The Department Head establishes and circulates the timetable for the PTR and defines when written reports are due in accordance with university guidelines. Faculty under consideration for PTR will be given at least one month to prepare their documents.

b. The Department Head meets with the subject(s) of PTR reviews to discuss the written report.

c. The Department Head appends an evaluation to that written report relative to the mission of the university, college and department, to which the PTR review subject has the option of attaching a written response.

d. In the case of an unsatisfactory review, the department head will, in consultation with the faculty member, the PTR review committee, and the College Dean, develop a three (3) year plan for improvement. That plan will be done within one (1) month of the PTR review. That plan will include (a) specific areas of improvement; (b) resources available for that improvement; and (c) administrative support provided. The plan will also include consequences for failure to make adequate progress by the third year.

c. The Department Head will, in conjunction with the PTR review team, monitor the progress of that plan and provide oral and written assessments of that progress to the faculty member every six (6) months.

Responsibility of the Review Team
a. The Review Team will, in accord with the schedule established, review the materials provided by the PTR candidates.

b. The Review Team will, in accord with the schedule established, provide the Department Head with a written statement of their findings.

c. The Review Team will collaborate with the Department Head, in the event of an unsatisfactory review, on the development of an improvement plan and the semi-annual monitoring of that plan.

Due Process
a. Disciplinary actions for noncompliance with the improvement plan are limited to those established in Chapter VI of The Code.
b. Due process and right of appeal are specified in *The Code* and in the “Tenure Policies and Regulations of Western Carolina University” in the *Faculty Handbook* and are guaranteed.

Criteria for Annual Faculty Evaluation, Reappointment, Tenure, Promotion, and Post Tenure Review

IV. The criteria for meeting expectations in Department of Geosciences and Natural Resources

A. Annual Faculty Evaluation (4.05)

1. Teaching –
The Department requires that every faculty member be an effective teacher as demonstrated by, among other things, student evaluations, peer evaluations, and thorough peer reviews of course materials and works toward meeting Departmental learning goals defined in Section II.A.3. On any given year, the teaching by faculty should promote critical thinking in addition to content knowledge; provide learning experiences for students that, when possible, include opportunities outside of the classroom such as fieldwork, research, applied training, or service; and engage in activities to promote ongoing innovation and improvement in their instruction. In addition, faculty must also adapt and contribute to the Department’s continuous curricular improvements.

2. Scholarship –
Each faculty member must demonstrate that they are active scholars to maintain currency in their field, to help advance their discipline, to improve as educators, and to provide opportunities for students. The type, amount, and role of scholarship may vary between faculty members due to expertise, stage of a scholarly project, interests, needs of the Department and University, and stage of career. Though scholarly products may vary year by year, each year faculty must show evidence of ongoing scholarly activity and continued progress towards completion of scholarly products (as one example, publications).

3. Service –
Each faculty member must show meaningful, on-going participation in program and departmental activities, consistent with their position, experience, and background. This participation is required of all faculty; especially where the faculty member can make substantive contributions (e.g. curriculum, advising, etc.). Other forms of service, such as, service to the College, University, discipline, and region are also expected, though the type and amount will likely vary from year to year.

4. General comments –
Any given year is a snapshot into the longer career of a faculty member. While teaching should continuously meet expectations, defined elsewhere, it is understood that on an annual basis scholarly products and the level service may be variable. During each year, however, faculty should be active in scholarship and service consistent to achieving longer terms goals proper for the faculty member’s appointment and rank.
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B. Reappointment (4.06)

1. Teaching -

Teaching: To achieve the teaching mission and aspirations of WCU, and the strategic goals of the GNR department, the GNR faculty have expectations of how and what we teach. We expect that in addition to satisfactorily meeting University definitions of load and the three dimensions of teaching (as described above), faculty must prepare students to contribute to society, be able to understand science, and be able to communicate in this changing world. To achieve these goals, we expect the cumulative record of individuals will reflect that:

- Their courses promote critical thinking in addition to content knowledge
- They provide learning experiences for our students that include opportunities outside of the classroom such as fieldwork, research, applied training, and service
- They teach courses that reflect departmental needs, and these courses may include lower and upper level majors courses, liberal studies courses, and graduate level courses
- They will engage in activities to promote ongoing innovation and improvement in their ability to meet the above goals

2. Scholarship -

Scholarly Activity: Faculty must show evidence of ongoing scholarly activity and continued promise toward achieving the level of scholarly productivity required for tenure. The scholarship of application, integration, and of teaching and learning are valued, but the scholarship of discovery must be represented in the granting of tenure.

Evidence of scholarly activity may include peer-reviewed publications; oral presentations; grants applied for and funded; dissemination of innovative teaching methods and new curriculum development; research in progress; involvement with students; unpublished research and manuscripts; organizing and leading professional field trips; lectures in the discipline presented at non-professional meetings; other indications of keeping current in the field; workshop or short course attendance; formal academic course completion; membership and participation in professional organizations. As described previously, the boundaries between teaching, scholarship, professional activity, and service are commonly blurred, as exemplified by the activities listed above. To be considered as productive scholarship, as defined in section II. B., these activities must include external peer review and dissemination of results.

3. Service -

Service/Engagement: faculty must continuously show meaningful participation in program and departmental activities, especially where the faculty member can make substantive contributions (e.g. curriculum, advising). A faculty member’s record of service beyond the department at reappointment; such as regional or professional engagement, and college or university level service, should be consistent with the faculty member’s type of appointment, length of appointment, and rank.

4. General comments -

Determination of whether faculty are meeting expectations for reappointment is not solely gauged by the sum of selected accomplishments. Instead, faculty evaluation is assessed through consideration of their cumulative past record, and evidence for continued growth. The GNR Department expects that recently-hired faculty will, in most cases, initially devote a
disproportionate amount of time to their teaching activities, and that the amount of time that they spend on scholarly activities and service will increase in subsequent years.

GNR-DRED 2nd and 4th Year Expectations

While the overall GNR teaching, scholarship and service expectations remain the same, the point on the trajectory toward tenure will differ for 2nd and 4th year faculty. The following language informs both GNR faculty and college level reviewers of expectations for teaching, scholarship and service at years 2 and 4.

Year 2 Expectations

- **TEACHING:** Expectations for teaching load consider that when possible, GNR offers a reduced course load to first year faculty. The 2nd year reappointment file should demonstrate progress towards meeting department teaching standards and student learning goals. Faculty should reflect upon their first year of teaching considering both university and departmental goals of promoting critical thinking and student experiential learning. Faculty should articulate plans for continued growth in teaching.

- **SCHOLARSHIP:** Faculty should formulate a tentative research agenda that includes enrichment opportunities for students.

- **SERVICE:** 2nd year faculty have participated only in departmental service with no college or university level service expectations during this time.

Year 4 Expectations

- **TEACHING:** The cumulative teaching record of individuals should demonstrate evidence of effectiveness and the promise of continued growth in achieving GNR teaching expectations for promoting critical thinking in students and providing learning experiences which include opportunities outside of the classroom.

- **SCHOLARSHIP:** Faculty must show evidence that their cumulative record of scholarly activity is on a trajectory to achieve the level of productivity required for tenure (DRCD Section IV-B.2.). This should include an active scholarly research agenda that provides enrichment opportunities for students.

- **SERVICE:** By year 4, faculty should demonstrate meaningful participation in service to the department and program and also show willingness to serve beyond the department level. Such service could include service to the college or university, service to the profession, and/or service to the region.
C. Tenure (4.07)

1. Teaching –
Teaching: In addition to the criteria described for reappointment, a faculty member must have demonstrated a consistent and commendable record of teaching over several years. The faculty member must have demonstrated proficiency in the range of teaching preparations he or she has been assigned. This range might include different levels (from introductory and liberal studies courses to upper level courses in the major) and class types (traditional lecture courses, independent studies, or field investigation courses).

2. Scholarship –
Scholarly Activity: For tenure, a faculty member must demonstrate evidence of 1) an on-going, established research program, 2) that has been productive, and 3) shows promise of continued productivity. Such a record is typically evidenced by publications in peer-reviewed journals, involvement of students in research activities, and the ability to obtain external funds if necessary to carry out scholarly activities. The scholarship of application, integration, and of teaching and learning are valued, but the scholarship of discovery must be represented in the granting of tenure.

Our department expects faculty to actively engage students in learning using a teacher-scholar model. This requires that faculty are active, productive scholars and that some of their scholarly activity provides students with opportunities to enrich their educational experience. It is not feasible to establish a standard publication expectation for tenure because 1) the Department encompasses a wide-range of disciplines, having collectively published in about sixty different peer reviewed journals, with research approaches ranging from computer-based to lab-based, to field-based; 2) the highly variable, and sometimes lengthy time it may take from project initiation to publication; and 3) the expectation of undergraduate student involvement in research, which requires significant time and may decrease scholarly productivity.

The typical successful case for tenure will include several peer-reviewed publications. However, the number of peer-reviewed publications is not the sole source of evidence that will be considered in granting tenure. It is the responsibility of the faculty member being considered for tenure to demonstrate that their scholarship is 1) on-going, 2) productive, and 3) has promise for continued productivity.

3. Service –
Service/Engagement: In addition to the criteria described for reappointment, a faculty member must have engaged in service beyond the department prior to the granting of tenure. This type of service should include serving on college level or university level committees and include discipline-based service to the community or society or service to the profession.

4. General comments –
Determination of whether faculty are meeting expectations for tenure is not solely gauged by the sum of selected accomplishments. Instead, faculty evaluation is assessed through consideration of the cumulative past record, and evidence for continued growth.

d. Promotion to Associate Professor (4.07)
1. Teaching –
Teaching: In addition to the criteria described for reappointment, a faculty member must have demonstrated a consistent and commendable record of teaching over several years. The faculty member must have demonstrated proficiency in the range of teaching preparations he or she has been assigned. This range might include different levels (from introductory and liberal studies courses to upper level courses in the major) and class types (traditional lecture courses, independent studies, or field investigation courses).

2. Scholarship –
Scholarly Activity: For promotion to Associate Professor, a faculty member must demonstrate evidence of 1) an on-going, established research program, 2) that has been productive, and 3) shows promise of continued productivity. Such a record is typically evidenced by publications in peer-reviewed journals, involvement of students in research activities, and the ability to obtain external funds if necessary to carry out scholarly activities. The scholarship of application, integration, and of teaching and learning are valued, but the scholarship of discovery must be represented in the granting of promotion to Associate Professor.

Our department expects faculty to actively engage students in learning using a teacher-scholar model. This requires that faculty are active, productive scholars and that some of their scholarly activity provides students with opportunities to enrich their educational experience. It is not feasible to establish a standard publication expectation for promotion to Associate Professor because 1) the Department encompasses a wide-range of disciplines, having collectively published in about sixty different peer reviewed journals, with research approaches ranging from computer-based to lab-based, to field-based; 2) the highly variable, and sometimes lengthy time it may take from project initiation to publication; and 3) the expectation of undergraduate student involvement in research, which requires significant time and may decrease scholarly productivity.

The typical successful case for promotion to Associate Professor will include several peer-reviewed publications. However, the number of peer-reviewed publications is not the sole source of evidence that will be considered in granting promotion to Associate Professor. It is the responsibility of the faculty member being considered for tenure to demonstrate that their scholarship is 1) on-going, 2) productive, and 3) has promise for continued productivity.

3. Service –
Service/Engagement: In addition to the criteria described for reappointment, a faculty member will have engaged in service beyond the department prior to promotion to associate professor. This type of service should include serving on college level or university level committees and include discipline-based service to the community or society or service to the profession.

i. General comments –
Determination of whether faculty are meeting expectations for promotion is not solely gauged by the sum of selected accomplishments. Instead, faculty evaluation is assessed through consideration of the cumulative past record, and evidence for continued growth.
e. Promotion to Full Professor (4.07)
For promotion to Full Professor, a faculty member must demonstrate a record of superior teaching, scholarship, and service.

1. Teaching
Teaching: Faculty should show continued progress on the trajectory established in earning tenure and promotion to Associate Professor, and should demonstrate leadership as a teacher. Evidence of this leadership could include publications related to pedagogy, mentoring of young faculty, or participation (as a leader) in teaching workshops or seminars.

2. Scholarship
Scholarly Activity: Faculty are expected to demonstrate that their cumulative scholarly record will have a broad and long-lasting impact on their discipline, education, and community. The record should show the faculty member has been continuously engaged in scholarship, and produced publications and artifacts indicative of continuous and cumulative work. Evidence of broad and long-lasting impact includes, but is not limited to, being recognized by professional organizations, such as invitations to speak or participate in panel discussions; authoring oft-cited work that has advanced their discipline, creating an innovative pedagogical model that has been adopted by other institutions, performing critical reviews of scholarly programs and proposals; and refereeing articles for peer-reviewed journals. The scholarship of discovery, application, integration, and teaching and learning are all valued when considering promotion from Associate Professor to Full Professor.

3. Service
Service/Engagement: Faculty should show broadening contributions to service internal and external to the University. This service should reflect clear evidence of superior performance, which would include the evolution of the faculty member from a participant to a leader in service activities. Evidence of this broader impact may include a wide range of activities, such as application of scholarship to serve regional needs, collaborative projects with government and nongovernment agencies, bringing forth new education models, etc.

4. General comments
Determination of whether faculty are meeting expectations for promotion is not solely gauged by the sum of selected accomplishments. Instead, faculty evaluation is assessed through consideration of the cumulative past record, and evidence for continued growth.

f. Post-Tenure Review (4.08)
1. Teaching
Teaching — a faculty member must have demonstrated a consistent and commendable record of teaching over several years. The faculty member must have demonstrated proficiency in the range of teaching preparations he or she has been assigned. This range might include different levels (from introductory and liberal studies courses to upper level courses in the major) and class types (traditional lecture courses, independent studies, or field investigation courses).

2. Scholarship —
Scholarly Activity: A faculty member must demonstrate continued productivity in scholarship. Scholarly productivity is defined in section II B. It is expected that the faculty member’s scholarly activities will have a broader and long-lasting impact on their discipline, education, and community.

3. Service –
Service/Engagement: A faculty member must demonstrate service contributions above the program/department level. Faculty should demonstrate service internal and external to the University. This service should reflect clear evidence of superior performance and broad impact. Evidence of this broader impact may include a wide range of activities, such as application of scholarship to serve regional needs, collaborative projects with government and nongovernment agencies, and bringing forth new education models.

4. General comments –
Determination of whether faculty are meeting expectations for post-tenure review is not solely gauged by the sum of selected accomplishments. Instead, faculty evaluation is assessed through consideration of the cumulative past record, and evidence for continued growth. The Department recognizes that a faculty member cannot perform equally well in all areas each year, but each individual must make an effort to make a contribution across the board over time. Furthermore, the Department recognizes that faculty members who have been at WCU for lengthy careers have much to offer given their experience and knowledge of institutional history. In consultation with the Department Head, these faculty may choose to engage in significantly increased levels of service, such as, serving on major WCU or UNC committees or establishing and facilitating important professional contacts. The Department fully values this level of service. Faculty failing to meet Departmental standards for any category must develop, in conjunction and with the approval of the Department Head, an action plan to address the specified deficiencies. Progress on the action plan will be assessed in the next Annual Faculty Evaluation.

Approved by:

[Signatures]

13 Oct. 2014
Date

[Signatures]

7 Oct. 2014
Date

[Signatures]

2/27/15
Date
We attempted to assess the effectiveness of our NRM-210 class field trip in increasing our students’ understanding of the discipline and potential career opportunities. The section of our QEP Plan that describes this activity is presented below.

All freshman or sophomores in the NRCM program take NRM 210 - Methods in Natural Resource Management. Students participate in a 3-day field trip and tour in western North and South Carolina. During this field trip, students camp at national forest campgrounds and meet with resource managers from a variety of agencies. Students will tour resource conservation and management projects on both public and private lands, and have opportunities to see the application of skills from our discipline. Some of the key goals of the field trip are to introduce students to a wide range of career and professional opportunities, as well as, building a sense of camaraderie early in the academic careers of the NRCM majors.

QEP Learning Goals and Outcomes:

a) Increase student understanding of the discipline and the potential careers of incoming students to the NRCM program

We developed a brief survey that participating students completed both before and after the field trip. The survey address students’ understanding of the NRCM discipline, knowledge of career opportunities, and certainty of career path on a scale from 1 to 4 (1=low and 4=high). The post-trip survey asked students to assess the value of the field trip. We believe our methods and capture points were effective. We had nearly 100% participation in the survey. It appears that our goals for the field trip are largely being met (Table 1). The field trip significantly increased students understanding of the discipline (p < 0.001) and their knowledge of career opportunities (p ≤ 0.001). However the field trip did not seem to significantly increase students’ certainty in identifying a career path (p = 0.336).

<table>
<thead>
<tr>
<th>Category</th>
<th>Pre-trip</th>
<th>Post-trip</th>
<th>Value of trip</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean</td>
<td>sd</td>
<td>mean</td>
</tr>
<tr>
<td>Understanding of discipline</td>
<td>2.88</td>
<td>0.62</td>
<td>3.32</td>
</tr>
<tr>
<td>Knowledge of career opportunities</td>
<td>2.62</td>
<td>0.83</td>
<td>3.32</td>
</tr>
<tr>
<td>Certainty of career path</td>
<td>2.99</td>
<td>0.99</td>
<td>3.08</td>
</tr>
</tbody>
</table>

Overall the students felt the field trip was very valuable in terms of improving their understanding of the discipline, their knowledge of career opportunities, and giving them clarity regarding career objectives. We do not plan any major changes to our program or curriculum based on these results. We are confident that the field trip is achieving our overall goals. However, based on student comments, we will continue to tweak the field trip to better serve their needs. For example, while it is impossible to visit sites representing the entire range of natural resource careers, we will look for opportunities to include additional sites as is feasible. A number of students commented that they would like to see stops devoted more exclusively to wildlife management. We have done that in past field trips, and we will make an effort to include wildlife management in the future.
Appendix 2: Geology Program QEP Impact Report

Geology Program QEP Impact Report 2012

We proposed a strategy where students have a QEP-focused experience at each step of their track through the Geology Program in order to address QEP-related outcomes. These include (1) a first-year experience during which students enrolled in the GEOL 150 (Methods in Geology) course attend a weekend field trip to the Great Smoky Mountains National Park (GSMNP) and synthesize geologic concepts, (2) a second-year experience during which students are required to participate in service within the Geology Program, (3) a third-year, one-credit career planning course during which students develop a resume, explore geology careers, learn about graduate school, and plan what to do with their senior capstone experience, and (4) a fourth year experience during which each student, individually or as part of a small team, completes a faculty-guided authentic research project. The capstone project demonstrates to employers and graduate schools the student’s ability to complete a major assignment, to work independently, to analyze and synthesize information, and to write and speak effectively. While we have not yet implemented (2), we have been active in implementing the other three experiences and include observations below.

Methods in Geology Field Trip to The Great Smoky Mountains National Park (first year experience) – This trip has been run since fall, 2009 as part of Geology QEP implementation. Since that time around 330 students have taken the course, and we have an average attendance rate of 85% on the field trip (estimate based on a sample of classes). Up to six geology faculty have attended the trip, allowing students to meet different professors in the program. Students are required to answer a series of questions at each stop where they synthesize material covered in the course (lecture and lab) and apply it in a real-world setting. Students hand in their materials at the end of the field trip for assessment and evaluation by the instructor. A sample of 182 of these graded assignments shows an average student score of 83%.

Geology Careers Seminar (third year experience) – This course has been taught two times since QEP implementation (fall, 2009) with a total attendance of 19 students. Fourteen outside speakers have been brought in as part of the course and these include alumni, regional geologists, and representatives from graduate programs in the region. All 19 of the students attending the course have developed CVs, resumes, cover letters, as well as 3 year plans, 5 year plans, and end of the semester reflections. It is not possible to present these reflections in a one page summary, but this course clearly addresses at least two QEP outcomes since students: (1) identify their aptitudes, abilities, and interests and articulate their future goals and aspirations and (2) recognize the synthesis of their university experiences and evaluate those experiences relative to their future education and career plans. Students in the course are also required to participate in a networking activity by attending a professional meeting.

Geology Capstone (fourth year experience) – Students in the capstone course must recognize the synthesis of their university experiences and evaluate those experiences relative to their future education and career plans (QEP learning outcome). All of our graduating seniors have completed a capstone project since implementation of the geology QEP began and have thus done authentic geology research. Twenty four students have completed our capstone course as part of a group investigation, while 8 students have completed a senior thesis project. The capstone is the culmination of the geology degree and requires the application of knowledge and skills towards a geologic investigation and original research project. Students present the results of their research orally to the department as well as in a written report. These capstone projects almost always result in a student presentation at a professional conference in geology. We have had 32 students (total) complete a capstone since implementation of our QEP. In that time, we have had 28 students present research results at either a regional or national geology conference (many of the same students). Although we have individually graded student performance in this course, we are still considering how to evaluate student conceptual and applied learning in the capstone.
### Appendix 2.9: Student reflections from attending southeastern Geological Society of America, Spring 2015 meeting.

<table>
<thead>
<tr>
<th>Q1</th>
<th>Q3</th>
<th>Q8</th>
<th>Q9</th>
<th>Q10</th>
<th>Q11</th>
</tr>
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<tbody>
<tr>
<td>Name</td>
<td>Reflect on the value of the meeting related to your discipline, Geoscience or Geoscience education. Please include specific examples that exemplify your thoughts.</td>
<td>Reflect on the value of the meeting related to your career. As above, please include specific examples that exemplify your thoughts.</td>
<td>Wild / card: Please provide an additional reflection on the value / of the meeting.</td>
<td>Did anything at the meeting change your area of interest in the geosciences or your potential career path</td>
<td>Networking. To help us communicate the value of professional meetings, it is important that we track concrete benefits and opportunities that result from student participation.</td>
</tr>
<tr>
<td>1</td>
<td>Speaking to folks from different disciplines helped me to communicate my work in different ways. This in hand help strengthen my knowledge by forcing me to review concepts that were blurry, and essentially by communicating all the research I've done over the last several months.</td>
<td>I was good to observe professionals in their natural environment. It is clear to me that conferences are a great place to network.</td>
<td>Overall, the meeting was good for our department. It was nice to see everyone enthusiastic about their work. The meeting formed some camaraderie amongst our group(s).</td>
<td>No, I was really focused in on research related to my thesis project.</td>
<td>-picked up info packet on professional geologist certification / -University (Ft. Meyers/Naples) interested in me applying to graduate program</td>
</tr>
<tr>
<td>2</td>
<td>As a Geoscientist undergrad this was my first time going to a GSA conference. At first it seemed pretty small because it seemed to fit into one room, but once all the festivities began I realized with the rotation of presentations there were quite a few people presenting research. This was an amazing opportunity to witness the geoscientist community and experience what it really means to be a geologist. There is such a diversity of different fields of study such as paleoecology, hydrology, geo-oceanography, mapping outcrops, and plenty of interdisciplinary studies blending geology with biology.</td>
<td>Before going to GSA I knew I was going directly into the workforce instead of graduate school. Which career path exactly I did not know, but after I have a strong feeling going into the field of consulting. I have a strong background in industry having to work in metal fabrication before college I could use this knowledge with what I am currently learning to find solutions. The oral career presentations provided a lot of background information for traits that they look for during the hiring process. They also provided different suggestions of training we could do before applying to make our resumes standout such as the OSHA 40-hour training seminar. This path however may lead me back to school for additional training if the job would pay for it.</td>
<td>The actual Presentation of a professional poster at GSA for the first time was quite fun. Working with the hydro group we didn’t have any crazy people come by to argue our research. Most of them were very friendly and asked some good questions. Everyone who stopped by were positive about our poster and shocked when we told them this was undergraduate research. They then would ask about our future goals or studies. We also got a few good tips about making a poster for next time, for instance not including an abstract since it was already published. Other common questions we received included if any there were any plans for future research or restoration. There was one guy who came by who gave us hell for our poster. I believe his name was Jeff if that rings any bells.</td>
<td>No, this meeting didn’t change my area of interest it only reaffirmed what I wanted to do. I have had an idea of going into the consulting field for a while and I really enjoyed the talks that were given.</td>
<td>During this meeting I spent most of my time observing the diversity of the information presented so I didn’t make any direct networking connections with possible graduate or career opportunities. I did however spend an hour over at the SEM Electron microscope booth about allowing remote access for research and provided them with my contact information. This was the same for a few other booths where I provided contact information. I went to quite a few of the oral presentations which didn’t allow for a lot of the one on one time that the posters would give.</td>
</tr>
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</table>
I was able to meet and have meaningful conversations with professional geologist who's work I have sted in papers I've written over the last three years. Rick Wooten was one of them and he gave me great insight on using LIDAR to examine.

GSA was an opportunity to meet students and professors from other universities and learn how the education here at western compares with other schools. Presenting the research from our posters to other undergrads, as well as grad students, professors, and professionals, was very cool. Also, being able to attend talks that relate to my interests was helpful. Speakers explored the different opportunities for geologists in both the private and state industry including private contracting, and government agency. They also gave great advice for students that will be looking to get their foot in the door and begin their career. This included certifications such as OSHA, and professional geologist test.

It was awesome to network and to meet other people who do the same thing as me, and the same thing as others. When I returned to my classroom the following week, my students were interested in where I had gone and what I did they. I took this opportunity to encourage them to pursue science, specifically geology, as a career choice. I also encouraged the girls in my classes to never give up their dreams, even if everyone around them tells them that they can't do something.

The value of the meeting related to my career was also very cool. Learning about different career opportunities was important and helpful for me because I was not aware of the different opportunities. Talking to professionals and getting their opinion on things like grad school, resumes, internships, experiences, etc. was very informative.

Even though there were a lot of females there, I differently felt discriminated because of my gender. For example, when I was standing at my poster, the people who were walking around never looked directly at me. They would also look at Mike, Hans, or Reece first. So to deal with this, I tried to be the first thing that got their attention. Also, when they asked a question, and I answered it, they would ask the SAME questions to Mike, Hans, or Reece. It was like they didn't believe my answer, or my answer wasn't good enough. But all in all, it encouraged me to continue my science career path, and to empower young girls in my classrooms.

We have students in our undergraduate program that are conducting the same level of work of others in graduate programs around the South East. This reflects a lot about the education I have received at WCU.

I ended up going to a lot of tectonic and landslide talks which I found very interesting and I know for sure know that is an area I want to pursue.

I was actually offered a position for graduate studies at Old Dominion University in Va. All though I'm not going to peruse it, I was able to open a door and shake the right hand by being at GSA.

I gave out many resumes while I was there, and signed up for the AIPG so I can get job information.
<table>
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<th>6</th>
<th>My specific discipline is biology education but the meeting offers an excellent opportunity to network with fellow educators in an inter-disciplinary fashion that is not available at Western. I worked with Frank to use a common open response assessment of natural selection and evolution to determine if there is a difference in the understanding of those concepts based on geographic location. Frank also presented a study about evolution education, but his assessment was multiple choice. The entire session focused evolution understanding in the southeast and we began the session with data-driven conclusions. Evolution is important in the understanding of all biological concepts, but also goes hand-in-hand with the understanding of geologic time. The session was a great way to discuss a concept so central to biology, that also crosses over into other disciplines. There is not much research at Western about science education so I was thrilled that Frank was interested in this subject and that we were able to collaborate for this project. As a senior, I am currently completing my student teaching so it was nice to be able to hear</th>
<th>Conference meetings are essential to my future career plans. I am graduating this semester and then going directly into a STEM PhD program at North Dakota State University. Research opportunities at the undergraduate level are so essential in preparing for a career as a researcher because they let you explore topics that interest you and determine what kind of research you would like to do in the future. At last years GSA I gave my first oral presentation on research that I conducted with Mike Meyer and I vividly remember how nervous I was and how little I knew about research in general. This year was a complete 180, I felt really confident and all of the experience with Mike and Frank really helped me solidify my desire to go to graduate school.</th>
<th>Conferences are a valuable experience regardless of your academic or career goals. They provide opportunities for networking, fellowship, and travel that students otherwise would not receive. A lot of the students on the trip this year do not have plans to go on to graduate school or to even continue work in geology, but the ability to practice public speaking or travel to new places may give them incentive to research new ideas or try meet new people that could lead to job opportunities and friends. School can be grind, with daily classes, homework, and jobs so a conference can reinvigorate students and faculty to refocus on research and classes with new charisma.</th>
<th>I was already really excited to embark on the next step of my education, with grad school beginning in July, but it did provide a chance to meet other researchers from institutions across the southeast who are researching similar topics. The evolution education section had a lunch meeting for geoscience educators that I was able to attend. At the meeting we discussed lesson plans and future research about evolution and climate change. It really helped me put some of my own ideas into perspective and helped me gear up to teach evolution in my own classroom right now.</th>
<th>Discussed a new research plan with Frank and other geoscience educators for the annual meeting in November, possible opportunities to work with geoscience educators at Georgia Southern &amp; Georgia State</th>
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<tr>
<td>7</td>
<td>At GSA was used as a networking, and educational experience. I was able to meet professors interested in my capstone research; as well as, attend and talk to Structural geology, and geochemistry presentations.</td>
<td>Networking allowed me to meet people who represented graduate universities, for continuing my geoscience career in academia.</td>
<td>The experience of going to GSA I saw as being a necessary one. Going to this conference showed me an entire other side geology, and the topics pertaining to it that I was not able to experience on my own.</td>
<td>No, I have always been very set in my interests, and even though I have always been exposed in all topics geology, I was still able to meet professional, and pursue the topics that interested me at GSA.</td>
<td>Discussed a new research plan with Frank and other geoscience educators for the annual meeting in November, possible opportunities to work with geoscience educators at Georgia Southern &amp; Georgia State</td>
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<td></td>
<td>I thought the meeting was valuable for my overall Geoscience experience. Since this was the first meeting I had been to, I didn't really know what I needed to expect out of it, but I really liked the overall experience. The most valuable thing for me was the experience of presenting our poster, and looking and talking to others about their poster. It was really good to have people come up who were genuinely interested in our research and had a lot of positive feedback. Also, I went to a few academic talks tat I was interested in and learned a little bit. Some of the talks were just honestly over my head as far as the content, but they were still interesting. Overall it just was kind of a reminder that geology happens outside of the textbook, and new things are constantly being discovered and debated and that GSA is a really cool place to go see what is discovered and debated and that GSA is a really good experience because I got to see that what I was doing as an undergrad was just about as good as what others were doing for their Masters. Another thing I learned at the meeting, is the diversity of the things people research and present on at the conference. There was presentations from hydrogeology to talking about how to teach evolution in schools. There was even a poster that was about using sediment analysis to solve a capitol murder case where they collected sand form the gas pedal of the car, the victims body and the alibi location. I guess overall, GSA wasn't totally what I expected and there was certainly a lot of interesting presentations to go see, even though I wasn't necessarily interested in that subject as a career or anything. Yes! After talking to mentors and seeing career presentations i kind of more firmly decided I want to pursue a career in environmental consulting, or maybe an environmental job in state government. I went to a mentor lunch, where we got to talk more one-on-one (even though we were in groups) with people in different career fields. I got to speak with a few people that work in oil, environmental consulting and state agencies. Also, some people that came up and talked to us about our poster gave us information about their graduate schools and they all asked what our plans for after graduation were. Between speaking with doctors of about their graduate programs and talking with professionals and getting their contact information, it was definitely good for networking. And after talking with them, it made the idea of 'networking' a whole lot less intimidating really.</td>
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<td>When we were at GSA I went to a luncheon where there were multiple tables and &quot;mentors&quot; rotated from each table and talked to us about their careers in the geology world. This was a really good experience. I got the contact information of all the mentors and spoke one on one with them about different careers that I may be interested in applying for in the future.</td>
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<td>At GSA my friends convinced me to go up and talk to a presenter with his doctorate in paleontology. I walked up to him, shook his hand, and introduced myself. He ended up coming to my oral presentation and it made me really happy to see him there.</td>
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<td>One of the mentors at the luncheon I attended talked about her time at Exxon. She said she really loved it and got to travel all over the world for her job. I think i might look into a career with them in the future.</td>
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<td>None.</td>
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<td></td>
<td>I found that the meeting allowed me to expand my understanding on topics previously unknown to me and therefore creating a chance to decide my future field</td>
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<td></td>
<td>I do not currently have a career.</td>
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<td></td>
<td>I think the sessions provide an excellent way to learn interesting topics from other disciplines and create connection across the concentrations.</td>
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<td></td>
<td>The geoscience education and petrology.</td>
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<td></td>
<td>I received a few cards from a lunch I went to.</td>
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<td>9</td>
<td>The SE GSA meeting was a very valuable experience to me. Since I did an oral presentation I got to get up the nerve to speak about my research in front of some very important people in the paleo world. Going to other paleontology talks was a great experience because I got to see that what I was doing as an undergrad was just about as good as what others were doing for their Masters. I am more confident about the education I have and am receiving (see above). I believe this will make the job/graduate school application process easier. I also learned a lot about the career paths available to hydrogeologists through the career talks. I listened to about 4 different professionals discuss their work and how to pursue their career. It was a good experience interacting with other geology students and faculty. My area of interest in hydrogeology is the same. Seeing the different posters related to hydrogeology and contaminants confirmed for me that environmental consulting is the career path I intend to take. Seeing the consulting professionals talk about their career also helped.</td>
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<td>I found that the meeting allowed me to expand my understanding on topics previously unknown to me and therefore creating a chance to decide my future field</td>
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<td>11</td>
<td>Attending this meeting helped assure me that what we are doing for research at WCU is comparable, if not higher quality than most other universities. For example, students from both undergraduate and graduate programs were impressed by the type and quality of the research we presented. It was also beneficial seeing how students from other schools address research topics. There were some posters that relate to my area of interest, but I did not know anything about their type of</td>
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<td></td>
<td>I am more confident about the education I have and am receiving (see above). I believe this will make the job/graduate school application process easier. I also learned a lot about the career paths available to hydrogeologists through the career talks. I listened to about 4 different professionals discuss their work and how to pursue their career.</td>
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<td></td>
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<td>12</td>
<td>Presenting my research in an interactive poster format helped me, personally, in relaying information to a general scientific audience. I was able to prepare and think through concepts in such a way that allowed me to reflect on my work. Many people throughout my presentation gave supportive feedback and asked valuable questions. On individual, in particularly, conducted similar research for his dissertation, and we were able to discuss certain methods that could support my findings.</td>
<td>It is important for a geoscientist to attend meetings such as the regional GSA meeting, in order to advance their career path. Many individuals who have various backgrounds and concentrations in the geosciences are able to present their advancements to a critical audience and collaborate on future work. In the same way, students are able to explore various pathways in the geo- and environmental sciences. My personal professional goal in attending the regional GSA meeting was to network as well as present research in a professional setting. The more experience students have in attending these meetings, even if they are not presenting, the more they are able to feel comfortable in these settings and not feel overwhelmed.</td>
<td>Confidence is probably the most valuable asset students will gain from attending GSA meetings such as this one. There are many skills that are not considered when participating in conferences, such as professionalism when talking, etiquette, asking valuable questions, critical thinking during presentations, synthesizing information, and answering questions in an understandable manner, among many others. It is the support of faculty and peers that allows students to gain confidence in their research.</td>
<td>This particular meeting did not change my area of interest from structural geology. Actually, I feel more confident in my interest as I was able to focus my time on presenting my research as well as talk with individuals with genuine interest in what I am studying.</td>
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<td>13</td>
<td>My trip to Southeast GSA was very beneficial to my focus in geoscience because it exposed me many different perspectives on research possibilities. Along with comments on my poster and how our station is run, I got to talk to different people while walking around the center. For example, I spoke on length to a student working on modeling rising gas bubbles in volcanic vents. He had an interesting perspective, and the way he worked with his professor showed me how undergraduate research, outside field work, could be done.</td>
<td>The meeting was important for my career for two primary reasons. First, it exposed me to different paths I can take. I attended talks by both economic geologists and scientific geologists, and I decided that the scientific side was much more appealing. Second, the preparation and act of presenting my poster gave me practical experience of consolidating and presenting research to my peers.</td>
<td>There isn’t much I haven’t said, I believe that the meeting was very beneficial to both my understanding of geoscience and ability to advance in my career for the reasons listed above. I also believe that this generally helped me grow as a person. Working and interacting with a large number of highly-educated people as, more or less, an equal has greatly bolstered my confidence and perspective on my future. This experience of working with people has also affected my leadership capabilities because, through these interactions, I have learned how to communicate in a way that lets people understand what needs to be done.</td>
<td>As I said before, it helped me decide that I wanted to lean more toward the scientific aspects of geoscience, but there were no planetary geologists there, so my interest in that didn’t change.</td>
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<td></td>
<td>A number professors stopped by my poster and wanted more information about it, including some from app state. I also got a card from a professor from the University of Mississippi to contact him if I was looking for a graduate adviser.</td>
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<td>14</td>
<td>The meeting related well to my groups hydrogeology project. Though no one was presenting a project using isotopes in the same way that we were, there were several or more hydrogeology posters and 1 or 2 posters that used water isotopes. I was also able to network and meet professionals within hydrogeology who provided great criticism and thoughts about what we were doing. I was impressed by some posters and a bit surprised by some that seemed somewhat uninvolved. Because it was my first GSA and because I was focused on career talks, I did not attend specific hydro talks.</td>
<td>The meeting gave me confidence regarding my personal competency within the geology job market. At my age I do not feel that I can afford to further my degree, but feel I could be successful if I, in fact, did go that route. This confidence comes from the support from those I spoke to at the meeting, while also coming from the comparison of myself to those presenting that were pursuing higher degrees.</td>
<td>Networking. I was able to obtain some contact information that could potentially help me find work.</td>
<td>No, I felt very comfortable in the hydrogeology group.</td>
<td>USGS contact information. / Graduate school at Mississippi State. /</td>
</tr>
</tbody>
</table>
Appendix 3: Program Provides and Evaluates a High-Quality Curriculum

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## Appendix 3.1: Courses Taught by Geology Faculty

<table>
<thead>
<tr>
<th>Course</th>
<th>Type/Cr</th>
<th>F 2013</th>
<th>S 2014</th>
<th>F 2014</th>
<th>S 2015</th>
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<tbody>
<tr>
<td>GEOL 140</td>
<td>Investigations in Environmental Geology</td>
<td>Lecture 3</td>
<td>x</td>
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<td>GEOL 140 H</td>
<td>Investigations in Env. Geology - HONORS</td>
<td>Lecture 3</td>
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<td>GEOL 150</td>
<td>Methods in Geology</td>
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<td>GEOL 155</td>
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<td>GEOL 191</td>
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<td>GEOL 250</td>
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<td>Soils and Hydrology</td>
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<td>GEOL 310</td>
<td>Principles of Soils and Hydrology for Constr. Managers</td>
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<td>GEOL 371</td>
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<td>GEOL 393</td>
<td>Special Problems in Geol.</td>
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<td>GEOL 394</td>
<td>Geol. Field Trip: Kentucky</td>
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<td>GEOL 394</td>
<td>Geol. Field Trip: Coastal Processes and Hazards South Carolina</td>
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<td>GEOL 405 / 505</td>
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<td>GEOL 422</td>
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<td>GEOL 423 / 523</td>
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<td>GEOL 455 / 555</td>
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<td>GEOL 465 / 565</td>
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<td>GEOL 471</td>
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<td>GEOL 494</td>
<td>Topics: Optical Mineralogy</td>
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<td>Course</td>
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<td>GEOL 494</td>
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<td>GEOL 593</td>
<td>Problems: Applied Isotope Hydrology</td>
<td>Ind Stud 2</td>
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## Appendix 3.2: Courses taught by NRCM faculty

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<td>Soil Conservation</td>
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<td>NRM 330</td>
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<td>NRM 420</td>
<td>Soil Genesis and Classification</td>
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<td>NRM 440</td>
<td>Integrated Resource Management</td>
<td>Lec-Lab 4</td>
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<tr>
<td>NRM 451</td>
<td>Foundations of Silviculture</td>
<td>Lec-Lab 4</td>
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<tr>
<td>NRM 452</td>
<td>Forest Management</td>
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<tr>
<td>NRM 460</td>
<td>Watershed Management</td>
<td>Lecture 3</td>
<td></td>
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<tr>
<td>NRM 472</td>
<td>Geospatial Analysis</td>
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<td></td>
<td>x</td>
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<tr>
<td>NRM 480</td>
<td>Ind Study: Adv Remote Sensing</td>
<td>Ind Stud 3</td>
<td>x</td>
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<tr>
<td>NRM 480</td>
<td>Independent Study</td>
<td>Ind Stud 2-3</td>
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<tr>
<td>NRM 483</td>
<td>Applications in Forest Management</td>
<td>Intern. 2</td>
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<td>NRM 493</td>
<td>Topics in NRM</td>
<td>Ind Stud 2</td>
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**Appendix 3.3: Course syllabi – Geology**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor(s)</th>
<th>Page</th>
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<tr>
<td>GEOL 140</td>
<td>Investigations in Environmental Geology</td>
<td>Stafford</td>
<td>5</td>
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<td>GEOL 140</td>
<td>Investigations in Environmental Geology</td>
<td>Tormey</td>
<td>8</td>
</tr>
<tr>
<td>GEOL 140</td>
<td>Investigations in Environmental Geology - Honors</td>
<td>Tanner</td>
<td>11</td>
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<tr>
<td>GEOL 150</td>
<td>Methods in Geology</td>
<td>Tanner</td>
<td>14</td>
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<tr>
<td>GEOL 150</td>
<td>Methods in Geology - Waters-Tormey</td>
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<td>17</td>
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<td>GEOL 155</td>
<td>Historical Geology</td>
<td>Forcino</td>
<td>24</td>
</tr>
<tr>
<td>GEOL 191</td>
<td>Geology, Landscapes, and the Human Psyche</td>
<td>Kinner</td>
<td>27</td>
</tr>
<tr>
<td>GEOL 250</td>
<td>Introduction to Rock Forming Minerals</td>
<td>Fagan</td>
<td>34</td>
</tr>
<tr>
<td>GEOL 302</td>
<td>Geomorphology</td>
<td>Lord and Kinner</td>
<td>38</td>
</tr>
<tr>
<td>GEOL 305</td>
<td>Soils and Hydrology</td>
<td>Gannon</td>
<td>42</td>
</tr>
<tr>
<td>GEOL 310</td>
<td>Principles of Soils and Hydrology for Construction Managers</td>
<td>Gannon</td>
<td>46</td>
</tr>
<tr>
<td>GEOL 355</td>
<td>Petrology</td>
<td>Fagan</td>
<td>51</td>
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<td>GEOL 394</td>
<td>Field Trip: North Carolina Piedmont</td>
<td>Kinner and Waters-Tormey</td>
<td>55</td>
</tr>
<tr>
<td>GEOL 394</td>
<td>Field Trip: Kentucky</td>
<td>Lord</td>
<td>59</td>
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<tr>
<td>GEOL 394</td>
<td>Field Trip: Smoky Mountains</td>
<td>Tanner and Lord</td>
<td>62</td>
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<td>GEOL 405</td>
<td>Hydrogeology</td>
<td>Lord</td>
<td>66</td>
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<td>GEOL 410</td>
<td>Fluvial Geomorphology</td>
<td>Miller</td>
<td>70</td>
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<tr>
<td>GEOL 422</td>
<td>Sedimentation and Stratigraphy</td>
<td>Forcino</td>
<td>75</td>
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<tr>
<td>GEOL 423</td>
<td>Contaminated Rivers</td>
<td>Miller</td>
<td>80</td>
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<tr>
<td>GEOL 455</td>
<td>Wetlands</td>
<td>Tanner</td>
<td>83</td>
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<td>GEOL 465</td>
<td>Environmental Geochemistry</td>
<td>Tanner</td>
<td>85</td>
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<td>GEOL 471</td>
<td>Tectonics</td>
<td>Waters-Tormey</td>
<td>87</td>
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<td>GEOL 491</td>
<td>Careers in Geology</td>
<td>Waters-Tormey</td>
<td>93</td>
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<tr>
<td>GEOL 495</td>
<td>Senior Research Seminar</td>
<td>Lord and Gannon</td>
<td>95</td>
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<tr>
<td>GEOL 499</td>
<td>Senior Thesis</td>
<td>Tanner</td>
<td>98</td>
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</tbody>
</table>
GEOL 140 – Investigations in Environmental Geology  
Dr. Emily S. Stafford  Office: 337 Stillwell  
Email: esstafford@email.wcu.edu  
Office Hours: MW 9:00 – 10:00 or by appointment

My class:  Days ____________________  Time _______________________  Room ______________________________

Purpose: This course is intended to introduce students to (1) general science, (2) the primary processes that shape our world, and (3) humanity’s place in the natural universe. We will combine hands-on activities, inquiry-based exercises, and popular and technical readings to explore the major themes of Earth Science and to equip students to engage with scientific questions outside of the classroom.

Objectives: By the end of this liberal studies course, students will be able to:

• locate, analyze, synthesize, and evaluate scientific information;
• interpret and use numerical, written, oral, and visual data;
• read, comprehend, and effectively communicate scientific ideas;
• think critically to explore scientific claims;
• critically analyze contemporary issues in science and technology.

Grading: Your final grade will be based on a combination of in-class participation and activities, homework assignments; a project; and tests; computed as follows:

<table>
<thead>
<tr>
<th>Class participation/activities/homework assignments</th>
<th>40%</th>
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</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>15%</td>
</tr>
<tr>
<td>Test 2</td>
<td>15%</td>
</tr>
<tr>
<td>Test 3</td>
<td>15%</td>
</tr>
<tr>
<td>Science Symposium</td>
<td>15%</td>
</tr>
</tbody>
</table>

Readings: Lectures will not follow a textbook, so attendance in class is critical. Relevant readings (typically online or as PDF) will be assigned throughout the semester. Supplemental readings will be suggested as well.

Class notes: Slideshows from lecture will typically be posted on Blackboard after class. However, these notes are primarily visual aids for the lecture and are NOT a substitute for attending class.

Participation: Your attendance in class and participation in activities will play a large role in your success and will be part of your final grade. You are expected to attend class and take part in activities. You are solely responsible for missed materials if you miss a class.

In-class Activities / Homework: In-class activities and take-home exercises will be assigned throughout the course, and will make up 40% of your final grade. Homework will be due at the beginning of the next class period unless otherwise specified. Late assignments will incur a 10% per day penalty (per day for electronic submissions, per class-day for in-class submissions). There will be graded assignments EVERY WEEK, so do not skip class.

Attendance: If you have a scheduled absence due to university activities (sports, other classes, official clubs), you must provide me with notice at least one week in advance. Unforeseen but excusable absences (e.g. illness, family emergency) will be evaluated on a case-by-case basis and require documentation (e.g., doctor’s note). Do not schedule advising appointments, doctors’ appointments, or other appointments during class.

For documented, excused absences, you will have the opportunity to make up missed in-class work (the same or an alternative activity). Unexcused absences will not necessarily permit make up work (which may be considered late), and extensions will not be granted on due dates.

Frequent, unexcused absences will not be permitted. If you miss four or more classes during the first half of the term, you may be dropped from the class. Students with repeated unexcused absences get significantly lower grades than those who attend regularly and are at much greater risk of failing the course.

Students are not permitted to attend a section other than that in which they are officially registered. If you wish to change sections, you must do so officially through the Registrar.

Tests: There are three semi-cumulative tests throughout the term. Altogether, the tests make up 45% of your final grade. Tests missed due to excused absences will be made up immediately following the absence. Tests missed due to unexcused absences will be evaluated on a case-by-case basis, and will have a 5% late penalty. The make-up test may differ in format and content from the regularly scheduled test.
**Group Work:** Most exercises will involve group work. It is permissible, and often advisable, for a group to split up duties. However, each student is responsible for making all calculations, answering all questions, and drawing diagrams INDIVIDUALLY. Students should neither dominate the group, nor rely on the group to complete the activity. Failure to participate fully and fairly in group activities may result in a lower grade.

**Science Symposium Project:** A major portion of your grade (15%) will be a project on a science topic of your choice. This project comprises a brief paper and a presentation. Presentations will take place during the final exam period, at a “Symposium” where students share their work with the rest of the class.

**Email and Blackboard:** I will communicate with you through your catamount email address. You are expected to check your email every day for announcements and updates. I will post notes, resources, and assignments on Blackboard, so you must know how to navigate and use the system. I will post grades on Blackboard, but it is your responsibility to keep track of your running grade in the class (see below).

**Keeping Track of Grades:** It is your responsibility to keep all graded assignments and to track your grade in the class. A spreadsheet is provided for you to do so. I will not answer questions about class grades unless you can present your completed spreadsheet. It is illegal and unethical for me to communicate information about grades over email. Please set up an office appointment with me to discuss grades.

**Completion of Course Work:** You must satisfactorily complete all portions of the class (participation, tests, and the science symposium project) to pass the class. Failure to do so may result in a failing grade, even if your class average is above the “F” range.

**Academic Integrity Policy:** You will follow Western Carolina University’s Academic Integrity Policy (academicintegrity.wcu.edu). Academic dishonesty includes:

- **Cheating:** using or attempting to use unauthorized materials, information, or study aids.
- **Fabrication:** creating and/or falsifying information or citations in an academic exercise.
- **Plagiarism:** representing someone else’s words or ideas as one’s own.
- **Facilitation:** helping or attempting to help someone violate the Academic Honesty Policy (e.g., allowing another to copy during an exam; ghostwriting another’s essay).

The instructor has the right to determine the appropriate sanction(s) for academic dishonesty up to and including a final grade of “F” in the course. Further discipline may be imposed by the university.

**Class Conduct:** Disruptive or harassing behavior will not be tolerated in class. All class members must be treated with respect. Students who persist in derogatory or disruptive behavior may be asked to leave the classroom. Show up to class on time and be ready to begin. Persistent lateness may result in lost points on in-class activities. Cellphone use is not permitted in the classroom, unless otherwise specified. Please silence or turn off phones so they do not disrupt class. You are encouraged to bring laptops or tablets to class, but they may only be used to take notes and for class activities. Headphones and music players may not be used.

**Catamount Academic Tutoring Center:** 30 Hunter Library, 227-2274, (http://catcenter.wcu.edu) CAT Center tutors are academically successful students who are recommended by the faculty and trained in effective tutoring practice. Instructions for scheduling appointments with tutors are on the CAT Center website. Students are expected to arrive at tutoring sessions on time; prepared with class notes, readings, assignments, and any questions they have about the material.

**The Writing and Learning Commons (WaLC):** located in BELK 207, provides free small-group course tutoring, one-on-one writing tutoring and academic skills consultations, and online writing and learning resources for all students. To schedule tutoring appointments, log in to TutorTrac from the WaLC homepage (http://walc.wcu.edu/) or call 828-227-2274

**Student Support Services:** Student Support Services provides support to students who are either first-generation, low-income or those who have disclosed a disability with: academic advising, mentoring, one-on-one tutorial support, and workshops focused on career, financial aid and graduate school preparation. You may contact SSS at (828) 227-7127 or email sssprogram@wcu.edu for more information. SSS is located in the Killian Annex, room 138.

**Accommodations for Students with Disabilities:** Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to Disability Services. All information is confidential. Please contact the Office of Disability Services for more information at (828) 227-3886.

If you think you may have a disability that may interfere with your performance in class, please do not hesitate to contact the office of Disability Services for more information! If you require accommodation for a quiz or other activity, please contact me with official documentation at least one week prior to the quiz/activity.

*The instructor reserves the right to alter or amend this syllabus without notice.*
Course Outline

Topics and dates are subject to change.

<table>
<thead>
<tr>
<th>Week of</th>
<th>Topics/ Tests</th>
<th>Paper due dates</th>
</tr>
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<tbody>
<tr>
<td>Monday, January 12</td>
<td>Critical Thinking; What is Science?</td>
<td></td>
</tr>
<tr>
<td>Monday, January 19</td>
<td><strong>Monday No Class: MLK</strong> Earth Science; Earth System</td>
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<tr>
<td>Monday, January 26</td>
<td>Earth History Geologic Time</td>
<td><strong>Friday, January 30</strong> Topic choice due</td>
</tr>
<tr>
<td>Monday, February 2</td>
<td>Minerals Rocks</td>
<td></td>
</tr>
<tr>
<td>Monday, February 9</td>
<td>Earth Structure Plate Tectonics</td>
<td><strong>Friday, February 13</strong> Annotated biblio. &amp; outline due</td>
</tr>
<tr>
<td>Monday, February 16</td>
<td>Test 1 Volcanoes</td>
<td></td>
</tr>
<tr>
<td>Monday, February 23</td>
<td><strong>Tuesday No Class: Advising Day</strong> Volcanoes and Earthquakes</td>
<td><strong>Friday, February 27</strong> First draft due</td>
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<tr>
<td>Monday, March 2</td>
<td>Earthquakes Water on Earth</td>
<td></td>
</tr>
<tr>
<td>Monday, March 9</td>
<td><strong>No Class: Spring Break</strong></td>
<td></td>
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<tr>
<td>Monday, March 16*</td>
<td>Stream Processes/Ecology Cullowhee Creek!</td>
<td><strong>Friday, March 20</strong> Peer edits due</td>
</tr>
<tr>
<td>Monday, March 23</td>
<td>Paleontology, Fossils Evolution</td>
<td></td>
</tr>
<tr>
<td>Monday, March 30</td>
<td>Test 2; Diversity and Extinction Wed, Thu, Fri No Class: Easter Break</td>
<td></td>
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<tr>
<td>Monday, April 6</td>
<td>Paleoeocology</td>
<td><strong>Friday, April 10</strong> Final draft due</td>
</tr>
<tr>
<td>Monday, April 13</td>
<td>Paleoclimatologyplogy</td>
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</tr>
<tr>
<td>Monday, April 20</td>
<td>Global Climate Change</td>
<td></td>
</tr>
<tr>
<td>Monday, April 27</td>
<td>Global Climate Change Test 3</td>
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<tr>
<td><strong>Week of May 4</strong></td>
<td>Science Symposium</td>
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*Last day to drop with a “W” – Monday, March 16*

Final Exam Schedule

<table>
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<tr>
<th>day</th>
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GEOL 140-03 - Environmental Geology
Spring 2015 Syllabus

Instructor:  Blair Tormey  
Office: 285 Belk  
Phone: 227-3916 (3916 on campus)  
Email: btormey@wcu.edu  
Office Hours:  MWF 10:00 or by appointment

Class: MWF 1:25-2:15  305 Belk  

**Purpose:** This course is intended to improve understanding of fundamental geological processes and how they impact humans and the environment on regional and global scales.

**Objectives:** By the end of this liberal studies course, students will:
- Demonstrate the ability to locate, analyze, synthesize, and evaluate scientific information;
- Demonstrate the ability to interpret and use numerical, written, oral, and visual data;
- Demonstrate the ability to read, comprehend, and effectively communicate scientific ideas;
- Demonstrate the ability to critically analyze arguments;
- Demonstrate an understanding of the geologic past and how it relates to human timescales
- Demonstrate an understanding of scientific concepts and methods as well as contemporary issues in science and technology.

**Readings:** Lectures do not always follow the textbook, so attendance in class is critical. Reading assignments, from the text and other sources, may be assigned for certain lectures and exercises.

**Exercises:** You will be given some time in class to work on exercises, but they will often need to be completed outside of class. Unless otherwise stated, you will have one week to complete the exercises, and *late assignments will not be accepted without a valid excuse.* However, you will be permitted to drop one exercise.

**Participation:** Your attendance in class and participation in exercises and group activities will play a role in your success and final grade. You are solely responsible for missed materials if you miss a class. *I do not supply you with missed class notes and lectures are not posted online.*

**Grading:** Your final grade will be based on performance on exams, participation in discussions and group work, and the quality and completeness of exercises. Your overall grade will be computed as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Exercises</td>
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<tr>
<td>Presentation</td>
<td>14%</td>
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<tr>
<td>Exam 1</td>
<td>22%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>22%</td>
</tr>
<tr>
<td>Final Exam (non-cumulative)</td>
<td>22%</td>
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</table>
Absences: If you have a scheduled absence due to university activities, you must provide me with notice at least a week in advance. Unforeseen but excusable absences (e.g., illness, family emergency) will be evaluated on a case by case basis. Make-ups for unexcused absences will not be permitted and any corresponding exam or exercise will receive zero credit.

Make-up Exam: If you miss an exam for any reason, you must get my approval to make it up. There will be one cumulative make-up exam given immediately after your scheduled Final Exam. The make-up exam will be primarily essay and short-answer format, and cover the entire course.

Cancellations: I will email you or post a note on the classroom door if class is cancelled. I also recommend http://localyokelweather.com/ for the most accurate inclement weather forecasts.

Cell Phones, Laptops and Tablets: Use of cell phones, laptops and tablets is not permitted. If you wish to use a laptop or tablet for note-taking, you will be required to email me digital copies of your notes after each class. I may lower the grade of any student for violations of this policy.

Group Work: Some exercises in this course will require you to work in groups. Each student is expected to participate fully in the work of the group. It is permissible, and often advisable, for a group to split up work. However, each student is responsible for making all calculations, answering all questions and drawing diagrams INDIVIDUALLY, unless specifically stated otherwise. I may reduce the grade of any student who does not fully participate in group work.

Academic Integrity Policy: This class will adhere to Western Carolina University’s Academic Integrity Policy (academicintegrity.wcu.edu). Academic dishonesty includes:

- Cheating - Using or attempting to use unauthorized materials, information, or study aids in an academic exercise.
- Fabrication - Creating and/or falsifying information or citation in an academic exercise.
- Plagiarism - Representing the words or ideas of someone else as one’s own in an academic exercise.
- Facilitation - Helping or attempting to help someone commit a violation of the Academic Honesty Policy in an academic exercise (e.g., allowing another to copy during an exam).

I have the right to determine the appropriate sanction(s) for academic dishonesty up to and including a final grade of “F” in the course.

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# Geol 140-03 Course Outline
(subject to change with short notice)

<table>
<thead>
<tr>
<th>Week of</th>
<th>Topic</th>
<th>Relevant reading</th>
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</thead>
<tbody>
<tr>
<td>January 12</td>
<td>Introduction and Scientific Method</td>
<td>Chapter 1</td>
</tr>
<tr>
<td>January 19, 26</td>
<td>Minerals, Rocks and the Rock Cycle</td>
<td>Chapter 3</td>
</tr>
<tr>
<td>MLK Day (Jan 19)</td>
<td></td>
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</tr>
<tr>
<td>February 2, 9</td>
<td>Geologic Time and Earth History</td>
<td>pp. 9-12, sections 3.4, 11.1-11.3, Appendix D</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td><strong>EXAM 1: FRIDAY, FEBRUARY 13TH</strong></td>
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<td></td>
</tr>
<tr>
<td>February 16</td>
<td>Earth Structure</td>
<td>Chapter 2</td>
</tr>
<tr>
<td>February 23, March 2</td>
<td>Plate Tectonic Theory</td>
<td>Chapter 2</td>
</tr>
<tr>
<td>March 9-13 - no class</td>
<td>SPRING BREAK</td>
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<tr>
<td>March 16, 23</td>
<td>Earthquakes and Volcanoes</td>
<td>Chapters 6 and 7</td>
</tr>
<tr>
<td>March 18, 20 – no class</td>
<td></td>
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<tr>
<td><strong>EXAM 2: WEDNESDAY, MARCH 25TH</strong></td>
<td></td>
<td></td>
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<tr>
<td>March 27 – no class</td>
<td></td>
<td></td>
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<tr>
<td>March 30, April 6</td>
<td>Volcanic and Seismic Hazards</td>
<td>Chapters 6 and 7</td>
</tr>
<tr>
<td>April 1, 3 – no class</td>
<td>MIDTERM BREAK</td>
<td></td>
</tr>
<tr>
<td>April 13</td>
<td>Landslides and Slope Stability</td>
<td>Chapter 10</td>
</tr>
<tr>
<td>April 20</td>
<td>Coastal Processes and Hazards</td>
<td>Chapter 11</td>
</tr>
<tr>
<td>April 27</td>
<td>Global Climate and Climate Change</td>
<td>Chapter 18</td>
</tr>
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<td></td>
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<tr>
<td><strong>EXAM 3: FRIDAY, MAY 1ST</strong></td>
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<tr>
<td></td>
<td>PRESENTATIONS</td>
<td>WEDNESDAY MAY 6TH 3:00 – 5:30</td>
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<tr>
<td></td>
<td>(Final Exam Period)</td>
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COURSE DESCRIPTION
There is no doubt that our environment has a profound influence on our lives. People must deal with natural processes such as volcanoes, tsunamis, and earthquakes while also thinking about water quality, air quality, and changing climatic conditions. We also have a profound influence on our environment. While geologic processes have worked to shape the earth through many eons, humans have arguably become the most important agent shaping the landscape at present. This course is an exploration of the interaction between people and the physical environment. We will study issues in environmental geology that have gained recent attention such as global warming and fossil fuels. We will also apply scientific principles to directly investigate stream restoration (Cullowhee Creek) and wetlands (Rivercane project). I hope that we will all come away from the class with a better scientific understanding of the interplay between humans and their environment.

GRADING
Assignments and Participation 15% 1 drop allowed. No makeups. For Assignments, 15% deduction for every day late. It is essential for everyone to participate and participation will be graded during the appropriate classes with a check, check minus, or check plus.
Tests (3) 50% See note below for makeup policy
Abstracts (2) 20% Details and expectations will be communicated when assignment is introduced
Presentation (1) 10% Details and expectations will be communicated when assignment is introduced
Attendance 5% It is essential that you attend class in order to succeed in this course. Many topics that I introduce are not covered adequately in the text, and missing assignments and group work will directly impact your course grade. There are 3 “free” absences with no points deduction and then 2% deduction for additional absences to a maximum of 5%.

100-94%: A, 93-90%: A-, 89-87%: B+, 86-83%: B, 82-80%: B-, 79-77%: C+, 76-73%: C, 72-70%: C-, 69-60%: D, <60%: F

LIBERAL STUDIES OBJECTIVES
This course partially satisfies the C5 science requirement of the WCU liberal studies program. In the physical sciences, students will
- Be directed toward the definition and solution of problems involving earth materials and the environment
- Use scientific study to appreciate the tentative character of scientific conclusions: repeated experimental testing is needed in order to confirm assertions, and revision (even rejection) of hypotheses is allowed.

Hands-on field and laboratory work will be central to theoretical discussions as an experience in the character of scientific work, and will provide an opportunity to experience the environment in which scientific study is conducted.

This course will fulfill these objectives through several investigations where we will form and test hypotheses using real-world problems (Cullowhee Creek Project and Rivercane Project). We will collect and analyze data in order to test our hypotheses.

HONORS DESIGNATION
This is an honors course and much of the course work will be inquiry driven. You will have the opportunity to carry out several scientific investigations over the course of the semester and will also take part in challenging in-class and out of class assignments as well as stimulating discussions. This course format meshes nicely with the liberal studies objectives, as you will be directly investigating natural phenomena using scientific principles without a pre-defined outcome. I expect everyone to contribute to the course discussions, to participate fully in scientific investigations and assignments, and to turn in honors-level work.
FORMAT FOR ASSIGNMENTS
All written assignments must be typed unless I tell you otherwise. Also, please proof read all assignments to make sure that they are free of careless mistakes. I will deduct points for sloppy work.

MAKEUP POLICY
All assignments must be turned in on time and cannot be made up. You are allowed one dropped assignment, so use it wisely. Tests cannot be made up. If you miss a test and have a valid, verifiable excuse (i.e. Doctor’s note) you will have the opportunity to take a comprehensive final to replace the missing test grade. The comprehensive final will be given during the class final examination period.

A NOTE ON CLASSROOM ETIQUETTE
I strive to maintain a learning environment that is comfortable and free from distraction. Electronic devices must be put away before the beginning of class. If you are waiting on an important call (e.g. family member in the hospital), please see me before class for special arrangements. Also, please do what is necessary before class so that you do not have to step out (for water, bathroom, etc.) during class, especially during testing. Students leaving the room during testing will be required to turn their test in to be graded before exiting the classroom.

COMPOSITION CONDITION MARKS
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ACADEMIC HONESTY POLICY
(Complete policy can be found within the undergraduate catalog – several important points are included here)

Students, faculty, staff, and administrators of Western Carolina University (WCU) strive to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. While academic in scope, any violation of this policy is by nature, a violation of the Code of Student Conduct and will follow the same conduct process.

Violations of the Academic Integrity Policy include:
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Faculty members have the right to determine the appropriate sanction(s) for violations of the Academic Integrity Policy within their courses, up to and including a final grade of “F” in the course. Within five (5) days of the instructor’s knowledge of the alleged violation of the Academic Integrity Policy, the instructor will inform his/her department head in writing of the allegation and proposed sanction(s).

Subsequent procedures for cases involving allegations of academic dishonesty can be found in the student handbook.

CLASS SCHEDULE AND ASSIGNMENTS ARE TENTATIVE AND ARE SUBJECT TO CHANGE DURING THE SEMESTER. YOU WILL BE NOTIFIED OF ANY CHANGES DURING CLASS TIME.
Accommodations for Students with Disabilities: Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to the Office of Disability Services. All information is confidential. Please contact the Office of Disability Services at (828) 227-3886 or come by Suite 135 Killian Annex for an appointment.

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Writing and Learning Commons (WaLC)

The Writing and Learning Commons (WaLC), located in BELK 207, provides free small-group course tutoring, one-on-one writing tutoring and academic skills consultations, and online writing and learning resources for all students. All tutoring sessions take place in the WaLC or in designated classrooms on campus. To schedule tutoring appointments, log in to TutorTrac from the WaLC homepage (http://walc.wcu.edu) or call 828-227-2274. Distance students and students taking classes at Biltmore Park are encouraged to use Smarthinking and the WaLC’s online resources. Students may also take advantage of writing tutoring offered at the Biltmore Park campus on certain days of the week; call 828-227-2274 or log in to TutorTrac and select “Biltmore Park Writing Tutoring” for availabilities.

Math Tutoring Center (usually included in Math department lower division courses)

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Academic Calendar includes dates for all breaks, university closures, final exams, etc. The academic calendar can be found at: http://www.wcu.edu/academics/campus-academic-resources/registrars-office/academic-calendar.asp.
Geology 150-02: Methods in Geology
Geology 150-32: Methods in Geology Lab

Instructor: Dr. Ben Tanner
Office: Stillwell 307
Office Hours: MWF 10-11:00am; R 12:20-1:20pm
e-mail: btanner@email.wcu.edu
Phone: 227-3915 Also by appointment or “drop in”

Course Text: Chernicoff & Witney, An Introduction to Physical Geology, Fourth Edition
Class Meeting Time: MWF 9:05am – 9:55am, Stillwell 322
Lab Meeting Time: Stillwell 322; R 2:30 – 4:20pm

COURSE DESCRIPTION
Through this course we will achieve a better understanding of science and scientific principles, the Earth, the materials that make up the Earth, and how these materials came to be where they are. We will focus on the systems, processes and cycles on Earth, and begin to learn about the nature of the evolution of our planet. While many aspects of geology are relevant to our everyday lives, we will also explore some of the interesting phenomena of our planet out of pure interest and curiosity (Two traits that help to make us human!). Geology is a fascinating subject. Don’t be afraid to be amazed by the world around you!

Goals – This course will further the development of scientific communication and investigation skills. Many of the class assignments will require your active participation and will require systematic thought and problem solving. Many of the projects that we will undertake (such as the wetlands lab project) will not necessarily have a pre-defined outcome. We will develop the skills necessary to take on these types of assignments so that you can approach real-world scientific problems with confidence. You will also communicate your results in the form of scientific papers, lab reports, and in class presentations, thereby strengthening your scientific communication skills.

GRADING

Lab: 30% Lab practical = 8%, Lab final = 7%, Lab assignments = 15%
Tests (3): 45% See makeup policy note below
Assignments and Participation 10% Many of the topics that we cover will be through in class assignments, out of class assignments and discussions. It is essential for everyone to participate and participation will be graded during the appropriate classes with a check, check minus, or check plus. Assignments will receive a percentage score. 1 dropped assignment will be allowed and there will be no makeups for assignments unless agreeable arrangements have been made in advance (at least one day) of the class.
Quizzes 10% Pop quizzes will be given occasionally that will cover the previous night’s reading assignment. One drop is allowed and there will be no makeups unless agreeable arrangements have been made in advance (at least one day) of the class.
Attendance 5% It is essential that you attend class in order to succeed in this course. Many topics that I introduce are not covered adequately in the text, and missing assignments and group work will directly impact your course grade. 3 absences with no point deduction and then 2% deduction for additional absences to a maximum of 5% from the final course grade. Non attendance of the mandatory field trip on 3/29 (4/11 Alternative Date) will result in an automatic 2% deduction from the final course grade.

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MAKEUP POLICY
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GEOLOGY 150: METHODS IN GEOLOGY  Fall 2014

Instructor:  Dr. Cheryl Waters-Tormey  
Office: 308 Stillwell Building  
Phone: 227-3696  
Email: cherylwt@email.wcu.edu

Class:  MWF 9:05-9:55  
Stillwell 322
Lab:  Tuesday 1:25-3:15  
Stillwell 322
Office hours:  Mon 3:30-4:30;  
Tues 9:30-10:30;  Fri 10-11

ASSESSMENT:  
Labs & homeworks 40%  
Exams 1-2 20% (10% each)  
Final exam + lab practical 30% (10% is lab practical)  
Field trip activities + write-up 10%  
\rightarrow 100%

Text:  Chernicoff and Whitney (2007), Geology: An Introduction to physical geology (Pearson/Prentice Hall)  
+ supplemental readings

REQUIRED FIELD TRIP:  Saturday, Nov. 1, 8am–5pm  
Nov. 15 is the weather make-up day  
***Set aside BOTH days for the field trip. Attendance is mandatory!***

Course description:  Topics related to earth materials and solid and surficial earth processes explored through field, analytical, and computing methods, developing investigation and communication skills. This course will show you how geologists “read” the earth’s language to understand its history and how it works.

Learning Objectives:
• To understand the methods and tools geologists use to understand the earth;
• To understand and demonstrate the ability to use core geological concepts and principals, such as  
  o The interpretation of geological history from earth materials and their physical arrangement in the earth;
  o The use and interpretation of numerical, written, map-based, and observational data;
  o The integration of geological observations to assess geologic history and processes;
  o Earth material properties and their use in society;
  o The application of the scientific method in geology.
• To demonstrate the ability to  
  o Read textbook and journal articles about geology with comprehension;
  o Write and speak clearly, coherently, and effectively about geological concepts and principals;
  o Adapt modes of communication appropriate to a particular audience, primarily through group work and peer mentoring;
  o Critically analyze human behavior and choices as relevant to geology in society.
• To understand why geology, geological processes, and earth history are important to society.
Materials for class and lab, and technical competency requirements:

In addition to the normal materials, please bring colored pencils or pens to class and lab. You will commonly need a ruler, calculator, and eraser during lab time. A 3-ring notebook is best so you can combine notes, labs, and handouts. A small (~5x7”), sturdy, bound notebook is required for field labs and the field trip. All geology majors need one anyway for their courses and field trips. A common one is Elan’s Geologist field book, www.minerox.com, which is $8-10 depending on if you order a group.

As a WCU student, you are expected to understand the basics of using Adobe Acrobat, Blackboard, and Microsoft Office utilities and applications, as well as how to download and install freeware on the computer(s) you’ll be using. The WCU IT offices provide support for most of these at their Help Desk in the basement of the library.

Successfully managing your time

Based on the ideal “full time” course load at WCU (12 credit hours), you are expected on average to work ~2 hours per credit outside class meetings. For this course, that means ~8 hours per week outside class and lab meetings! Assume each lab will require up to 2 hours’ work on average after the lab time. Please manage your time accordingly. To minimize stress for all of us, please do not wait to work on assignments the day they’re due. First, careful thoughtful work cannot be done in a rush. Second, the few hours before lab are often when I’m setting up the next lab. Check the schedule on my door and posted in Blackboard for the best times to catch me outside my regular office hours.

Many science lab courses feel overwhelming because you are learning vocabulary, concepts AND skills all at once. It takes practice to absorb concepts and develop these skills, so be patient. Working with other students – while following the group work guidelines described in this syllabus – is a great complement to independent work and study.

Grading and assessment

1. Laboratory exercises and a few homework assignments give you the opportunity to apply concepts or knowledge, and to develop skills. Points will be assigned to different components of the activities. Labs and homeworks are weighted equally. You may drop your lowest score out of the lab/homework assignments.

2. REQUIRED FIELD TRIP: (Please see attendance policy.) The full-day field trip is a critical component of the class. It further emphasizes how important field observation and methods are to geology. It will give you practice synthesizing geological observations while sorting out the geological history and landscape evolution of a particular area. You will be graded on the quality of your field notes and answers to synthesis questions in the field trip activity handout during the trip itself.

3. Technical writing: Regardless of your chosen career, writing will be an important component. Several short lab reports are designed to give you experience in what I call “technical” writing instead of “essay” writing. In any of these, I encourage you to work with the Writing Center staff and use my feedback to improve subsequent assignments. We will discuss the particular goals and grading of each writing assignment as they are assigned.

4. Lab quizzes: These will assess your abilities and knowledge before the final cumulative lab practical. The dates may be adjusted depending on weather and the class itself. I will provide study guides for each quiz a week in advance.

5. Exams: The two exams will cover approximately one third of the material covered in class and lab. Exams will contain a mix of questions that require short-answers and/or sketches and/or calculations, filling in blanks, or labeling concept diagrams. Exams are cumulative in the sense that you are asked to apply knowledge or concepts that you learned during the semester, but will focus on
the most recent materials. The final exam is cumulative but will focus on the application of earlier concepts to examples from the last few weeks of the semester. It will also include essays relevant to the field trip and supplementary readings. The final, cumulative, lab practical will focus on specific skills you've developed over the semester.

6. Readings: Supplemental readings will be tied to specific activities. These are part of your “notes”.
7. Extra credit: Since there are many opportunities to build your grade over the semester, there will be no extra credit assignments offered. The only possible exceptions are geology department talks and extra credit questions on exams. So, do your best from the beginning!
8. Letter grading scale: 100-98 A+; 97-94 A; 93-90 A-; 89-88 B+; 87-84 B; 83-80 B-; 79-78 C+; 77-74 C; 73-70 C; 69-68 D+; 67-64 D; 63-60 D-; <60 F. I will assign a “U” as a 5th week grade if you have any zero’s, low scores on participation, or several absences at this time. These are usually indicators of a downward trajectory that should be identified early.

POLICIES

Student conduct and academic integrity (Please also see Student Handbook.)

"I will practice personal and academic integrity" – WCU Community Creed

Western Carolina University strives to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. Any violation of the Academic Integrity Policy is a violation of the Code of Student Conduct (see disce.wcu.edu for more information).

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Statement on Group Work and Plagiarism: In the modern work environment we are often called upon work as teams. Teamwork facilitates the exchange of ideas and helps us learn from one another. Different people bring different ideas to the group. However, teamwork does not eliminate the need for personal accountability and individual responsibility. Some exercises in this course will require you to work in peer groups. Each student is expected to participate fully in the work of the group, meaning:

- It is not acceptable to sit by the sidelines while your group works, and then copy the data or duplicate the results later.
- It is permissible, and sometimes advisable, for a group to split up work. For example, in a stream profiling lab, two group members might take measurements for a profile while two others take measurements for calculating the velocity of a stream. In this case, the two who gathered profile data may copy velocity from the other two. However, each student is responsible for making all calculations, answering all questions and drawing maps and profiles INDIVIDUALLY, unless specifically stated otherwise in the lab handout.
• Be warned that excessive similarity among the results of group members most likely will be considered plagiarism on all the group members’ part. 

I do expect groups to share ideas and thoughts, but everyone must participate fairly. I may reduce the grade of any student who does not fully participate in group work. If you have any questions about what is appropriate to share and what is not, ASK ME.

Problems with Blackboard and internet access outside of class time – few excuses!!

WCU students are expected to be familiar with basic software (e.g., internet browsers, Microsoft Office, Adobe Acrobat), basic internet and email functions (e.g., uploading/downloading files, “advanced” internet searches), and basic computer functions (e.g., folder and document management, installing freeware, keeping virus protection updated). Plan ahead to get the technical help you expect to need for each assignment. The campus IT help desk and Tutoring centers (see links below) are open virtually every day to help you.

Internet access issues, software problems, poor basic internet/computer skills, and other standard technical competencies will not be accepted as excuses for missed or late assignments. I know unavoidable issues do come up, so to request an extension, you must contact me no later than 3 hours before an assignment is due to see if I will give you permission to turn it in later. Be familiar with the many places where internet access is offered on and near campus so that you have a back-up plan in case the closest internet access point goes down. Blackboard (hosted on an off-campus server) and local campus servers occasionally go down. If this happens, faculty receive notification, and I will adjust deadlines as needed and alert you in class and/or over email.

Policy regarding laptop use, multitasking in class, use of cell phones, etc.

It is your responsibility to participate fully in class time: you have my full attention and I need yours! Multitasking must be avoided during class. Therefore, all electronic devices used for communication or amusement must be off during class time. Please see me within the first week of class if there is a specific need of yours, or let me know outside of class during the semester if there are special short-term circumstances. Laptops for note-taking are permitted, although there will be many days where computer note-taking will not suffice! I will ban them for everyone if there is evidence of other uses during class time ... it distracts you and your neighbors, and ultimately reduces learning.

Participation, attendance and deadlines

We have a working relationship this semester. You expect me to be prepared for class and mentor you towards success. I expect you to actively participate during and beyond class time, and make your best effort to learn content and skills. The easiest way to make decisions about how you participate and meet deadlines is to treat this as if this a job: be on time and do good work.

Unexcused absences from class time, lab, or field activities result in 0% for the activity. If the absence is excused (see the policies below), and depending on the activity/assignment, it will be omitted from your grade calculation or you will have to make it up by a deadline I set. The field trip make-up for excused absences is lengthy and no where near as fun!

Lab time with your peers and I, and the lab activity itself, are BOTH critical learning tools, so generally, missing lab means the grade being omitted. Regardless of whether your absence is excused or not, you are responsible for the lab material and skills practice. Handouts for the labs will be available in the Blackboard folder the day after lab; grading keys or feedback ~10 days later after we’ve discussed it in class. Extra hard copies are in the folder outside my door. Recall that I will drop the lowest score in the homework/lab category.
Provide to me notice of a scheduled absence due to **university activities at least one week in advance**. Meet with me to clarify how this policy applies to you before the 3rd week of the semester.

Contact the Provost’ office for the required form and procedures to request an excused absence due to religious observances ([http://www.wcu.edu/about-wcu/leadership/office-of-the-provost/index.asp](http://www.wcu.edu/about-wcu/leadership/office-of-the-provost/index.asp)). The WCU deadline is usually 2-3 weeks prior to the proposed absence. You should discuss it with me at least a week in advance.

**LATE WORK – NOT ACCEPTED!!**

Late work is NOT accepted except in extreme cases, and only then if you follow the policy below.

**REQUESTS FOR AN EXTENSION OR AN EXCUSED ABSENCE**

Reasonable requests for extensions or excused absences are evaluated on a case by case basis. Examples include illness and family emergencies. Please also re-read the Blackboard/internet policy above. The earlier you contact me (preferably, the day before) the more likely you will get permission. I will respond as soon as possible. To request an extension, contact me *no later than 3 hours before* an assignment is due. To request an excused absence, contact me *no later than 7:30 a.m.* the morning of the exam or activity. Exam make ups will usually be the following school day.

**Unavoidable class cancellation policy (e.g., weather problems):**

I will post an announcement on Blackboard by 30 minutes before class, or in extreme cases by a note on the classroom door, if a class or activity is canceled (for example, due to weather or instructor sickness). There will be instructions posted on Blackboard for alternate places to meet and/or for alternate activities as a substitute. If you have lost internet connection, you may call the GNR department office at 227-7367. *Use this last option very sparingly.*
Helpful resources on campus and online

Geology faculty web page:  http://www.wcu.edu/9565.asp

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The **Mathematics Tutoring Center** in Stillwell 455 provides drop-in tutoring for math courses and math-related content across the curriculum. Students who need help with software, technology, or eBriefcase should contact the **Technology Commons** on the ground floor of Hunter Library where students can access training via one-on-one appointments, walk-ups, workshops, and online tutorials.

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For this course, I want to support you in every way I can. I encourage you to stay in touch with me throughout the semester regarding course-related accommodations you may need or would like to try, or concerns about your accommodation plan in general. This is especially the case for field trips, field activities, group projects, and exam proctoring, as changing logistics for these may require advance planning. Requesting and planning for alternative testing accommodations with the ODS requires at least 3 business days; please notify me as well ASAP because this may require samples, maps, etc., to be delivered to the testing venue before the day of the exam.
TENTATIVE COURSE SCHEDULE: subject to change and will be updated in class, on Blackboard, or over email. Dress appropriately for outdoor labs!

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<tr>
<th>Wk of:</th>
<th>Topics:</th>
<th>Chap.</th>
<th>Lab and/or homework topics</th>
</tr>
</thead>
</table>
| Aug. 18, 25| Introduction; Earth’s origin and structure;                           | 1-2,  
parts of 11 | 8/19: no lab meeting. Homework will be assigned Friday.         |
|            | The building blocks of earth materials: mineral chemistry and important properties; mineral ores |       | 8/26: Introduction to topographic maps and cross-sectional views |
|            | Weathering, water chemistry                                           | 5-6,  
suppl. from Ch. 14 | 9/2: Mineral groups, properties, and “clues”                     |
| (no class 9/1) | Sediment transport, inferring depositional settings                     |       | 9/9: Field lab – Making field observations: weathering, transport, deposition |
| Sept. 1, 8, 15 | Sedimentary rocks, stratigraphic principles                           |       | 9/16: Sedimentary rock associations, common depositional settings |
|             | Hydrocarbon resources (fossil fuels)                                 |       | ~9/17, EXAM 1 – date announced a week in advance                |
|             | Fri, 9/12, 6-8pm: Required, Public Hearing on hydraulic fracturing laws (WCU FPAC). Time will be confirmed by the end of week 2. |
| Sept. 22, 29 | Metamorphism, metamorphism causes                                     | 7, 3-4 | 9/23: Intro. geologic maps (horizontal strata, geologic histories) |
|             | Causes of magmatism, igneous structures, hazards                      |       | 9/30: Using field relationships to understand metamorphism and interpreting lithospheric levels from metamorphic grade |
|             | Minerals quiz wk. of 9/22, date given a week before                   |       | 10/6 Homework: Interpreting igneous textures and color          |
| Oct. 6, 20 (10/13-17, Fall Break) | Folds, faults and rock deformation fabrics                           | 9, 10 | 10/7: Field lab – Making a geologic map (2 week lab)             |
|             | Earthquakes, seismicity patterns, hazards                             |       | 10/21: Finalize map and cross-section for report, revise homework |
|             | Creating a geologic study report                                      |       | Sat., 11/1, 8am-5pm: REQUIRED FIELD TRIP (make-up date Sat., 11/15) |
| Oct. 27, Nov. 3, 10 | Tectonic settings, rock associations, evidence for plate movement, isostasy | 8-10 | 10/28 – Advising Day, no lab                                    |
|             | ~10/29, EXAM 2 – date announced a week in advance                     |       | 11/4: Seismicity patterns, seismic velocities                   |
|             | 11/11: Interpreting map patterns (erosion, faults, folds)            |       | 11/18: Volcanic hazard assessment from topographic, geologic maps |
| Nov. 17, 24 | Groundwater-surface water                                            | 16    | 11/24: Homework: Hydrologic data analysis, interpretation       |
|             | Hillslope processes and failure (partial review)                     | 14    |                                                                 |
|             | Quiz during week 14: Rocks, textures (date TBA)                      |       |                                                                 |
| Dec. 1      | Synthesis: Evidence of past and current climate change               | Suppl. rdgs. | 12/2: Make-up day to accommodate schedule changes (weather, etc.) |

Final Exam – Tuesday, 12/9, 8:30-11:30am

The 1-hour lab practical will be individually scheduled during Mon-Wed. of finals week.
GEOL 155 – Historical Geology

Dr. Frank L. Forcino  Office: 335 Stillwell  Fall 2014
Phone: 277-2888
Email: ffforcino@email.wcu.edu
Office Hours: MTR 8:00am to 9:30am or by appointment

Lecture:  TR 9:30-10:45  229 McKee
Lab 1:  W 1:00-2:50  355 Stillwell
Lab 2:  W 3:00-4:50  355 Stillwell

Purpose: This course is intended to introduce students to the major events in the evolution of life and environments through Earth’s history. We will employ the tools that geologists use, such as rocks and minerals, dating methods, and fossils, in order to understand the fundamental geologic principles of plate tectonics, evolution, extinction, and deep time.

Objectives: By the end of this liberal studies course, students will be able to:
- Identify and understand the origin of key minerals, rocks, and fossils
- Understand the major events of geologic time and the stratigraphic rock record
- Understand the history of life, and the processes of evolution and extinction
- Collect, analyze, synthesize, and evaluate scientific information from a variety of sources including field and laboratory exercises, classroom discussions, and the scientific literature
- Create geologic maps and cross sections as part of the process of interpreting geologic data

Readings: Lectures will not necessarily follow the textbook, so attendance in class is critical. Relevant readings (typically online or as PDF) will be assigned throughout the semester. Supplemental readings will be suggested as well. Text: Martin (2013) Earth’s Evolving Systems. Jones & Bartlett Learning. (available to rent).

Lab: Most lab exercises will be due by the end of the lab period. Late assignments will not be accepted. If you miss a lab due to an excused absence, you may be able make it up.

Participation: Your attendance in class and participation in activities will play a large role in your success and will be part of your final grade. You are solely responsible for missed materials if you miss a class. I will not supply missed class notes. Obtain missed material from fellow classmates.

In-class Activities / Homework: In-class activities and take-home exercises will be assigned throughout the course. Homework will be due at the beginning of the next class period unless otherwise specified. Late assignments will not be accepted without a valid excuse.

Grading: Your final grade will be calculated as follows:

**Lecture (60%)**
- Quiz 1  5%
- Quiz 2  5%
- Quiz 3  5%
- Mid-term project  10%
- Final Exam (cumulative)  15%
- Class participation/in-class activities  20%

**Lab (40%)**
- Lab exercises & homework  30%
Lab final (exam / project) 10%

**Attendance:** If you have a scheduled absence due to university activities, you must provide me with notice at least one week in advance. Unforeseen but excusable absences (e.g. illness, family emergency) will be evaluated on a case-by-case basis. Make-ups for unexcused absences will not be permitted and any corresponding exam or in-class activity will receive zero credit. *Each unexcused absence after the first two will result in the lowering of your final grade by 5%.*

**Make-up Quizzes / Exams:** If you miss a quiz or exam for any reason, you must present an acceptable and documented excuse to make it up. The make-up test may differ in format and content from the regularly scheduled test.

**Personal Electronics:** Cellphone use is not permitted in the classroom, unless otherwise specified. Science gave you those phones, and it can take them away. Please silence or turn off phones so they do not disrupt class. You are encouraged to bring laptops or tablets to class, but they may only be used to take notes and for class activities. Headphones and music players may not be used.

**Group Work:** Many exercises in this course will require you to work in groups. It is permissible, and often advisable, for a group to split up duties. However, each student is responsible for making all calculations, answering all questions and drawing diagrams INDIVIDUALLY, unless specifically stated otherwise. Students should neither dominate the group, nor rely on the group to complete the activity. Failure to participate fully and fairly in group activities may result in a lower grade.

**Academic Integrity Policy:** You will follow Western Carolina University’s Academic Integrity Policy (academicintegrity.wcu.edu). Academic dishonesty includes:

- **Cheating:** using or attempting to use unauthorized materials, information, or study aids.
- **Fabrication:** creating and/or falsifying information or citation in an academic exercise.
- **Plagiarism:** representing someone else’s words or ideas as one’s own.
- **Facilitation:** helping or attempting to help someone violate the Academic Honesty Policy (e.g., allowing another to copy during an exam; ghostwriting another’s essay).

The instructor has the right to determine the appropriate sanction(s) for academic dishonesty up to and including a final grade of “F” in the course. Further discipline may be imposed by the university.

**Class Conduct:** Disruptive or harassing behavior will not be tolerated in class. All class members must be treated with respect. Students who persist in derogatory or disruptive behavior may be asked to leave the classroom.

**Catamount Academic Tutoring Center:** 30 Hunter Library, 227-2274, (http://catcenter.wcu.edu)

CAT Center tutors are academically successful students who are recommended by the faculty and trained in effective tutoring practice. Instructions for scheduling appointments with tutors are on the CAT Center website. Students are expected to arrive at tutoring sessions on time; prepared with class notes, readings, assignments, and any questions they have about the material.

**The Writing and Learning Commons (WaLC):** located in BELK 207, provides free small-group course tutoring, one-on-one writing tutoring and academic skills consultations, and online writing and learning resources for all students. To schedule tutoring appointments, log in to TutorTrac from the WaLC homepage (http://walc.wcu.edu/) or call 828-227-2274

**Accommodations for Students with Disabilities:** Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to Disability Services. All information is confidential. Please contact the Office of Disability Services for more information at (828) 227-3886.

If you think you may have a disability that may interfere with your performance in class, please do not hesitate to contact the office of Disability Services for more information! If you require accommodation for a quiz or
other activity, please contact me with official documentation at least one week prior to the quiz/activity.

The instructor reserves the right to alter or amend this syllabus without notice.

**Course Outline**

Topics and dates are subject to change.

<table>
<thead>
<tr>
<th>Week of</th>
<th>Topics</th>
<th>Readings</th>
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<tbody>
<tr>
<td>August 18</td>
<td>Introduction, Science, Critical Thinking</td>
<td>Chapter 1</td>
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<tr>
<td>Aug 20 Lab</td>
<td>Box Thinking, the Nature of Geoscience</td>
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<tr>
<td>August 25</td>
<td>Geologic Time, Tectonics</td>
<td>Chapters 6, 7</td>
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<tr>
<td>Aug 27 Lab</td>
<td>Tectonics Activity</td>
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<tr>
<td>Sept. 1</td>
<td>Tectonics, Sedimentary Systems</td>
<td>Chapter 3</td>
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<tr>
<td>Sept. 3 Lab</td>
<td>Rocks and Minerals</td>
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<tr>
<td>Sept. 8</td>
<td>Sedimentary Systems, Dating Techniques</td>
<td>Chapter 5</td>
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<tr>
<td>Sept. 10 Lab</td>
<td>Sedimentary Systems</td>
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<tr>
<td></td>
<td><strong>QUIZ 1</strong></td>
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<tr>
<td>Sept. 15</td>
<td>Dating Techniques</td>
<td>Chapter 5</td>
</tr>
<tr>
<td>Sept. 17 Lab</td>
<td>Dating</td>
<td></td>
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<tr>
<td>Sept. 22</td>
<td>Fossils, Diversity and Extinction</td>
<td>Chapters 3, 4</td>
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<tr>
<td>Sept. 24 Lab</td>
<td>Fossils</td>
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<tr>
<td>Sept. 29</td>
<td>Diversity and Extinction, Evolution</td>
<td>Chapters 3, 4</td>
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<tr>
<td></td>
<td><strong>QUIZ 2</strong></td>
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<tr>
<td>Oct. 1 Lab</td>
<td>Evolution</td>
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<tr>
<td>Oct. 6</td>
<td>Evolution, Origin of the Universe</td>
<td>Chapter 7, 8</td>
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<tr>
<td>Oct. 8 Lab</td>
<td>Project Meetings</td>
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<tr>
<td>Oct 13</td>
<td><strong>BREAK</strong></td>
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<tr>
<td>Oct. 20</td>
<td>Origin of the Universe and Solar System</td>
<td>Chapter 7, 8</td>
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<tr>
<td>Oct. 22 Lab</td>
<td>Sediment and Weathering</td>
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<tr>
<td></td>
<td><strong>BEGINNING OF PRESENTATIONS</strong></td>
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<tr>
<td>Oct. 27</td>
<td>Precambrian, Paleozoic</td>
<td>Chapters 9, 10</td>
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<tr>
<td>Oct. 29 Lab</td>
<td>Geologic Maps, Strike and Dip</td>
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<tr>
<td>Nov. 3</td>
<td>Paleozoic</td>
<td>Chapters 11, 12</td>
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<tr>
<td>Nov. 5 Lab</td>
<td>Stratigraphy</td>
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<tr>
<td>Nov. 10</td>
<td>Paleozoic, Mesozoic</td>
<td>Chapter 13</td>
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<tr>
<td>Nov. 12 Lab</td>
<td>Paleozoic Diversity, K/Pg review paper</td>
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<td></td>
<td><strong>QUIZ 3</strong></td>
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<tr>
<td>Nov. 17</td>
<td>Mesozoic</td>
<td>Chapter 13</td>
</tr>
<tr>
<td>Nov. 19 Lab</td>
<td>Cenozoic Climate, Ice ages</td>
<td>Chapters 16, 17</td>
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<tr>
<td>Nov. 24</td>
<td>Mesozoic, Cenozoic</td>
<td>Chapters 14, 15</td>
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<tr>
<td>Nov. 26 No Lab</td>
<td>Thanksgiving Break</td>
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<tr>
<td>Dec. 1</td>
<td>Cenozoic</td>
<td>Chapters 14, 15</td>
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<tr>
<td>Dec. 3 Lab</td>
<td><strong>LAB FINAL</strong></td>
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<tr>
<td>Dec. 8</td>
<td><strong>FINAL EXAM</strong></td>
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</tbody>
</table>

*Thursday December 10, 12:00pm – 2:30pm*
I. Rationale/Purpose
This seminar addresses both the relation of landscapes to culture and the forces that formed those landscapes. The tension between nature’s power and humans is documented by John McPhee in his *Atchafalaya* and can be seen in the recent tsunami and hurricane disasters. However, as Dave Montgomery show us, cities and societies have historically flourished or failed because of the presence or absence of natural resources, and Simon Schama shows us that nature is engrained in our culture. Thus, humans can be accused of being concurrently divorced and married to the natural world. This seminar explores the relation of humans, landscapes and the way that geologic forces create them while cultivating student writing, communication and logic skills.

II. Course Learning Objectives
Specific Learning Objectives:
By the end of this course, students will:

- Explain the geologic origin and geologic processes related to soils and rivers (powerpoint movies and readings)
- Analyze how landscapes affect the practical aspects of how and how well we live and the development of societies (Montgomery, project)
- Identify how people connect with the land. What inspires them? How do culture and landscape intersect (if they do)? (Kingsolver, Leopold, Schama, and Thoreau)
- Analyze how different people have different views of the best use of the same landscape (McPhee, Leopold, and Rash)
- Analyze data to solve basic geologic problems (water quality project, in class analysis of graphs and data)

Liberal Studies and First Year Seminar Learning Objectives
First Year Seminar goals
- Learn about the importance of Liberal Studies in the curriculum (first class, exams)
- Consider how reasoning skills and communication skills are the foundation of life-long intellectual and professional growth (presentation, research project, and ongoing writing assignments)
- See that cultural, social, economic and political issues of a global society are not limited to one academic discipline or profession (Montgomery book, readings and project)
- Discuss serious ideas and develop rigorous intellectual habits (reading assignments, project, Montgomery book, Rash book)

Liberal Studies Goals
- Demonstrate the ability to locate, analyze, synthesize, and evaluate information (project);
- Demonstrate the ability to interpret and use numerical, written, oral, and visual data (readings, project, field observation);
- Demonstrate the ability to read with comprehension, and to write and speak clearly, coherently, and effectively as well as to adapt modes of communication appropriate to an audience (reading exercises, readings, project presentation);
- Demonstrate the ability to critically analyze arguments (readings in class and homework);
- Demonstrate the ability to recognize behaviors and define choices that affect lifelong well-being (homework, studying, environmental issues discussion);
- Demonstrate an excitement for and love of learning;
- Demonstrate an understanding of
  - Past human experiences and ability to relate them to the present (Montgomery);
  - Different contemporary cultures and their interrelationships;
  - Issues involving social institutions, interpersonal and group dynamics, human development and behavior, and cultural diversity;
  - Scientific concepts and methods as well as contemporary issues in science and technology (project);
  - Cultural heritage through its expressions of wisdom, literature and art and their roles in the process of self and social understanding.
III. Course Materials

Course readings:

- Other readings, video and web content will be provided (see attached list).

IV. Faculty Expectations of Students/Course Policies

**Statement on Accommodations for students with disabilities:** Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to the Office of Disability Services. All information is confidential. Please contact the Office of Disability Services at (828) 227-3886 or come by Suite 135 Killian Annex for an appointment.

**Academic Honesty Policy:** "I will practice personal and academic integrity" – WCU Community Creed

Western Carolina University (WCU) strives to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. Any violation of the Academic Integrity Policy is a violation of the Code of Student Conduct (see dsce.wcu.edu for more information).

Violations of the Academic Integrity Policy include:

- **Cheating** - Using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
- **Plagiarism** - Representing the words or ideas of someone else as one’s own in any academic exercise.
- **Fabrication** - Creating and/or falsifying information or citation in any academic exercise.
- **Facilitation** - Helping or attempting to help someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another to copy information during an examination)

Faculty members have the right to determine the appropriate sanction(s) for violations of the Academic Integrity Policy within their courses, up to and including a final grade of “F” in the course. Students will be notified, in writing, of any Academic Integrity Policy allegation and have the right to respond to the allegation. The full text of the WCU Academic Integrity Policy, Process, and the Faculty Reporting Form can be found online at: academicintegrity.wcu.edu.

Please visit studysmart.wcu.edu for further information.

**Additional Honesty Policy for this class:**

**Statement on Group Work and Plagiarism:** In the modern work environment, we often work in teams. Teamwork facilitates the exchange of ideas and learning. However, teamwork does not eliminate the need for personal accountability and individual responsibility. Some course exercises and labs require you to work in peer groups. Each student is expected to participate fully in the work of the group:

1. You may not sit on the sidelines during group work and then copy the data or duplicate the results later.
2. It is permissible, and sometimes advisable, for a group to split up work. *For example*, in a stream profiling exercise, two group members might take measurements for a profile while two others take measurements for calculating the velocity of a stream. In this case, the two who gathered profile data may copy velocity from the other two. However, each student is responsible for making all calculations, answering all questions and drawing maps and profiles INDIVIDUALLY, unless specifically stated otherwise in the lab handout.
3. Excessive similarity among the results of group members may be construed as plagiarism.
4. In reading assignments, all quotations from the text book or other sources must be cited.

**Student Support Services**

Student Support Services provides support to students who are either first-generation, low-income or those who have disclosed a disability with: academic advising, mentoring, one-on-one tutorial support, and workshops focused on career, financial aid and graduate school preparation. You may contact SSS at (828) 227-7127 or email sssprogram@wcu.edu for more information. SSS is located in the Killian Annex, room 138.

**Attendance Policy:** Unless excused from class, students cannot turn in assigned work nor get credit for in-class assignments. Excused absences can be granted by contacting me at least an hour before class. I usually grant excused
absences for activities in other classes, sickness, family emergencies or issues, doctor’s appointments, etc. You must notify me by email prior to the class to be “excused.”

Statement on late and/or makeup assignments: Late assignments will NOT be accepted unless excused prior to the due date!

Statement of expectations for participation: This is a seminar, so student participation drives the class. Initially, I do not plan on having a participation policy, but I may gear grading towards encouraging participation if everyone is quiet or unprepared. Remember, you all have unique experiences and perspectives to offer—we’re all learning together!

Guidelines for classroom behavior: We simply need to treat each other with respect and consideration. Try to turn off your mobile devices. NO TEXTING!

Inclement weather policy: If the University is closed then we will not have class. If class is cancelled for another reason, then I will be sure to let you know as soon as I can.

CourseEval: Student evaluation of my instruction will be open at the end of the semester.

Blackboard: Blackboard is the major way that I will communicate and distribute information (assignments) in the class. Functions of Blackboard will definitely include distributing assignments, turning in assignments, class email, class announcements and class calendar. Please know how to access it!

Flipped Classroom: I will generally only lecture for short periods of time. Longer lectures that provide science background will be placed on Blackboard. You will be expected to watch these before the class where we discuss it.

V. Grading Procedures:

- **Exams:** Exams will be take home exams. They will be turned in online and consist of essay questions. Sample exams will be put online. I will provide rubrics in that they will allow me to provide feedback on your writing.

- **In-Class Activities:** We do a number of activities that you get a zero if you miss it. These activities generally reinforce the material which is introduced in lecture. These are generally group activities and focus around discussions and understanding the texts and ourselves.

- **Projects:** This semester will have a project—a study of water quality—which will involve collecting and analyzing data. Again, this will be an opportunity to work on your writing, analysis skill, and understanding how science can inform policy.

- **Reading Homework:** Reading the text is an essential part of learning the material. Our in-class time should be a analyzing and discussing the material, not presenting material for the first time, so outside reading is critical. Twelve response papers are required this semester. This means that you will respond individually to the reading. All of these assignments will be on Blackboard. I will not always correct the whole homework but rather sample a part of the homework to read. The homework will get a check (90), check minus (80) or check plus (100). If you do not complete the homework you receive a 0.

**Rubric for Reading Responses:**

<table>
<thead>
<tr>
<th>Criterion</th>
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<tbody>
<tr>
<td>Check minus</td>
</tr>
<tr>
<td>Does most of the assignment (3/4) or more and does reasonable job</td>
</tr>
<tr>
<td>Check</td>
</tr>
<tr>
<td>Does reasonable job (clear the individual read the assignment)</td>
</tr>
<tr>
<td>Check plus</td>
</tr>
<tr>
<td>Has clearly already mastered the material and is well written (complete and clear sentences)</td>
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</tbody>
</table>
- Class grades are determined by:

<table>
<thead>
<tr>
<th>Part of Class</th>
<th>Percentage of Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-Term Exam</td>
<td>25%</td>
</tr>
<tr>
<td>Final Examination</td>
<td>25%</td>
</tr>
<tr>
<td>Research Project</td>
<td>25%</td>
</tr>
<tr>
<td>In-Class Activity</td>
<td></td>
</tr>
<tr>
<td>Assignments, Homework</td>
<td>25%</td>
</tr>
</tbody>
</table>

- Letter grades will be assigned according to the following Grading and Quality Point System.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Interpretation</th>
<th>Quality Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Excellent</td>
<td>4.0</td>
</tr>
<tr>
<td>B</td>
<td>Good</td>
<td>3.0</td>
</tr>
<tr>
<td>C</td>
<td>Satisfactory</td>
<td>2.0</td>
</tr>
<tr>
<td>U</td>
<td>Unsatisfactory</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Incomplete</td>
<td></td>
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<tr>
<td>W</td>
<td>Withdrawal</td>
<td></td>
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The grades of A, B, C, and U indicate gradations in quality from Excellent to Unsatisfactory. There are NO +/- grades, nor D’s or F’s for the first-year seminar.

Grading must adhere to this menu for ALL first-year seminars.

Composition-Condition Marks. A student whose written work in any course fails to meet acceptable standards will be assigned a composition-condition (CC) mark by the instructor on the final grade report. All undergraduates who receive two CC grades prior to the semester in which they complete 110 hours at Western Carolina University are so notified by the registrar and are required to pass English 300 or English 401 before they will be eligible for graduation. This course must be taken within two semesters of receiving the second CC and must be passed with a grade of C (2.0) or better.

Students must be familiar with the class attendance, withdrawal, and drop-add policies and procedures.
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Reading Assignment (10 points apiece)</th>
<th>Other Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Mon, Aug 18</td>
<td>Class Introduction</td>
<td>Assignment 1: Kingsolver, Memory Place; Read Report from Hart and Associates</td>
<td></td>
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<tr>
<td>2 Wed, Aug 20</td>
<td></td>
<td>Memory Place Essays (10 points)</td>
<td></td>
</tr>
<tr>
<td>4 Mon, Aug 25</td>
<td>Reading Texts: Thoreau’s Walking and Others</td>
<td>Assignment 2: Schama, Landscape and Memory</td>
<td></td>
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<tr>
<td>5 Wed, Aug 27</td>
<td>Nature’s Embeddedness in our Culture</td>
<td>Assignment 3: Leopold, Land Ethic</td>
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<tr>
<td>Mon, Sep 1</td>
<td>University Closed – Labor Day</td>
<td>Meet at Cullowhee Creek</td>
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<tr>
<td>7 Wed, Sep 3</td>
<td>A Land Ethic</td>
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<tr>
<td>9 Mon, Sep 8</td>
<td>Creek Observation</td>
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<td></td>
<td><strong>Rivers: Transport and Life</strong></td>
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<tr>
<td>10 Wed, Sep 10</td>
<td>Water Basics</td>
<td>Watch Dave’s Powerpoint on Rivers; Hand in Creek Observation (10 pts)</td>
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<td>12 Mon, Sep 15</td>
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<tr>
<td>13 Wed, Sep 17</td>
<td>Commerce and Rivers</td>
<td>Assignment 4: McPhee, Atchafalyya</td>
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<tr>
<td>15 Mon, Sep 22</td>
<td>River Aesthetics</td>
<td>Assignment 5: Rash, Saints at the River</td>
<td></td>
</tr>
<tr>
<td>16 Wed, Sep 24</td>
<td>Water Quality</td>
<td>Assignment 6: Murphy, Exurbanization</td>
<td></td>
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<tr>
<td>18 Mon, Sep 29</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>19 Wed, Oct 1</td>
<td>Study Design</td>
<td></td>
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<tr>
<td>21 Mon, Oct 6</td>
<td></td>
<td></td>
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<tr>
<td>22 Wed, Oct 8</td>
<td>Data Analysis Basics</td>
<td>Group Research Question Due (15 points)</td>
<td></td>
</tr>
<tr>
<td>24 Mon, Oct 20</td>
<td>Project Days: Students in Field and Meeting with Prof</td>
<td></td>
<td>Field Quiz (15 points)</td>
</tr>
<tr>
<td>25 Wed, Oct 22</td>
<td></td>
<td></td>
<td>Mid Semester Peer Evaluation (10 points)</td>
</tr>
<tr>
<td>27 Mon, Oct 27</td>
<td>Rivers and Society</td>
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<td></td>
<td><strong>Soils and Life</strong></td>
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<tr>
<td>28 Wed, Oct 29</td>
<td>Soil Properties and Field Experience</td>
<td>Watch: Dave’s Powerpoint on Soil Basics</td>
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<tr>
<td>30 Mon, Nov 3</td>
<td></td>
<td>Assignment 7: Dirt, Chapter 2 “Skin of the Earth”</td>
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</tr>
<tr>
<td>31 Wed, Nov 5</td>
<td>Food and Flooding</td>
<td>Assignment 8: Dirt, Chapter 3 “Rivers of Life”</td>
<td></td>
</tr>
<tr>
<td>33 Mon, Nov 10</td>
<td>Project Data Analysis</td>
<td>Assignment 9: Summary of Dirt, Chapter 10</td>
<td></td>
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<tr>
<td>34 Wed, Nov 12</td>
<td>Soil Production+ Dust Bowl</td>
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<tr>
<td></td>
<td><strong>Soil Erosion, Development and Society</strong></td>
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<tr>
<td>36 Mon, Nov 17</td>
<td>Soil Erosion Field Trip</td>
<td>HHS Building: TBA</td>
<td>Data Analysis (10 points)</td>
</tr>
<tr>
<td>37 Wed, Nov 19</td>
<td>Serena, Forestry, and the Appalachian Landscape</td>
<td>Assignment 10: Ron Rash’s Serena</td>
<td></td>
</tr>
<tr>
<td>39 Mon, Nov 24</td>
<td>Thanksgiving – No Classes</td>
<td></td>
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<tr>
<td>Wed, Nov 26</td>
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<tr>
<td>40 Mon, Dec 1</td>
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<tr>
<td>41 Wed, Dec 3</td>
<td>Presentations and Review</td>
<td></td>
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<td></td>
<td><strong>Appendix 3: Page 31 of 189</strong></td>
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</tbody>
</table>
Reading List


NSF Grant Information (IRB Approved)

As part of this class, all students will participate in scientific research related to the course topic. Together, we will be investigating how different elements of the landscape in the Southern Appalachians can be used to develop predictive models of the quality and quantity of stream water and groundwater. This type of knowledge is important to understanding aquatic ecosystems and to environmentally sound land use planning.

Separate from the class scientific research project, we (Dave Kinner & Mark Lord) are carrying out a study to evaluate the role of authentic (i.e. real) research experiences on student learning, especially in the sciences. Lots of data show that individual research by college seniors provides benefits to understanding science and careers. For our study, we want to test the role of research-based learning by small groups of students in a wide variety of classes. To best test this, we hope that you will permit us to use your feedback on the value of research-based learning. Your feedback will be collected during class time in two ways: 1) In a small-group discussion led by member of the WCU faculty center who specializes in educational assessment. 2) By completing an online questionnaire related to undergraduate research.

All students in this class must take part in the group discussions and complete the survey. However, only the feedback by students who provide consent will be included in our research-based learning study. We will analyze the data from these assessments to better understand the value of research-based learning. If all goes well, you can help us advance the understanding of science education in general. Be assured that your answers are completely confidential and will be reported only as summaries in which no individual’s answers will be identified.

We (Dave & Mark) will not receive questionnaire responses or feedback of small-group discussions until after the semester is over and grades are completed.

Permitting us to use your feedback as part of our study on research-based learning is completely voluntary. It will have no impact on your course grade, our view of you, or any future opportunities.

If you have any questions or comments about this study, we would be happy to talk with you. Please be aware that this questionnaire has been approved by the University’s Institutional Review Board. If you have any questions about this approval process, please contact the IRB at 227-317

I ___________ (do or do not; circle one) consent to let my assessments of research-based learning to by used as part the study by Drs. Kinner and Lord.

____________________________________  ____________________________________  
printed name   signature

__________________________  
date
GEOL 250: Introduction to the Rock Forming Minerals

Fall 2014

Lecture: Stillwell 322
Lab: Stillwell 355
Tuesday & Thursday 11:00 am to 12:15 pm
Monday 1:00 to 2:50 pm OR 3:00 to 4:50 pm

Instructor: Amy L. Fagan, PhD
Office: Stillwell 319
E-mail: alfagan@email.wcu.edu
Phone: (828) 227-3820
Office Hours: 12:30 to 2:00 pm Tuesday and Thursday or by appointment

I. RATIONALE/PURPOSE

Minerals form under many conditions (over a range of temperatures and pressures) and provide us with information that allows us to understand the history of Earth and the origin of the solar system. Therefore, mineralogy is integral to all branches of geology, from petrology to structural geology. This course also serves directly as the pre-requisite for GEOL 355 (Petrology), which will be taught next semester (Spring 2015).

We will cover three basic topics to allow you to identify minerals in hand sample and thin-section throughout the semester: crystal structure & mineral chemistry, physical properties of minerals, and optical mineralogy. These topics will be introduced in class, and you will be given the opportunity to put this knowledge to use during weekly lab periods as well as a research project.

Prerequisites: GEOL 140 (Invest. Env. Geo) or 150 (Methods in Geo.) and CHEM 132 (Surv. of Chem. I) or 140 (Adv. Gen. Chem).

Credits: 3

II. COURSE AIMS AND OBJECTIVES

- Aims: This course provides students with an introduction to the study of minerals, their structure, uses, and physical and optical properties used in identification. Students will learn how to identify unknown minerals in hand sample and thin-section.

- Specific Learning Objectives: Following completion of this course, you will be able to:
  - Evaluate the physical properties of minerals and use these properties to identify unknown minerals;
  - Use the petrographic microscope to identify minerals in thin-section;
  - Utilize the classification scheme for silicate minerals;
  - Explain the practical uses for a variety of minerals;
  - Use the scientific literature for research and clearly present research to your peers;
  - Discover a life-long appreciation of minerals, their uses in other Geoscience disciplines, and their place in your everyday life!

III. Course Materials

- Availability: Rental through the WCU bookstore; Amazon.com list price of $128.53 (as of 08/11/2014)
- Recommended Reference texts (available in Stillwell 355):
  - An Introduction to the Rock-Forming Minerals by Deer, Howie and Zussman
  - Introduction to Optical Mineralogy by William D. Nesse
- Supplementary readings may be assigned and will be available on Blackboard.

IV. FACULTY EXPECTATIONS OF STUDENTS/ AVAILABLE UNIVERSITY RESOURCES /COURSE POLICIES

Accommodations for Students with Disabilities: Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to the Office of Disability Services. All information is confidential. Please contact the Office of Disability Services at (828) 227-3886 or come by Suite 135 Killian Annex for an appointment. You may also visit the office’s website at http://disability.wcu.edu.

Student Support Services: Student Support Services provides support to students who are either first-generation, low-income or those who have disclosed a disability with: academic advising, mentoring, one-on-one tutorial support, and workshops focused on career,
financial aid and graduate school preparation. You may contact SSS at (828) 227-7127 or email sssprogram@wcu.edu for more information. SSS is located in the Killian Annex, room 138.

**Writing and Learning Commons (WaLC):** The Writing and Learning Commons (WaLC), located in BELK 207, provides free small-group course tutoring, one-on-one writing tutoring and academic skills consultations, and online writing and learning resources for all students. All tutoring sessions take place in the WaLC or in designated classrooms on campus. To schedule tutoring appointments, log in to TutorTrac from the WaLC homepage (walc.wcu.edu) or call 828-227-2274. Distance students and students taking classes at Biltmore Park are encouraged to use Smarthinking and the WaLC’s online resources. Students may also take advantage of writing tutoring offered at the Biltmore Park campus on certain days of the week; call 828-227-2274 or log in to TutorTrac and select “Biltmore Park Writing Tutoring” for availabilities.

**The Mathematics Tutoring Center:** The Mathematics Tutoring Center (455 Stillwell, http://mathlab.wcu.edu, 227-3830) provides tutoring in all lower-division math and many CS courses, help with mathematical concepts in other disciplines, and workshops on study skills specific to mathematics courses. Tutoring is available on a drop-in basis, 9-5 and 6-9 pm Monday-Thursday, and 9-5 on Friday or by appointment.

**Academic Integrity Policy:**

"I will practice personal and academic integrity" – WCU Community Creed

Western Carolina University (WCU) strives to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. Any violation of the Academic Integrity Policy is a violation of the Code of Student Conduct (see dsce.wcu.edu for more information).

Violations of the Academic Integrity Policy include:

- **Cheating** - Using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
- **Plagiarism** - Representing the words or ideas of someone else as one’s own in any academic exercise.
- **Fabrication** - Creating and/or falsifying information or citation in any academic exercise.
- **Facilitation** - Helping or attempting to help someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another to copy information during an examination).

Faculty members have the right to determine the appropriate sanction(s) for violations of the Academic Integrity Policy within their courses, up to and including a final grade of “F” in the course. Students will be notified, in writing, of any Academic Integrity Policy allegation and have the right to respond to the allegation. The full text of the WCU Academic Integrity Policy, Process, and the Faculty Reporting Form can be found online at: academicintegrity.wcu.edu.

Please visit studysmart.wcu.edu for further information.

**Statement on Group Work and Plagiarism:** In the modern work environment we are often called upon work as teams. Teamwork facilitates the exchange of ideas and helps us learn from one another. Different people bring different ideas to the group. However, teamwork does not eliminate the need for personal accountability, and individual responsibility. Some exercises in this course will require you to work in peer groups (such as the Pet Mineral Project). Each student is expected to participate fully in the work of the group and to follow these guidelines:

- It is permissible, and sometimes advisable, for a group to split up work. However, each student is responsible for answering all questions INDIVIDUALLY, unless specifically stated otherwise in the assignment.
- It is not acceptable to sit by the sidelines while your group works, and then copy the data or duplicate the results later.
- Be warned that excessive similarity among the results of group members will be treated as plagiarism.

I expect groups to share ideas and thoughts, but everyone must participate fairly. If you have any questions about what is appropriate to share and what is not, ASK ME.

**Attendance Policy:** Students are expected to attend class, and should do so to receive full class participation credit. Due to the condensed nature of this course, missing a single class constitutes missing a major portion of the material and is strongly discouraged. Excused absence requests/notifications should be provided to be via e-mail at least 24 hours in advance. Please see WCU’s policy on what constitutes an excused absence: http://catalog.wcu.edu/content.php?catoid=29&navoid=560 - clas_att_poli. The forms for University Sponsored Absence and Class Absence due to Required Religious Observance are found on the Registrar’s webpage at http://www.wcu.edu/24089.asp.
**Deadlines and Late Work:** Assignments are due at the beginning of class, and I expect you to turn in work on time. Any assignment turned in after this deadline will be late. For each day that an assignment is late, you will lose 20% of your grade for that assignment. Late work will not be accepted more than 3 days after the original due date. Note: assignments turned in at the end of the due date (rather than the beginning of class) will result in a 10% deduction. Exams must be taken during the scheduled time. If you have an extenuating circumstance, you must inform me at least 3 days in advance.

**Participation:** Participation, although a small portion (5%) of your grade, is important on a practical level, as it develops mature behaviors that will serve you well beyond the walls of WCU. To be considered an active class participant (and therefore receive full class participation credit), you must abide by the following rule:

- Be attentive and respectful to others in the classroom
  - What does this mean? Attend class regularly, be on time, turn off mobile devices, etc.

**Inclement weather policy:** If the University closes for inclement weather, class will be canceled. If there is another reason to cancel class, then I will attempt to notify everyone by email. I may rearrange assignments if the weather is inclement.

**V. Grading Procedures**

Grades and point scale*: 100-97%: A+, 96-94%: A, 92-90%: A-, 89-87%: B+, 86-83%: B, 82-80%: B-, 79-77%: C+, 76-73%: C, 72-70%: C-, 69-67%: D+, 66-63%: D, 62-60%: D-, <60%: F

<table>
<thead>
<tr>
<th>Percentage of Grade</th>
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</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>15%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>15%</td>
</tr>
<tr>
<td>Final Exam (cumulative)</td>
<td>25%</td>
</tr>
<tr>
<td>Lab and Lecture Assignments</td>
<td>20%</td>
</tr>
<tr>
<td>Pet Mineral Project</td>
<td>20%</td>
</tr>
<tr>
<td>Class Participation</td>
<td>5%</td>
</tr>
</tbody>
</table>

**Exam 1 (15%):** The first exam will tentatively be scheduled for in class on **Tuesday, September 9** and will cover all material from lecture and lab up until that point. It will not, however, include the use of the microscope.

**Exam 2 (15%):** The second exam will tentatively be scheduled for in lab on **Monday, October 6** and will cover all material from lecture and lab since the first exam. There will be a portion of the exam that will employ the use of the microscope to identify minerals in thin-section.

**Final Exam (25%):** The final exam is scheduled for 12:00-2:30 pm on **Tuesday, December 9**. This exam will be cumulative for all material covered in the lecture and lab as well as material presented by your peers in the final portion of the Pet Mineral project (see below).

**Lab and Lecture Assignments (20%):** Lab assignments will be given in the Lab portion of the course. Students are expected to work through the assignment during the lab time slot as well as any necessary time on their own. Lab assignments are due at the beginning of the next lab meeting. Some assignments will also be given during the lecture portion of the course; due dates for these assignments will vary.

**Pet Mineral Project (20%):** The majority of the second half of this course will be a research project while I am unable to be in the office and classroom on a daily basis. I will provide you with a detailed assignment a few weeks into the semester, but here is a very brief summary: You will work with your peers in assigned groups. Your group will be provided with a hand specimen of a mineral, which you must identify and carefully note how the identification was made and any physical properties of the mineral. After the initial identification, your group will be given a thin-section of the mineral and you will note all of the optical properties. Your group will then research the chemical composition, history, uses, etc. of the mineral. Individually, you will each write-up your findings (making sure to fully cite sources); the final write-up will be due at the beginning of the last lab section (Monday, December 1). As a group, you will present your findings to the class in the final two sections of lecture (Tuesday, December 2 and Thursday, December 4). These presentations will serve as a great review for the final; in addition, some material from the final will be pulled directly from these presentations, such as the primary uses of particular minerals.

**Class Participation (5%):** All students are expected to participate fully and respectfully in class. Please see “Expectations for Participation” above to ensure that you earn full credit here.
## VIII. Tentative Course Schedule

*May change to accommodate student needs and the arrival of Baby Fagan 2.0*

<table>
<thead>
<tr>
<th>Week</th>
<th>Day</th>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Monday</td>
<td>18-Aug</td>
<td>First Day of Class Logistics, syllabus, expectations</td>
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<tr>
<td></td>
<td>Tuesday</td>
<td>19-Aug</td>
<td>Crystal Chemistry</td>
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<td></td>
<td>Thursday</td>
<td>21-Aug</td>
<td>Crystal Structure and Growth</td>
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<tr>
<td></td>
<td>Monday</td>
<td>25-Aug</td>
<td>LAB: Physical Properties of Minerals</td>
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<tr>
<td></td>
<td>Tuesday</td>
<td>26-Aug</td>
<td>Refraction and Isotropic Minerals</td>
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<tr>
<td></td>
<td>Thursday</td>
<td>28-Aug</td>
<td>Anisotropic Minerals</td>
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<tr>
<td>2</td>
<td>Monday</td>
<td>1-Sep</td>
<td>LABOR DAY-NO CLASS</td>
</tr>
<tr>
<td></td>
<td>Tuesday</td>
<td>2-Sep</td>
<td>Uniaxial Minerals</td>
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<td></td>
<td>Thursday</td>
<td>4-Sep</td>
<td>Biaxial Minerals</td>
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<tr>
<td>3</td>
<td>Monday</td>
<td>8-Sep</td>
<td>LAB: Intro to the microscope and identifying minerals in thin-section</td>
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<td></td>
<td>Tuesday</td>
<td>9-Sep</td>
<td>EXAM 1</td>
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<tr>
<td></td>
<td>Thursday</td>
<td>11-Sep</td>
<td>Mineral Classification and Composition</td>
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<td></td>
<td>Monday</td>
<td>15-Sep</td>
<td>LAB: Identifying minerals in thin-section</td>
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<tr>
<td></td>
<td>Tuesday</td>
<td>16-Sep</td>
<td>Mineral Classification and Composition</td>
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<td></td>
<td>Thursday</td>
<td>18-Sep</td>
<td>Mantle Minerals</td>
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<tr>
<td>4</td>
<td>Monday</td>
<td>22-Sep</td>
<td>LAB: Mineral formulae</td>
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<td></td>
<td>Tuesday</td>
<td>23-Sep</td>
<td>Mantle Minerals</td>
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<td>Thursday</td>
<td>25-Sep</td>
<td>Crustal Minerals</td>
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<td>5</td>
<td>Monday</td>
<td>29-Sep</td>
<td>LAB: Solid solution and plotting</td>
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<td></td>
<td>Tuesday</td>
<td>30-Sep</td>
<td>Metamorphic Minerals</td>
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<td>Thursday</td>
<td>2-Oct</td>
<td>Metamorphic Minerals</td>
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<tr>
<td>6</td>
<td>Monday</td>
<td>6-Oct</td>
<td>EXAM 2</td>
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<tr>
<td></td>
<td>Tuesday</td>
<td>7-Oct</td>
<td>Weathering Minerals</td>
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<td></td>
<td>Thursday</td>
<td>9-Oct</td>
<td>Weathering Minerals</td>
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<tr>
<td>7</td>
<td>Monday</td>
<td>13-Oct</td>
<td>FALL BREAK-NO CLASS</td>
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<tr>
<td></td>
<td>Tuesday</td>
<td>14-Oct</td>
<td>FALL BREAK-NO CLASS</td>
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<td></td>
<td>Thursday</td>
<td>16-Oct</td>
<td>FALL BREAK-NO CLASS</td>
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<tr>
<td>8</td>
<td>Monday</td>
<td>20-Oct</td>
<td>LAB: TBD</td>
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<td></td>
<td>Tuesday</td>
<td>21-Oct</td>
<td>Hydrothermal Minerals</td>
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<td>Thursday</td>
<td>23-Oct</td>
<td>Gems</td>
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<td>9</td>
<td>Friday</td>
<td>24-Oct</td>
<td>Baby Fagan 2.0's Due Date</td>
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<td>10</td>
<td>Monday</td>
<td>27-Oct</td>
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<td></td>
<td>Tuesday</td>
<td>28-Oct</td>
<td>ADVISING DAY-NO CLASS</td>
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<td></td>
<td>Thursday</td>
<td>30-Oct</td>
<td><em>Pet Min Project: Physical properties and ID complete</em></td>
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<td>11</td>
<td>Monday</td>
<td>3-Nov</td>
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<td></td>
<td>Tuesday</td>
<td>4-Nov</td>
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<tr>
<td></td>
<td>Thursday</td>
<td>6-Nov</td>
<td><em>Pet Min Project: Optical properties and ID complete</em></td>
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<tr>
<td>12</td>
<td>Monday</td>
<td>10-Nov</td>
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<td></td>
<td>Tuesday</td>
<td>11-Nov</td>
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<td>Thursday</td>
<td>13-Nov</td>
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<tr>
<td>13</td>
<td>Monday</td>
<td>17-Nov</td>
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<tr>
<td></td>
<td>Tuesday</td>
<td>18-Nov</td>
<td><em>Pet Min Project: Research complete</em></td>
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<tr>
<td></td>
<td>Thursday</td>
<td>20-Nov</td>
<td>LECTURE: The Do's and Don'ts of Powerpoint Presentations</td>
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<tr>
<td>14</td>
<td>Monday</td>
<td>24-Nov</td>
<td></td>
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<tr>
<td></td>
<td>Tuesday</td>
<td>25-Nov</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thursday</td>
<td>27-Nov</td>
<td>THANKSGIVING-NO CLASS Are you thankful for minerals?</td>
</tr>
<tr>
<td>15</td>
<td>Monday</td>
<td>1-Dec</td>
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<tr>
<td></td>
<td>Tuesday</td>
<td>2-Dec</td>
<td><em>Pet Min Project: Write-up Due</em></td>
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<tr>
<td></td>
<td>Thursday</td>
<td>4-Dec</td>
<td><em>Pet Min Project: Group Presentations</em></td>
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<tr>
<td></td>
<td>Monday</td>
<td>8-Dec</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tuesday</td>
<td>9-Dec</td>
<td>FINAL EXAM (12:00 to 2:30 pm)</td>
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</tbody>
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GEOMORPHOLOGY

Scope and Objectives:
Geomorphology, most simply, is the study of landforms and the processes that shape them. As we will learn, because landscapes are at the Earth’s surface, they are both the result of and affect geologic, biologic, hydrologic, and atmospheric systems. And, undoubtedly, the more than 7 billion people on Earth today, as well as our ancestors, are also intricately linked into many cause-effect relationships in landscape systems. Today, an understanding of geomorphology is essential to many environmental problems and policies: some examples are stream restoration, coastal zone management, landslides, climatic change, flooding, and water quality.

The purpose of this course is to provide an introduction to key principles, skills, and investigative approaches to major topics in geomorphology. The laboratory portion of this course, especially the research project, plays a critical part in your learning. At the end of this course you should be able to:

- Analyze how geomorphology can be used to aid society
- Make fundamental observations by learning where, what and how to observe
- Interpret landforms for understanding what geomorphic processes are at work or the geomorphic history for a particular area
- Understand how fundamental physics and chemistry impacts geomorphic processes and be able to apply equations of simple geomorphic phenomena (i.e., driving/resisting forces, budgets, infinite slope equation, resistance law, etc.)
- Apply tools of the trade (topographic maps, spreadsheets, field equipment) towards solving geomorphic processes
- Define and address a geomorphic research question using standard methods and data analysis techniques, and be able to communicate those results to scientific and nonscientific audiences.

Your final exam will have questions that ask you to apply each of these principles to specific examples. Therefore, you already know to some extent what is on your final.

Course Expectations:
We will provide overviews, perspective, assignments, and experiences through classes, labs, a research project, and field trips. For you to maximize the value of this course to your education, your full participation in this course is essential (i.e. attendance, preparedness, effort, attitude, completing all assignments with your best quality, etc.--you should know the drill). Specifically, you need to be learning outside of class. Class time should not be the first time you have seen specific material—read your assignments! We have high expectations for all of you in this class. We expect you to demonstrate appropriate resourcefulness, independence, and dedication to your studies related to this course.

Field investigations, student projects, homework, and other problem solving exercises will make up a significant part of our exploration of geomorphology. There is a very practical side to this course too: geomorphology is embedded into many of our nation’s (and world’s) environmental problems. There is a high probability that those of you who pursue careers in environmental work will be, directly or indirectly, involved in geomorphic studies. Therefore, your ability to get a job related to geomorphology and to do well at the job will be linked to how much you take from this course.
Grading:
Labs, projects, homework, etc. will make up a significant portion of this course. We will have two midterm exams and a cumulative final. Quizzes are not scheduled, but may be used if we feel it will improve the educational value of the course.

20% Midterm Exam I
20% Midterm Exam II
30% Final Exam (cumulative)
30% In-class exercises, labs and research project.

All work submitted for this course must meet minimum college-level requirements with respect to writing, clarity, and completeness. Work submitted that does not meet minimum expectations will not be accepted for evaluation, but may be corrected and resubmitted with a late penalty (see below). Except when noted, all work must be turned in on the assigned due date at the start of lab or class to be considered for full credit. Late work that is not excused will be penalized at 20% per day (including Saturday and Sunday). All out-of-class written assignments, unless stated otherwise, must be typed, 12 point font, double-spaced, and have one inch margins. All references used must be cited in a standard scientific reference format (for example, USGS guidelines; posted on Blackboard for your reference).

Tentative Course Schedule:
Because of the ongoing research project, the schedule will be relatively flexible. We, at this point, will not assign dates, but we will post reading completion dates on Blackboard, so you know when you should finish your reading. Textbook chapters and the instructors (ML or DK) for each topic are included in parentheses.

- Introduction (Chap 1. ML and DK)
- Important Concepts and Energy (Chap 1 and 2, ML)
- Slope Processes and Landslides (Chap 4, DK)
- Hydrology and Basin Morphometry (Chap 5, DK)
- Stream Processes and Forms (Chap 5, 6 ML)
- Fluvial Landscapes (Chap 7, ML)
- Soils and Weathering (Chap 3, DK)
- Glacial Landscapes and Climatic Change (Chap 9,10 ML)
- Karst Processes and Forms (Chap 12, DK)

Important Dates
Exam I: September, 24th
Exam II: November, 14th
Final Exam: December, 11th, Wednesday, 12-2:30

Course Text and Readings: Process Geomorphology, (5th edition), by Ritter, Kochel, and Miller. Other readings will be included on Blackboard.

Attendance:
We expect each of you to attend all classes unless you have an excused absence, although we will not directly count attendance in your grade (but... missing any assignments will directly affect your grade). Your presence, your preparedness, and your participation in all classes and labs are important to your success in the course as well as the success of the class. There will be no make-up work permitted for unexcused absences. Excused absences are given only when: (1) you have a reasonable reason for missing class, (2) before the class you are going to miss, you notify one of us by email. Try to get in the habit of bringing your text and a calculator to all class and lab meetings.
Research Project
You will conduct geomorphic research in the class as part of the class. This research is focused around our hydrologic research station that has been supported by the National Science Foundation (NSF) and NC Dept. of Environment & Natural Resources. This semester, research will be related to channel characteristics of streams within small watersheds near campus. In our opinion, research is that the best way to train to a geoscientist. Note that this project is real research—it is part of a larger effort to learn about the region, and we don’t know what the results will be. Some of you may even be able to present the results of your semester’s work at a professional conference. Research will be completed during class, labs and in some cases your own time. More information will be given about this effort as the semester continues.

NSF Grant Information (IRB Approved)
As part of this class, all students will participate in scientific research related to the course topic. Together, we will be investigating the how different elements of the landscape in the Southern Appalachians can be used to develop predictive models of the quality and quantity of stream water and groundwater. This type of knowledge is important to understanding aquatic ecosystems and to environmentally sound land use planning.

Separate from the class scientific research project, we (Dave Kinner & Mark Lord) are carrying out a study to evaluate the role of authentic (i.e. real) research experiences on student learning, especially in the sciences. Lots of data show that individual research by college seniors provides benefits to understanding science and careers. For our study, we want to test the role of research-based learning by small groups of students in a wide variety of classes. To best test this, we hope that you will permit us to use your feedback on the value of research-based learning. Your feedback will be collected during class time in two ways: 1) In small-group discussions led by member of the WCU faculty center who specializes in educational assessment. 2) By completing an online questionnaire related to undergraduate research.

All students in this class must take part in the group discussions and complete the survey. However, only the feedback by students who provide consent will be included in our research-based learning study. We will analyze the data from these assessments to better understand the value of research-based learning. If all goes well, you can help us advance the understanding of science education in general. Be assured that your answers are completely confidential and will be reported only as summaries in which no individual’s answers will be identified.

Permitting us to use your feedback as part of our study on research-based learning is completely voluntary. It will have no impact on your course grade, our view of you, or any future opportunities.

If you have any questions or comments about this study, we would be happy to talk with you. Please be aware that this questionnaire has been approved by the University’s Institutional Review Board. If you have any questions about this approval process, please contact the IRB at 227-7212.

Geomorphology Lab:
Labs are an essential part, and hopefully a fun part, of this course. The best way to learn geomorphology is to do geomorphology—that is our goal for you in lab. There will be a wide variety of lab types on the topics we study in class—the types include field exercises, map & aerial photo exercises, computer modeling, and quantitative analysis. The specific expectations for labs will vary (i.e. maps, short answer questions, lab reports, etc.) Please, for your enjoyment of field labs, come prepared—at some point in the semester, you will likely be out in the rain, heat, cold, etc. Probable lab activities include field exercises to study soils, stream flow, landslides, infiltration capacities, etc.; modeling slope failures, and mapping exercises.
Cell Phones and other classroom distractions:
Learning is always the top goal in class, so...... cell phones are not permitted unless ‘okayed’ by your instructor as well as any other activities & actions that disrupt class.

Blackboard:
We will use the Blackboard site to post extra readings, to collect assignments, and to post grades. We will not as a practice post Powerpoints. Please be sure to know how to access these materials.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES
Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to Disability Services. All information is confidential. Please contact the Office of Disability Services for more information at (828) 227-3886 visit the office’s website: http://disability.wcu.edu.

ACADEMIC INTEGRITY
Students, faculty, staff, and administrators of Western Carolina University (WCU) strive to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. While academic in scope, any violation of this policy is by nature, a violation of the Code of Student Conduct and will follow the same conduct process (see Article VII.1.a.). If the charge occurs close to the end of an academic semester or term or in the event of the reasonable need of either party for additional time to gather information timelines may be extended at the discretion of the Department of Student Community Ethics (DSCE).

Violations of the Academic Integrity Policy include:

Cheating - Using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
Fabrication - Creating and/or falsifying information or citation in any academic exercise.
Plagiarism - Representing the words or ideas of someone else as one's own in any academic exercise.
Facilitation - Helping or attempting to help someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another to copy information during an examination)

Faculty members have the right to determine the appropriate sanction(s) for violations of the Academic Integrity Policy within their courses, up to and including a final grade of “F” in the course. Within five (5) days of the instructor’s knowledge of the alleged violation of the Academic Integrity Policy, the instructor will inform his/her department head (Associate Dean of the Graduate School when the student is a graduate student) in writing of the allegation and proposed sanction(s).

The Academic Integrity Policy, Process and Faculty Reporting Form can be found online at: academicintegrity.wcu.edu.

Statement on Group Work and Plagiarism: In the modern work environment we are often called upon work as teams. Teamwork facilitates the exchange of ideas and helps us learn from one another. Different people bring different ideas to the group. However, teamwork does not eliminate the need for personal accountability, and individual responsibility. Some exercises in this course will require you to work in peer groups. Each student is expected to participate fully in the work of the group:

a. It is not acceptable to sit by the sidelines while your group works, and then copy the data or duplicate the results later.
b. It is permissible, and sometimes advisable, for a group to split up work. For example, in a stream profiling lab, two group members might take measurements for a profile while two others take measurements for calculating the velocity of a stream. In this case, the two who gathered profile data may copy velocity from the other two. However, each student is responsible for making all calculations, answering all questions and drawing maps and profiles INDIVIDUALLY, unless specifically stated otherwise in the lab handout.
c. Be warned that excessive similarity among the results of group members may be construed as plagiarism.

We do expect groups to share ideas and thoughts, but everyone must participate fairly. If you have any questions about what is appropriate to share and what is not, ASK US.
## Course Schedule (Subject to Change)

<table>
<thead>
<tr>
<th>Class</th>
<th>Week</th>
<th>Topic</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>13-Jan</td>
<td>1</td>
<td>Introduction - What is this class?</td>
<td></td>
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<tr>
<td>15-Jan</td>
<td>1</td>
<td>Earth Materials: Rocks and Minerals</td>
<td>Drivers of Soil</td>
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<tr>
<td>20-Jan</td>
<td>2</td>
<td>Landforms and Topography</td>
<td>Soil Formation</td>
</tr>
<tr>
<td>22-Jan</td>
<td>2</td>
<td>Components of the Water Cycle</td>
<td></td>
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<tr>
<td>27-Jan</td>
<td>3</td>
<td>Water Budget and Drivers of the Water Cycle</td>
<td></td>
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<tr>
<td>29-Jan</td>
<td>3</td>
<td>Soil Genesis - Forming Factors</td>
<td>Classifying</td>
</tr>
<tr>
<td>3-Feb</td>
<td>4</td>
<td>Soil Properties and Classification</td>
<td>Soils and Their</td>
</tr>
<tr>
<td>5-Feb</td>
<td>4</td>
<td>Soil Hydrology</td>
<td>Hydrology</td>
</tr>
<tr>
<td>10-Feb</td>
<td>5</td>
<td>Soil Hydrologic Properties</td>
<td></td>
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<tr>
<td>12-Feb</td>
<td>5</td>
<td>Test 1</td>
<td></td>
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<tr>
<td>17-Feb</td>
<td>5</td>
<td>Landscape variations in Soils and Hydrology</td>
<td></td>
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<tr>
<td>19-Feb</td>
<td>6</td>
<td>Weathering Processes</td>
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<tr>
<td>24-Feb</td>
<td>6</td>
<td>Advising Day - No Class</td>
<td></td>
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<tr>
<td>26-Feb</td>
<td>7</td>
<td>Weathering Products</td>
<td></td>
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<tr>
<td>3-Mar</td>
<td>7</td>
<td>Soil Taxonomy</td>
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<tr>
<td>5-Mar</td>
<td>8</td>
<td>Groundwater Basics</td>
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<tr>
<td>10-Mar</td>
<td>8</td>
<td>Spring Break</td>
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<tr>
<td>12-Mar</td>
<td>9</td>
<td>Spring Break</td>
<td></td>
</tr>
<tr>
<td>17-Mar</td>
<td>9</td>
<td>Runoff Generation and GW/SW Interactions</td>
<td>The Bigger Picture</td>
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<tr>
<td>19-Mar</td>
<td>10</td>
<td>Nutrient Cycling</td>
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<tr>
<td>24-Mar</td>
<td>10</td>
<td>Water Quality</td>
<td></td>
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<tr>
<td>26-Mar</td>
<td>10</td>
<td>Test 2</td>
<td></td>
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<tr>
<td>31-Mar</td>
<td>11</td>
<td>Soil Erosion/Loss</td>
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<tr>
<td>2-Apr</td>
<td>11</td>
<td>Slope Stability and Landslides</td>
<td></td>
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<tr>
<td>7-Apr</td>
<td>12</td>
<td>No Classes</td>
<td></td>
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<tr>
<td>9-Apr</td>
<td>12</td>
<td>Groundwater Surface Water Interactions</td>
<td></td>
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<tr>
<td>14-Apr</td>
<td>13</td>
<td>Applied Hydrology/Hydrogeology</td>
<td></td>
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<tr>
<td>16-Apr</td>
<td>13</td>
<td>Project Presentations</td>
<td></td>
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<tr>
<td>21-Apr</td>
<td>14</td>
<td>Regional Groundwater Systems</td>
<td></td>
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<tr>
<td>23-Apr</td>
<td>14</td>
<td>Environmental Issues in Hydrology</td>
<td>Environmental</td>
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<tr>
<td>28-Apr</td>
<td>15</td>
<td>Environmental Issues in Hydrology</td>
<td>Issues</td>
</tr>
<tr>
<td>30-Apr</td>
<td>15</td>
<td>Solving Environmental Problems</td>
<td></td>
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<tr>
<td>7-May</td>
<td></td>
<td>FINAL EXAM: 3:00-5:30 PM</td>
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</tbody>
</table>
Student Learning Objectives:
1. Have a fundamental understanding of basic processes and properties of soils and hydrology and how they interrelate.
2. Be able to interpret fundamental soils and hydrology processes and properties through landscape and data analysis.
3. Understand the relationship and importance of soils and hydrology to your education and career preparation.
4. Understand the mutual interactions of humans and natural systems.
5. Be able to apply standard methods in Soils & Hydrology to basic problems in the field and office.
6. Be able to define and address a research questions in Soils & Hydrology using standard methods and data analysis techniques, and be able to communicate those results to scientific and nonscientific audiences.

Grading
15 % Exam I
15 % Exam II
20 % Final Exam (cumulative)
15 % Lab & Class assignments & quizzes
35 % Research Project
Grades and point scale*: 100-97%: A+, 96-94%: A, 92-90%: A-, 89-87%: B+, 86-83%: B, 82-80%: B-, 79-77%: C+, 76-73%: C, 72-70%: C-, 69-67%: D+, 66-63%: D, 62-60%: D-, <60%: F

Class and lab will play an integral role in your success in this course. The assignments will offer you the opportunity to become an active investigator in our field of study as well as let you master basic skills. All work submitted for this course must meet minimum college-level requirements with respect to writing, clarity, and completeness. Work submitted that does not meet minimum expectations will not be accepted for evaluation; work that is not accepted may be corrected and resubmitted but will be considered late. All late work, without an approved excuse, will receive a penalty. Assignments turned in late on the day it is due will lose 10%. After this day, assignments will lose an additional 20 % per day. Unless specified otherwise, all out-of-class written assignments must be word-processed (i.e. typed), 12 point font, double-spaced, and have one inch margins. All references used must be cited in a standard, complete reference format.

Texts
Elements of the Nature and Properties of Soils, 2nd edition, by Brady and Weil. (from Bookstore)

Attendance and Classroom/Lab Policy: I expect you to attend all classes unless you have an excused absence, although I will not directly count attendance in your grade. This course is being taught for you—not for me. Your presence, your preparedness, and your participation in all classes are critical to your success in the course as well as the success of the class. Furthermore, there will be some in-class exercises and quizzes—there will be no make-up for these types of assignments. I expect you to be to class on time and ready to participate and learn.

Portable Electronics: Cell phone use is not permitted in class. If I see you using your cell phone you will be asked to leave the class and receive a zero for any assignments during that class period. Students using cell phones in class is extremely distracting and inhibits my ability to effectively run the classroom.
E-mail: Read your e-mail! I will communicate with you often via e-mail. If you miss something because you didn’t read the e-mail, it is on you. Additionally, if you send me an e-mail for any reason (even if it is a simple question), include a salutation and a closing (i.e., sign your name). It is unprofessional to do otherwise. I will never send you an e-mail without these components and I expect the same show of respect from you.

WCU Academic Honesty Policy: Western Carolina University, as a community of scholarship, is also a community of honor. Faculty, staff, administrators, and students work together to achieve the highest standards of honesty and integrity. Academic dishonesty is a serious offense at Western Carolina University because it threatens the quality of scholarship and defrauds those who depend on knowledge and integrity. Academic dishonesty includes:

a. Cheating—Intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise.

b. Fabrication—Intentional falsification of information or citation in an academic exercise.

c. Plagiarism—Intentionally or knowingly representing the words or ideas of someone else as one’s own in an academic exercise.

d. Facilitation of Academic Dishonesty—Intentionally or knowingly helping or attempting to help someone else to commit an act of academic dishonesty, such as knowingly allowing another to copy information during an examination or other academic exercise.

Instructors have the right to determine the appropriate sanction or sanctions for academic dishonesty within their courses up to and including a final grade of “F” in the course. Within 5 calendar days of the event the instructor will inform his/her department head, and the Associate Dean of the Graduate School when the student is a graduate student, in writing of the academic dishonesty charge and sanction.

Statement on Group Work and Plagiarism: In the modern work environment we are often called upon work as teams. Teamwork facilitates the exchange of ideas and helps us learn from one another. Different people bring different ideas to the group. However, teamwork does not eliminate the need for personal accountability, and individual responsibility. Some exercises in this course will require you to work in peer groups. Each student is expected to participate fully in the work of the group:

a. It is not acceptable to sit by the sidelines while your group works, and then copy the data or duplicate the results later.

b. It is permissible, and sometimes advisable, for a group to split up work. For example, in a stream profiling lab, two group members might take measurements for a profile while two others take measurements for calculating the velocity of a stream. In this case, the two who gathered profile data may copy velocity from the other two. However, each student is responsible for making all calculations, answering all questions and drawing maps and profiles INDIVIDUALLY, unless specifically stated otherwise in the lab handout.

c. Be warned that excessive similarity among the results of group members will be treated as plagiarism.

I do expect groups to share ideas and thoughts, but everyone must participate fairly. If you have any questions about what is appropriate to share and what is not, ASK ME.

Accommodations for Students with Disabilities: Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to Disability Services. All information is confidential. Please contact the Office of Disability Services for more information at (828) 227-3886.
**Course and Instructor Evaluation:** Please take the time to complete CoursEval when open near the close of the semester—they do make a difference, they are anonymous, and they cannot be reviewed until after grades are submitted.

**The University Writing Center** in Hunter Library offers free, friendly, one-on-one writing feedback for students of all class levels and majors. Visit their online writing resources to find helpful guidelines and other information. Call 828.227.7197 to make individual appointments. There is high demand for tutoring appointments during midterms and at the end of the semester, so plan ahead!
I. Rationale/Purpose
Provides an understanding of the distribution and genesis of soils, soil physical and geotechnical properties, and hydrogeological processes that impact construction; field and geologic analysis.

II. Course Aims and Objectives:

- **Aims:** The course provides construction management students with an introduction to soils and hydrology. Student will gain the ability to interpret consultant soil reports, the ability to do basic soil analyses, general knowledge to aid in the planning and budgeting of a construction project, and a sensitivity to environmental issues related to construction.

- **Specific Learning Objectives:**

  **By the end of this course, students will be able to:**
  
  - Examine the links between soil properties, soil location, and parent material (labs, exam 1)
  - Evaluate soil and drainage characteristics with building site selection (exams 1, 2, 3)
  - Analyze the impact of construction on slope stability, water availability and erosion (exam 2; erosion lab)
  - Argue the links between grain size and soil geotechnical and hydraulic properties that relate to construction (exam 2, grain size lab)
  - Explain the mechanisms of groundwater and surface water flow (exam 3)
  - Analyze graphs, data and materials commonly found in construction consultant reports and in online soil websites (labs and exams)

III. Course Materials

**Course readings:**

- Additional resources see below. All will be provided as pdfs on Blackboard.

IV. Faculty Expectations of Students/Course Policies

**Accommodations for students with disabilities:**
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**Academic Integrity Policy:**
This policy addresses academic integrity violations of undergraduate and graduate students. Graduate students should read inside the parenthesis below to identify the appropriate entities in charge of that step of the process.

Students, faculty, staff, and administrators of Western Carolina University (WCU) strive to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. While academic in scope, any violation of this policy is by nature, a violation of the Code of Student Conduct and will follow the same conduct process (see Article...
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The Academic Integrity Policy, Process and Faculty Reporting Form can be found online at: academicintegrity.wcu.edu.

**Additional Honesty Policy for this class:**

*Statement on Group Work and Plagiarism:* In the modern work environment, we often work in teams. Teamwork facilitates the exchange of ideas and learning. However, teamwork does not eliminate the need for personal accountability and individual responsibility. Some course exercises and labs require you to work in peer groups. Each student is expected to participate fully in the work of the group:

1. You may not sit on the sidelines during group work and then copy the data or duplicate the results later.
2. It is permissible, and sometimes advisable, for a group to split up work. *For example,* in a stream profiling lab, two group members might take measurements for a profile while two others take measurements for calculating the velocity of a stream. In this case, the two who gathered profile data may copy velocity from the other two. However, each student is responsible for making all calculations, answering all questions and drawing maps and profiles INDIVIDUALLY, unless specifically stated otherwise in the lab handout.
3. Excessive similarity among the results of group members may be construed as plagiarism.
4. In reading assignments, all quotations from the text book must be quoted and cited

**Attendance Policy**

Students will be expected to be in class. Unless you are excused from class, you will receive a zero on any class activity/quiz that is given during the missed class. Excused absence requests/notifications should be over 24 hours in advance and in email to me. *It is not an official excuse unless it is in email!* Please also be aware of university attendance policies.

- **Statement on late and/or makeup assignments**
  
  No late assignments will be accepted unless a student is given leave before it is due to turn it in late.

- **Guidelines for classroom behavior:**

  I expect that students will be courteous to me and to other students. As per the Geology Program Policy: NO TEXTING! If I see you texting, you will be excused from the class.

- **Inclement weather policy**

  If the University closes for inclement weather, class will be canceled. If there is another reason to cancel class, then I will attempt to notify everyone by email. I may rearrange assignments if the weather is inclement.
- **Statement regarding use of Blackboard or other programs**
  All assignments will be turned in on Blackboard, except those that are in-class. Powerpoint links and reading files are online. All grades will be reported on Blackboard as issued. Learn how to use it...I will not accept the excuse “I couldn’t get it to work”.

**V. Grading Procedures:**

**Exams:**
Because of the number of people in the class, the exams will be mixed between short answer questions and multiple choice questions. I will give you 5 to 8 short answer essay questions before the test, and 3 to 4 will generally be on the test. The questions will be the same, but the examples might change in order to test your ability to apply the knowledge. The rest will be multiple choice or fill in the blank style questions. We will have three tests—the final is cumulative.

**In-Class Activities/Quizzes:**
We do a number of activities that you get a zero if you miss it, and if I randomly collect an assignment. You will frequently be working in groups. Groups will be defined by me for both in-class and lab activities. They will change after each exam. Quizzes will also be given in class. I will generally allow students to use notes that they have taken, but no textbooks can be used.

**Laboratories:**
There are two lab sections. Labs will be turned in online, and some lab assignments may be “group” and others will be “individual”. There may also be individual grades.

**Homework:**
Reading assignments will help you understand lectures. Written and/or multiple choice homework assignments will be given about once a week.

<table>
<thead>
<tr>
<th>Percentage of Grade Or number of points</th>
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<tbody>
<tr>
<td>Exam 1</td>
<td>25</td>
</tr>
<tr>
<td>Exam 2</td>
<td>25</td>
</tr>
<tr>
<td>Laboratories/In Class/Homework</td>
<td>20</td>
</tr>
<tr>
<td>Final Examination (Cumulative)</td>
<td>30</td>
</tr>
<tr>
<td><strong>100%</strong></td>
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</table>
Letter grades will be assigned according to the following:

**Grading and Quality Point System**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Interpretation</th>
<th>Quality Points per Semester Hour</th>
<th>Grade</th>
<th>Interpretation</th>
<th>Quality Points per Semester Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>Excellent</td>
<td>4.0</td>
<td>I</td>
<td>Incomplete</td>
<td>--</td>
</tr>
<tr>
<td>A</td>
<td>Excellent</td>
<td>4.0</td>
<td>IP</td>
<td>In Progress</td>
<td>--</td>
</tr>
<tr>
<td>A-</td>
<td>Excellent</td>
<td>3.67</td>
<td>S</td>
<td>Satisfactory</td>
<td>--</td>
</tr>
<tr>
<td>B+</td>
<td>Good</td>
<td>3.33</td>
<td>U</td>
<td>Unsatisfactory</td>
<td>--</td>
</tr>
<tr>
<td>B</td>
<td>Good</td>
<td>3.0</td>
<td>W</td>
<td>Withdrawal</td>
<td>--</td>
</tr>
<tr>
<td>B-</td>
<td>Good</td>
<td>2.67</td>
<td>AU</td>
<td>Audit</td>
<td>--</td>
</tr>
<tr>
<td>C+</td>
<td>Satisfactory</td>
<td>2.33</td>
<td>NC</td>
<td>No Credit</td>
<td>--</td>
</tr>
<tr>
<td>C</td>
<td>Satisfactory</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C-</td>
<td></td>
<td>1.67</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D+</td>
<td>Poor</td>
<td>1.33</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D-</td>
<td>Poor</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Poor</td>
<td>.67</td>
<td></td>
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<td></td>
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<tr>
<td>F</td>
<td>Failure</td>
<td>0</td>
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</tr>
</tbody>
</table>

**VIII. Tentative Course Schedule**

*May change to accommodate guest presenters & student needs*

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Reading Assignment</th>
<th>Labs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Tues, Aug 19</td>
<td>Class Introduction</td>
<td></td>
<td>Topography</td>
</tr>
<tr>
<td>2 Thurs, Aug 21</td>
<td>Parent materials</td>
<td>Keller pg. 67-83</td>
<td></td>
</tr>
<tr>
<td>3 Tues, Aug 26</td>
<td>Parent materials</td>
<td>Keller pg. 88-101</td>
<td></td>
</tr>
<tr>
<td>4 Thurs, Aug 28</td>
<td>Depositional parent materials</td>
<td>Schroeder 15-21</td>
<td></td>
</tr>
<tr>
<td>5 Tues, Sep 2</td>
<td>Soil properties and definitions</td>
<td>Schroeder 2-8; 23-40</td>
<td></td>
</tr>
<tr>
<td>6 Thurs, Sep 4</td>
<td>Soil properties and definitions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Tues, Sep 9</td>
<td>Physical and chemical weathering</td>
<td>Schroeder 8-11</td>
<td>Soil Properties</td>
</tr>
<tr>
<td>8 Thurs, Sep 11</td>
<td>and clay types</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Tues, Sep 17</td>
<td>Exam 1 Review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Thurs, Sep 18</td>
<td>Exam 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 Tues, Sep 23</td>
<td>Soil classification and soil reports</td>
<td>Schroeder Chapter 7: 101-121</td>
<td>Field soil work</td>
</tr>
<tr>
<td>12 Thurs, Sep 25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 Tues, Sep 30</td>
<td>Rill and sheet erosion</td>
<td>Brady and Weil 517-527; 540-543</td>
<td>Field USLE</td>
</tr>
<tr>
<td>14 Thurs, Oct 2</td>
<td>Settlement estimates</td>
<td>Schroeder 60-62</td>
<td>Settlement/factor of safety</td>
</tr>
<tr>
<td>Tues, Oct 7</td>
<td>Effective stress profiles</td>
<td>Schroeder 211-211</td>
<td></td>
</tr>
<tr>
<td>Thurs, Oct 9</td>
<td>Settlement estimates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 Tues, Oct 14</td>
<td>Fall Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 Thurs, Oct 16</td>
<td>Fall Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17 Tues, Oct 21</td>
<td>Exam 2 Review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 Thurs, Oct 23</td>
<td>Exam 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tues, Oct 28</td>
<td>Advising Day – No Classes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 Thurs, Oct 30</td>
<td>Factor of safety/slope stability</td>
<td>Keller 288-307</td>
<td></td>
</tr>
<tr>
<td>20 Tues, Nov 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 Thurs, Nov 6</td>
<td>Trench stability</td>
<td>Schroeder 185-198</td>
<td></td>
</tr>
<tr>
<td>22 Tues, Nov 11</td>
<td>Compaction and Consolidation</td>
<td>Schroeder p. 69-76</td>
<td></td>
</tr>
<tr>
<td>23 Thurs, Nov 13</td>
<td>Compaction and Consolidation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
24 Tues, Nov 18  Runoff, recharge and flooding  Healy and others, 2007  Creek discharge
25 Thurs, Nov 20
26 Tues, Nov 25  Groundwater flow concepts  Uliana 5-11  Groundwater models
27 Tues, Dec 2  Groundwater flow concepts  Uliana 16-19  Groundwater field
28 Thurs, Dec 4

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advising Day</td>
<td>Tuesday</td>
<td>October 28</td>
<td></td>
</tr>
<tr>
<td>Final Semester Examinations</td>
<td>Monday-Friday</td>
<td>Dec 7 – Dec 13</td>
<td></td>
</tr>
<tr>
<td>Final Exam in this course</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Student Support Services**

Student Support Services provides support to students who are either first-generation, low-income or those who have disclosed a disability with: academic advising, mentoring, one-on-one tutorial support, and workshops focused on career, financial aid and graduate school preparation. You may contact SSS at (828) 227-7127 or email sssprogram@wcu.edu for more information. SSS is located in the Killian Annex, room 138.

**Writing and Learning Commons (WaLC)**

Electronic format (with hyperlinks):

The Writing and Learning Commons (WaLC), located in BELK 207, provides free small-group course tutoring, one-on-one writing tutoring and academic skills consultations, and online writing and learning resources for all students. All tutoring sessions take place in the WaLC or in designated classrooms on campus. To schedule tutoring appointments, log in to TutorTrac from the WaLC homepage (walc.wcu.edu) or call 828-227-2274. Distance students and students taking classes at Biltmore Park are encouraged to use Smarthinking and the WaLC’s online resources. Students may also take advantage of writing tutoring offered at the Biltmore Park campus on certain days of the week; call 828-227-2274 or log in to TutorTrac and select “Biltmore Park Writing Tutoring” for availabilities.

The Mathematics Tutoring Center (455 Stillwell, http://mathlab.wcu.edu, 227-3830) provides tutoring in all lower-division math and many CS courses, help with mathematical concepts in other disciplines, and workshops on study skills specific to mathematics courses. Tutoring is available on a drop-in basis, 9-5 and 6-9 pm Monday-Thursday, and 9-5 on Friday or by appointment.

**Academic Calendar** includes dates for all breaks, university closures, final exams, etc. The academic calendar can be found at: http://www.wcu.edu/academics/campus-academic-resources/registrars-office/academic-calendar.asp.
GEOL 355: Petrology
Spring 2015

Lecture: Stillwell 322
MWF 11:15 am to 12:05 pm

Lab: Stillwell 355
Thursday 12:35-2:25 pm OR 3:00-4:50 pm

Instructor: Amy L. Fagan, PhD
Office: Stillwell 319
E-mail: alfagan@email.wcu.edu
Phone: (828) 227-3820
Office Hours: MWF 1:30-2:30 pm, Th 8:30-9:30 am, when the office door is open, or by appointment

I. RATIONALE/PURPOSE

In this class, we will consider the description, classification, composition, petrogenesis, and tectonic setting of igneous and metamorphic rocks. The majority of the Earth is composed of igneous and metamorphic rocks, therefore, these rocks record much of the history and evolution of the Earth. Igneous and metamorphic rocks teach us about the formation of Earth (and other planets), the origins of mantle and crust, and record the tectonic history. But first, we must learn the language of rocks to be able to understand what they have to teach us.

Credits: 4.0

II. COURSE AIMS AND OBJECTIVES

• Aims: This course provides students with an introduction to the language of rocks to be able to understand how they form.

• Specific Learning Objectives: Following completion of this course, you will be able to:
  o Utilize the basic classification schemes for igneous and metamorphic rocks;
  o Identify igneous and metamorphic rocks by visual and optical examination;
  o Interpret geochemical (i.e., major and trace elements) and mineralogical data of igneous and metamorphic rocks;
  o Use textural observations to decipher the history of rocks;
  o Recognize the environments in which different rocks form and how they are related to plate tectonics;
  o Critically read, summarize, and use scientific literature for research.

III. Course Materials

  o Availability: Rental through the WCU bookstore; Amazon.com list price of $192.69 (as of 1/6/2015)

• Recommended Reference texts:
  o An Introduction to the Rock-Forming Minerals by Deer, Howie and Zussman (available in Stillwell 355)
  o Introduction to Mineralogy by William D. Nesse

• Supplementary readings will be assigned (See ‘Reading the Literature’ below) and will be available on Blackboard.

IV. FACULTY EXPECTATIONS OF STUDENTS/ AVAILABLE UNIVERSITY RESOURCES/COURSE POLICIES

Accommodations for Students with Disabilities: Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to the Office of Disability Services. All information is confidential. Please contact the Office of Disability Services at (828) 227-3886 or come by Suite 135 Killian Annex for an appointment. You may also visit the office’s website at http://disability.wcu.edu.

Student Support Services: Student Support Services provides support to students who are either first-generation, low-income or those who have disclosed a disability with: academic advising, mentoring, one-on-one tutorial support, and workshops focused on career, financial aid and graduate school preparation. You may contact SSS at (828) 227-7127 or email sssprogram@wcu.edu for more information. SSS is located in the Killian Annex, room 138.

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**Academic Integrity Policy:**

"I will practice personal and academic integrity" – WCU Community Creed

Western Carolina University (WCU) strives to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. Any violation of the Academic Integrity Policy is a violation of the Code of Student Conduct (see dsce.wcu.edu for more information).

Violations of the Academic Integrity Policy include:

- **Cheating** - Using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
- **Plagiarism** - Representing the words or ideas of someone else as one’s own in any academic exercise.
- **Fabrication** - Creating and/or falsifying information or citation in any academic exercise.
- **Facilitation** - Helping or attempting to help someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another to copy information during an examination)

Faculty members have the right to determine the appropriate sanction(s) for violations of the Academic Integrity Policy within their courses, up to and including a final grade of “F” in the course. Students will be notified, in writing, of any Academic Integrity Policy allegation and have the right to respond to the allegation. The full text of the WCU Academic Integrity Policy, Process, and the Faculty Reporting Form can be found online at: academicintegrity.wcu.edu.

Please visit studysmart.wcu.edu for further information.

**Statement on Group Work and Plagiarism:** In the modern work environment we are often called upon work as teams. Teamwork facilitates the exchange of ideas and helps us learn from one another. Different people bring different ideas to the group. However, teamwork does not eliminate the need for personal accountability, and individual responsibility. Some exercises in this course may require you to work in peer groups. Each student is expected to participate fully in the work of the group and to follow these guidelines:

- It is permissible, and sometimes advisable, for a group to split up work. However, each student is responsible for answering all questions INDIVIDUALLY, unless specifically stated otherwise in the assignment.
- It is not acceptable to sit by the sidelines while your group works, and then copy the data or duplicate the results later.
- Be warned that excessive similarity among the results of group members will be treated as plagiarism.

I expect groups to share ideas and thoughts, but everyone must participate fairly. If you have any questions about what is appropriate to share and what is not, ASK ME.

**You will be allowed (and encouraged) to work on lab assignments together. The guidance stated above applies to lab assignments.**

**Attendance Policy:** Students are expected to attend class, and should do so to receive full class participation credit. As a courtesy, please try to send me any excused absence requests/notifications via e-mail at least 24 hours in advance. Please see WCU’s policy on what constitutes an excused absence: http://catalog.wcu.edu/content.php?catoid=29&navoid=560 - clas_atte_pol. The forms for University Sponsored Absence and Class Absence due to Required Religious Observance are found on the Registrar’s webpage at http://www.wcu.edu/24089.asp.

**Deadlines and Late Work:** Assignments are due at the beginning of class, and I expect you to turn in work on time. Any assignment turned in after this deadline will be late. For each day that an assignment is late, you will lose 20% of your grade for that assignment. Late work will not be accepted more than 3 days after the original due date. Note: assignments turned in at the end of the due date (rather than the beginning of class) will result in a 10% deduction. Exams must be taken during the scheduled time. If you have an extenuating circumstance, you must inform me at least 3 days in advance.
**Participation**: Participation, although a small portion (5%) of your grade, is important on a practical level, as it develops mature behaviors that will serve you well beyond the walls of WCU. To be considered an active class participant (and therefore receive full class participation credit), you must abide by the following rule:

- Be attentive and respectful to others in the classroom
  - What does this mean? Attend class regularly, be on time, turn off mobile devices, pay attention and take notes, etc.
- Plus: participate fully in the mandatory field trip on Thursday, April 9 (12:30-5:00 pm)

**Inclement weather policy**: If the University closes for inclement weather, class will be canceled. If there is another reason to cancel class, then I will attempt to notify everyone by email. I may rearrange assignments if the weather is inclement.

**V. Grading Procedures**

Grades and point scale*: 100-97%: A+, 96-94%: A, 92-90%:A-, 89-87%:B+, 86-83%:B, 82-80%:B-, 79-77%:C+, 76-73%:C, 72-70%:C-, 69-67%:D+, 66-63%:D, 62-60%:D-, <60%:F

<table>
<thead>
<tr>
<th>Percentage of Grade</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture Exam 1</td>
<td>8%</td>
</tr>
<tr>
<td>Lecture Exam 2</td>
<td>8%</td>
</tr>
<tr>
<td>Lecture Exam 3</td>
<td>8%</td>
</tr>
<tr>
<td>Lab Exam 1</td>
<td>8%</td>
</tr>
<tr>
<td>Lab Exam 2</td>
<td>8%</td>
</tr>
<tr>
<td>Lab assignments</td>
<td>10%</td>
</tr>
<tr>
<td>Reading The Literature (RTL)</td>
<td>10%</td>
</tr>
<tr>
<td>Project</td>
<td>15%</td>
</tr>
<tr>
<td>Final Exam (Cumulative)</td>
<td>20%</td>
</tr>
<tr>
<td>Class Participation + Field Trip</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

**Lecture Exams:**

Exam 1 (8%): The first lecture exam is tentatively scheduled for in class on **Monday, February 9** and will cover all material presented in lecture up until that point (Igneous Processes).

Exam 2 (8%): The second lecture exam is tentatively scheduled for in class on **Monday, March 2** and will cover all material from lecture since the first exam (Igneous Provinces).

Exam 2 (8%): The third lecture exam is tentatively scheduled for in class on **Monday, April 13** and will cover all material from lecture since the second exam (Metamorphic Processes).

Final Exam (20%): The final exam is scheduled for 3:00 to 5:30 pm on **Monday, May 4 (Star Wars Day)**. This exam will be cumulative for all material covered in the lecture, but will be heavy on the material after the third exam.

**Lab Exams:**

Lab Exam 1 (8%): The first lab exam is a “take-home” exam that will be available starting at 8 am on Monday, March 21 and is **due by 5:30 pm on Thursday, March 19**. Students must work on their own and are not allowed to work with another student, although students are allowed to use other resources such as their book when taking the exam. Any excessive similarities between students’ exams may make me suspicious of plagiarism.

Lab Exam 2 (8%): The second lab exam is a “take-home” exam that will be available starting at 8 am on Monday, April 27 and is **due by 5:30 pm on Thursday, April 30**. Students must work on their own and are not allowed to work with another student, although students are allowed to use other resources such as their book when taking the exam. Any excessive similarities between students’ exams may make me suspicious of plagiarism.

**Lab Assignments (10%)**: Lab assignments will be given during the Lab portion of the course. Students are expected to work through the assignment during the lab time slot as well as any necessary time on their own. Students will likely need to use their own time to complete the labs. Lab assignments are due at the **beginning** of the next lab meeting. Assignments handed in after the beginning of lab will be considered late.

**Reading the Literature (10%)**: Throughout the semester, you will be assigned 5 papers to read that are related to the topics in class. After reading the paper, students must summarize the paper and answer questions. The paper will be briefly discussed in class on the day that the assignment is due. This is to give students practice at critically reading, understanding, and summarizing scientific work.
**North American Rocks Project (15%)**: You will select a rock from Ward’s collection of classic North American Rocks at the beginning of the semester. You will use this rock to hone your skills of observation for hand samples and thin-sections. You will also do research on the rock and write a paper about its petrogenesis (also include regional geology or geologic setting, structure/tectonics, petrologic descriptions of hand sample and thin-section, mineralogical composition). The final part of the project will include a “lightning round” talk on the final day of class. You may work alone (8-10 page paper) or with another person (15-20 page paper, double the # of sources). Details of the project will be given in another document, but the basic breakdown of the assessment is:

<table>
<thead>
<tr>
<th>Item</th>
<th>% of Project Grade</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annotated Bibliography</td>
<td>10</td>
<td>Friday, January 30</td>
</tr>
<tr>
<td>Paper Outline</td>
<td>20</td>
<td>Monday, February 16</td>
</tr>
<tr>
<td>Paper</td>
<td>60</td>
<td>Draft for Peer Review: Friday, March 20</td>
</tr>
<tr>
<td>Lightning Round Talk</td>
<td>10</td>
<td>Final Draft: Friday, April 17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Friday, May 1</td>
</tr>
</tbody>
</table>

**Class Participation (5%)**: All students are expected to participate fully and respectfully in class. Please see “Expectations for Participation” above to ensure that you earn full credit here. Participation in a **required field trip** is included in this. We will have one, ~4.5 hour field trip during the two lab sections on **Thursday, April 9** to study petrology in the field. Students who are unable to attend due to an excused absence will have a make-up assignment.

**VIII. Tentative Course Schedule**

> May change to accommodate student needs and any unforeseen hiccups.

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topic</th>
<th>Read</th>
<th>Exams/Meetings/No Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/12-1/16</td>
<td>Introduction to Petrology and Igneous Structures</td>
<td>Ch 1</td>
<td>No class on Monday (MLK Holiday)</td>
</tr>
<tr>
<td>2</td>
<td>1/19-1/23</td>
<td>Phase Diagrams</td>
<td>Ch 5</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1/26-1/30</td>
<td>Igneous Textures and Chemistry</td>
<td>Ch 2, 3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2/2-2/6</td>
<td>Generation of Basaltic Magma (not on first exam)</td>
<td>Ch 3, 4</td>
<td><strong>EXAM 1: Mon., Feb 9</strong></td>
</tr>
<tr>
<td>5</td>
<td>2/9-2/13</td>
<td>Magma diversification</td>
<td>Ch 6, Ap 4</td>
<td>Seds Class Trip (2/20)</td>
</tr>
<tr>
<td>6</td>
<td>2/16-2/20</td>
<td>Oceanic and Continental Lithosphere</td>
<td>Ch 8, 10</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>2/23-2/27</td>
<td>Convergent Boundaries</td>
<td>Ch 9</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>3/2-3/6</td>
<td>Introduction to metamorphism and metamorphic textures</td>
<td>Ch 17, 18</td>
<td><strong>EXAM 2: Monday, March 2</strong></td>
</tr>
<tr>
<td>9</td>
<td>3/9-3/13</td>
<td>SPRING BREAK-No Class</td>
<td>Ch 19</td>
<td>LPSC and SE GSA meetings</td>
</tr>
<tr>
<td>10</td>
<td>3/16-3/20</td>
<td>Guest Lecture: Brandon Schwab</td>
<td>Ch 19</td>
<td>Coastal Geology Class Trip (3/26-3/29)</td>
</tr>
<tr>
<td>11</td>
<td>3/23-3/27</td>
<td>Mineral Assemblages</td>
<td>Ch 17</td>
<td>No class Wed-Friday</td>
</tr>
<tr>
<td>12</td>
<td>4/6-4/10</td>
<td>Reactions and MM of Mafic and Ultramafic rocks</td>
<td>Ch 20, 21</td>
<td><strong>4.5 Hour Field Trip</strong></td>
</tr>
<tr>
<td>13</td>
<td>4/13-4/17</td>
<td>MM of Aluminous clastic rocks</td>
<td>Ch 22</td>
<td><strong>EXAM 3: Monday, April 13</strong></td>
</tr>
<tr>
<td>14</td>
<td>4/20-4/24</td>
<td>MM of Calcareous rocks</td>
<td>Ch 23</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4/27-5/1</td>
<td>Wrap-up and Lightning Round Talks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Monday, May 4 (3:00-5:30) Cumulative Final Exam
### IX. Stillwell 355 Schedule

To help students plan for time to complete lab & project assignments.

<table>
<thead>
<tr>
<th>Time</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
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<td>9:00</td>
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<td>10:00</td>
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<tr>
<td>11:00</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>12:00</td>
<td>12:20-1:10 GEOL 494</td>
<td>12:20-1:10 GEOL 494</td>
<td>12:35-2:25 GEOL 355</td>
<td>1:00-2:50 pm GEOL 494</td>
<td></td>
</tr>
<tr>
<td>1:00</td>
<td>1:00-2:50 GEOL 422</td>
<td>1:00-2:50 GEOL 422</td>
<td>3:00-4:50 GEOL 355</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:00</td>
<td></td>
<td>2:00-3:50 ES 300</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:00</td>
<td>3:15-4:05 ES 300</td>
<td>3:00-4:50 GEOL 422</td>
<td>3:00-4:50 GEOL 355</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:00</td>
<td></td>
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</tr>
</tbody>
</table>
Geology 394, Spring 2014
North Carolina Piedmont field trip: Tectonics, economic resources, and geomorphology

Class: Monday 1:25-2:15, Stillwell 355  Required field trip: Thursday through Sunday evening, March 20-22

Course overview:
The purpose of this course is to learn about the relationships between tectonic history, economic resources, and earth surface processes. We will examine these relationships in part of the southern Appalachian Piedmont in central North Carolina. Together these field experiences will show how the “academic” and “applied” areas of geology relate.

Instructors:
Dr. Cheryl Waters-Tormey  
308 Stillwell Building  
227-3696  
cherylw@email.wcu.edu  
Office hours: Mondays 11-1, Tuesdays 9:30-10:30, or by appointment

Dr. Dave Kinner  
319 Stillwell building  
Phone: 227-3821  
Email: dkinner@wcu.edu  
Office hours: M, W 11:00-12:00, T 10-11:30 or by appointment

Assessment:
Participation and preparedness 20%  
Field notebooks 40%  
Field guide and presentation 40%  
An unexcused absence from the field trip will earn an F.

Reading: Figures, papers and field guides will be provided as hard copies or through Blackboard.

Learning Objectives:
• To demonstrate understanding of major geologic concepts: tectonic accretion, rift basin depositional environments, related geologic resources, and earth surface processes related to the rock types and tectonic history of the field trip area
• To demonstrate the ability to use geologic materials, structures and spatial relationships to infer processes and/or geologic history
• To demonstrate the ability to collect and share observational field data
• To demonstrate understanding of the Paleozoic and Recent geologic history of central North Carolina, as part of the southern Appalachian Piedmont

Participation and preparedness:
It is expected that you will actively engage in the course. Effective participation requires preparation. This means reading in advance, active field investigation, having appropriate field gear, etc. As this is a field trip course, quality participation also includes being a helpful and happy camper (i.e. chipping in with work, being on time, being courteous of others – even when you’ve been stuck with the same person for three days in a van).

Materials, technical competency requirements and field trip gear:
In addition to the normal materials, please bring colored pencils or pens to every class so you can create effective sketches for your notes and on handouts. We strongly recommend a 3-ring notebook so you can keep notes, handouts and readings together. As a WCU student, you will also need to understand the basics of using Adobe Acrobat, Blackboard, and Microsoft Office utilities and applications. The WCU IT department provides support for these in the Technology Commons (ground floor, Hunter Library).
Required field gear and clothing *(required to participate)*

**Field trip fee: $30 per person (for group food), due by March 17, 5pm**

- Sturdy close-toed shoes (recommended 2 pairs, one for evening)
- Clothing sufficient for 4 days in the field and appropriate for the weather (sunny/cold/wet)
- Sleeping bag, sleeping pad (bring one!!), personal stuff including all prescription medications. Camping and field gear rentals are available through Basecamp Cullowhee at reasonable rates.
- Personal re-usable cup/mug, plate, utensils
- Hand lens AND lanyard!! (The department has a limited number. We recommend all geology majors purchase their own: ~$25 from Miner’s www.minerox.com)
- **Hard-backed** “5x7” notebook for the field. **DO NOT buy a Write in the Rain book** – they are hard to erase and get messy quickly, ironically. (We recommend all geology majors have a professional field notebook for this and other field activities over the course of your degree. A common one is Elan’s Geologist field book, [www.minerox.com](http://www.minerox.com), $8-10 depending on if you order a group. There are also top edge-bound books for lefties.)
- **Pencils** for field notes
- Sturdy belt for field belt pack and Brunton

You’ll check these out from the department: Brunton compasses and cases, field belt packs, hammers, hand lenses (limited #), in addition to other items.

**Class policies — Please read the complete policies posted on Blackboard.**

1. We’re here to have fun, get to know each other better, and learn a lot!
2. Expectations for student conduct and academic integrity both on campus and during the field trip are as described in the student handbook. Please remember that the instructors’ first priorities are students’ safety and their right to a positive and effective learning environment. If a problematic situation arises, the instructors will not hesitate to remove students from the field trip with any resulting expenses becoming the student’s responsibility. This situation may also result in an F for the course.
3. Attendance is required. No late work will be accepted. Exceptions must be requested and approved before the activity or deadline and may be approved in extreme circumstances. Please read the attendance policies, including how to request an absence to be excused and for extensions, posted on Blackboard. *Almost no excuses will be accepted regarding problems with Blackboard, your computer, or internet access.* *Have a back-up plan.* Whether excused or not, you are responsible for material covered in class, in assigned readings, and on the field trip.

**Grading and assessment**

Participation and preparedness 20% *(10 pts each out of 100)*

- Attendance is required for all the class meetings and field trip (⅓ for class time, ⅔ for trip). **Participation for a field trip course is more than physical presence.** Participation requires engaged body language, asking or answering questions voluntarily, participating in group discussions, and enthusiastic field geology activity. All of this should demonstrate increasing geological knowledge and skills over the course of the semester. There will be a few short assignments before the field trip (such as a multiple choice open-note quiz) to demonstrate understanding of the topics covered during class.

Field notebooks 40% *(40 pts out of 100)*

- This field trip will help you learn how to take useful and effective field notes, which is a fundamental skill and database type for geologists. A rubric for grading and guidelines for each stop will be provided before the field trip. Assessment will reflect how well the student demonstrates understanding of geological concepts, materials, and history (as appropriate for each student’s experience level), as well as neatness, organization, and completeness. The field notebooks will be collected when getting off the van when we depart for WCU on the last day and returned graded soon afterwards.
“Field notes” also includes maps with stop locations and a running list of photographs members of the group take in the field, which are also critical elements of field observation datasets. These all will be indexed in your field book. Each student will receive a CD of the photographs if they wish.

End-semester group presentation 40%  (40 pts out of 100)

- The Geology program has a seminar at the end of each semester for Capstone and field trip presentations. Groups of 2-3 students from our class will be assigned 1-2 stops after the field trip. Each group will contribute 2-3 slides per stop containing a succinct “field guide” based on their notes, photographs and readings. The presentation submissions will be evaluated based on quality of content and how well the group demonstrates an understanding of the “whole picture” for each stop (geological materials, processes, history, resources, hazards).

- Each student will submit a confidential peer evaluation for the members of their group. Not submitting the evaluation OR evidence of a student’s poor performance will result in a lower grade for the individual. Otherwise, the group will be assigned the same grade.

### Tentative class schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Mon. date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 13</td>
<td>Class Introduction</td>
</tr>
<tr>
<td>n/a</td>
<td>Jan 20</td>
<td>Birthday of Martin Luther King, Jr. – No Classes</td>
</tr>
<tr>
<td>3</td>
<td>Jan 27</td>
<td>Late Neoproterozoic - Mesozoic paleogeography  [<a href="http://www.ucmp.berkeley.edu/help/timeform.php%5C">http://www.ucmp.berkeley.edu/help/timeform.php\</a>]</td>
</tr>
<tr>
<td>4</td>
<td>Feb 3</td>
<td>Accretionary and collisional tectonic events recorded by the Carolina Terrane region</td>
</tr>
<tr>
<td>5</td>
<td>Feb 10</td>
<td>Rift basins, Triassic tectonics</td>
</tr>
<tr>
<td>6</td>
<td>Feb 17</td>
<td>Hydrocarbon system “hydrology” &amp; “tight” shale reservoirs; hydraulic fracturing &amp; risks</td>
</tr>
<tr>
<td>7</td>
<td>Feb 24</td>
<td>Geomorphology of Piedmont; Blue Ridge vs Piedmont hydrology</td>
</tr>
<tr>
<td>8</td>
<td>March 3</td>
<td>Trip logistics, job assignments, review</td>
</tr>
<tr>
<td>9</td>
<td>March 10</td>
<td>Spring Break – No classes</td>
</tr>
<tr>
<td>10</td>
<td>March 17</td>
<td>Trip preparation work</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Field trip March 20-23</strong></td>
</tr>
<tr>
<td>11</td>
<td>March 24</td>
<td>No meeting (get caught up!)</td>
</tr>
<tr>
<td>12</td>
<td>March 31</td>
<td>Field trip recap, presentation groups assigned</td>
</tr>
<tr>
<td>13</td>
<td>April 7</td>
<td>TBA (week of AAPG and SEGSA meetings)</td>
</tr>
<tr>
<td>14</td>
<td>April 14</td>
<td>Peer review of presentation sections, edits</td>
</tr>
<tr>
<td>15</td>
<td>April 21</td>
<td>Final versions of presentations given to class</td>
</tr>
<tr>
<td>16</td>
<td>April 28</td>
<td>No meeting</td>
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<tr>
<td></td>
<td></td>
<td><strong>Program seminar TBA, probably Friday afternoon</strong></td>
</tr>
</tbody>
</table>

Final exam time: Wednesday, May 7, 3-5pm

### Tentative trip itinerary:

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thurs, 3/20</td>
<td>Assemble gear and pack vans. Travel from WCU to Jordan Lake State Park campsite. <em>Purchase supper en route, or bring your own.</em></td>
</tr>
<tr>
<td>Fri-Sat, 3/21-22</td>
<td>Early Paleozoic volcanic arc (Carolina terrane), folded and accreted to pre-North American continent; Hillsborough, Chapel Hill &amp; Durham, NC, areas (tectonic history, groundwater resources, slope instability)</td>
</tr>
<tr>
<td>Sunday, 3/22</td>
<td>Triassic strata of the Deep River Basin in Sanford, NC, area (hydrocarbon basin; “fracking” debate); “Fall line” location and Piedmont geomorphology (Raven Rock State Park); Return to WCU after supper. <em>Purchase supper en route. Or, there may be some food left over.</em></td>
</tr>
</tbody>
</table>
Ancient Sedimentary Environments:
Natural Bridge State Resort Park, Kentucky Field Trip

Geol 394: Geology Field Trip: Ancient Sedimentary Environments     Fall 2013
Instructors: Mark Lord with Mike Meyer       Class: Friday, 10:10-11:00, ST 152

Mark Lord, #2271, mlord@wcu.edu, ST331A
Office Hrs: Mon. &Wed. at 10:00-11:00, Tues. & Thurs. at 10:45-11:45AM or by appointment

Course Overview
The purpose of this course is to explore ancient sedimentary environments of the Southern Appalachians. We’ll do this through a weekend field trip to classic outcrops of sandstones, limestones, etc. as well as examining modern process (ex. caverns) and environmental problems shaped by the past. The focus of the field trip will be on the beautiful, and geologically famous, Natural Bridges State Resort Park in Kentucky. In addition to exploring the park, we will likely make a few other stops on route.

The trip will involve camping and hiking. We will meet every class time before the trip, and a couple afterward. Students will be required to conduct prepare reports on an assigned/selected topic and keep a field journal during the trip (there will be no exams!).

REQUIRED FIELD TRIP: Sept. 27th-29th. Field trip will leave early on Friday and plan to return by 6 PM on Sunday.

<table>
<thead>
<tr>
<th>Date (Thurs)</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 23</td>
<td>Course overview and schedule. Trip individual and group assignments, and logistics.</td>
</tr>
<tr>
<td>Aug 30</td>
<td>Geology Overview of trip (Mark). Group assignments</td>
</tr>
<tr>
<td>Sept 6</td>
<td>Logistics, group projects</td>
</tr>
<tr>
<td>Sept 13</td>
<td>Group topic presentations</td>
</tr>
<tr>
<td>Sept 20</td>
<td>Group topic presentations continued. Logistics (gear, food, times, rules &amp; regs, etc.)</td>
</tr>
<tr>
<td>Sept 27-29</td>
<td>Field Trip</td>
</tr>
<tr>
<td></td>
<td>Presentation preparation</td>
</tr>
<tr>
<td>TBA</td>
<td>Brief presentation of field trip geology/sees seminar</td>
</tr>
</tbody>
</table>

Contact Info.
Mark Lord (ST331A: mlord@wcu.edu; #2271)
Mike Meyer (ST335; mbmeyer@wcu.edu; #2888)
Ancient Sedimentary Environments: 
Natural Bridge State Resort Park, Kentucky Field Trip

COURSE RESPONSIBILITIES & GRADING

Participation and Preparedness (25 %)
It is expected that you will actively engage in the course—this is important to your education as well as that of your peers. Past talking and ‘doing’, effective participation requires preparation. This means reading and understanding class readings, making appropriate observations in the field, having appropriate field gear, etc. As this is a field trip course, quality participation also includes being a helpful and happy camper (i.e. chipping in with work, being on time, being respectful and courteous of others—even when you’ve been stuck with the same person for three days in a van and they stink). It should go without saying, but...attendance at all classes is expected and the field trip is mandatory.

Student Topic Assignments (35 %)
Each group of students is responsible for educating the class on the background of a topic and leading the discussion of the topic at the related stop on the field trip. Each group will make a presentation to the class starting on September 13th. During that same class, each group must submit a draft of the handout for the field trip to the instructors. The outline for the class and field talk will vary with topic. The general guidelines are below.

Class talk—This will be a formal presentation to the class to provide the necessary background on the topic for the field trip. The talk should be ~10 minutes (long talks will be cut off).

Field talk—Each group will provide a site-specific overview of their topic at a designated field stop or stops. On site, the feature (rock, landform, etc.) should be described, and a suggestion of field observations to be made by our group. The handout should include a one-page, single-spaced summary of the topic/field site. The summary page should include group member names, the summary and at least 3 references (cited in proper format). Also, the handout should include a topographic map of the site and any appropriate figures. A final copy of the handout must be provided to each participant at the start of the trip.

In class on August 30th, we will assign topics, and provide each group with a list of questions and references for the topic. The topics will be chosen to support our field itinerary; the likely topics to be assigned are listed below.

- Stratigraphy/Geologic Setting (including Coal):
- Sandstone Depositional Environments & Analysis:
- Landscape Patterns & Evolution:
- Limestone and Karst:

Field Notebook (40%) 
Field notes must be made most stops in addition to interpretive comments. We’ll talk more about this later. The notebooks will be evaluated based on neatness, completeness, and accuracy.

Grades and point scale: 100-97%: A+, 96-93%: A, 92-90%: A-, 89-87%: B+, 86-83%: B, 82-80%: B-, 79-77%: C+, 76-73%: C, 72-70%: C-, 69-60%: D, <60%: F
Faculty Expectations of Students/Course Policies

Accommodations for Students with Disabilities: Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to Disability Services. All information is confidential. Please contact the Office of Disability Services for more information at (828) 227-3886 or visit the office’s website: http://disability.wcu.edu.

Academic Honesty Policy: Students, faculty, staff, and administrators of Western Carolina University (WCU) strive to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. While academic in scope, any violation of this policy is by nature, a violation of the Code of Student Conduct and will follow the same conduct process (see Article VII.1.a.). If the charge occurs close to the end of an academic semester or term or in the event of the reasonable need of either party for additional time to gather information timelines may be extended at the discretion of the Department of Student Community Ethics (DSCE).

Violations of the Academic Integrity Policy include:

- **Cheating** - Using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
- **Fabrication** - Creating and/or falsifying information or citation in any academic exercise.
- **Plagiarism** - Representing the words or ideas of someone else as one’s own in any academic exercise.
- **Facilitation** - Helping or attempting to help someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another to copy information during an examination)

Faculty members have the right to determine the appropriate sanction(s) for violations of the Academic Integrity Policy within their courses, up to and including a final grade of “F” in the course. Within five (5) days of the instructor’s knowledge of the alleged violation of the Academic Integrity Policy, the instructor will inform his/her department head (Associate Dean of the Graduate School when the student is a graduate student) in writing of the allegation and proposed sanction(s).

The Academic Integrity Policy, Process and Faculty Reporting Form can be found online at: academicintegrity.wcu.edu.

- **Attendance Policy**: Students will be expected to be in class. Unless you are excused from class, you will receive a zero on any class activity/quiz that is given during the missed class. Excused absences are in writing and before the class in question. If you can’t participate in the field trip, you can’t pass the course.

- **Statement on late and/or makeup assignments**: Late assignments are not accepted unless the lateness is due to an excused absence (see above).
Course Overview
The purpose of this course is to explore the origin and characteristics of topography, rocks, and landscapes of the Southern Appalachians through a weekend field trip. The field trip will involve visiting several sites along a transect through the Southern Appalachians with emphasis on the Great Smoky Mountains National Park. The trip will involve camping and some hiking. There will be a few class meetings before the trip, but none after the trip. Students will be required to conduct background research on a field stop, lead discussion in the field at ‘their’ field stop, and keep a field journal during the trip (there will be no exams!). The field trip will provide an overview of the natural history of the region for introductory and advanced students.

**REQUIRED FIELD TRIP:** Oct. 3rd – 5th. Field trip will leave early Friday and return early evening on Sunday. You will need to arrange to miss other classes on the 3rd. We can provide a note if necessary, but excusing the absence is not automatic and is your instructor’s decision.

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 19</td>
<td>Course overview, logistics, and student assignments</td>
</tr>
<tr>
<td>Aug. 26</td>
<td>Geologic origin of the GSMNP (Ben)</td>
</tr>
<tr>
<td>Sept. 9</td>
<td>Landscape evolution in the GSMNP (Mark)</td>
</tr>
<tr>
<td>Sept. 16</td>
<td>Student Meetings (Work on presentation and handout)</td>
</tr>
<tr>
<td>Sept. 23</td>
<td>Overview of selected topics (student presentations) &amp; logistics</td>
</tr>
<tr>
<td>Sept. 30</td>
<td>Last minute logistics and field trip preparation (food, van, equipment, etc.)</td>
</tr>
<tr>
<td><strong>FIELD TRIP</strong></td>
<td>Leave NS parking lot at 7:30 am</td>
</tr>
<tr>
<td>Oct. 3, Friday</td>
<td>Camp: Elkmont</td>
</tr>
<tr>
<td>Oct. 4, Saturday</td>
<td>Camp: Elkmont</td>
</tr>
<tr>
<td>Oct. 5, Sunday</td>
<td>Home: Base Camp Cullowhee</td>
</tr>
</tbody>
</table>

**Required Materials**
- GSMNP Map (provided)
- Field Notebook (get from bookstore)
- Several required readings will be placed on reserve in the library or posted on Blackboard
- $10 for food
- Tent/sleeping Bag

**Contact Info.**
Ben Tanner (NS335; btanner@wcu.edu; #3915)
Mark Lord (NS331; mlord@wcu.edu; #2271)
Geology Smoky Mountains Field Trip, Fall 2014

COURSE RESPONSIBILITIES & GRADING

Participation and Preparedness (20 %)
It is expected that you will actively engage in the course—this is important to your education as well as that of your peers. Past talking and ‘doing’, effective participation requires preparation. This means reading and understanding class readings, making appropriate observations in the field, having appropriate field gear, etc. As this is a field trip course, quality participation also includes being a helpful and happy camper (i.e. chipping in with work, being on time, being courteous of others—even when you’ve been stuck with the same person for three days in a van and they stink). It should go without saying, but...attendance at all classes and the field trip is mandatory. You can not pass the course without participation in our field trip.

Student Research Assignments (40 %)
Each group of students is responsible for educating the class on the background of a topic and leading the discussion of the topic at the related stop on the field trip. Each group will make a presentation to the class on Sept. 12th to provide background on the topic. During that same class, each group must submit a draft of the handout for the field trip to the instructors. The outline for the class and field talk will vary with topic. The general guidelines are below.

Class talk—This will be a formal presentation to the class to provide the necessary background on the topic for the field trip. The talk should be 5-10 minutes (long talks will be cut off).

Field talk—Each group will provide a site-specific overview of their topic at a designated field stop or stops. On site, the feature (rock, landform, etc.) should be described, and a suggestion of field observations to be made by our group. The handout should include a one-page, single-spaced summary of the topic/field site. The summary page should include group member names, the summary, and at least 3 references (cited in proper format). Also, the handout should include a topographic map of the site and any appropriate figures. A draft of the handout is due on Sept. 23th. A final copy of the handout must be provided to each participant at the start of the trip.

In class on August 26th, we will assign topics, and provide each group with a list of questions and references for the topic. The topics will be chosen to support our field itinerary; the likely topics to be assigned are listed below.

- Anakeesta Formation
- Thunderhead Sandstone
- Great Smoky Fault and structural windows
- Karst topography—sink holes, dry valleys, caves
- Pleistocene climate and blockfields
- Debris avalanches
- Stream patterns & form
- Landscape evolution

Field Notebooks (40%)
Field notes are mandatory at designated stops in addition to interpretive comments. We’ll talk more about this later. The notebooks will be evaluated based on neatness, completeness, demonstrated understanding, and accuracy. The field notebooks will be collected when getting off the van back at WCU.

100-94%: A, 93-90%: A-, 89-87%: B+, 86-83%: B, 82-80%: B-, 79-77%: C+, 76-73%: C, 72-70%: C-, 69-60%: D, <60%: F
ACADEMIC HONESTY POLICY

Western Carolina University, as a community of scholarship, is also a community of honor. Faculty, staff, administrators, and students work together to achieve the highest standards of honesty and integrity. Academic dishonesty is a serious offense at Western Carolina University because it threatens the quality of scholarship and defrauds those who depend on knowledge and integrity. Academic dishonesty includes:

a. Cheating—Intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
b. Fabrication—Intentional falsification of information or citation in an academic exercise.
c. Plagiarism—Intentionally or knowingly representing the words or ideas of someone else as one's own in an academic exercise.
d. Facilitation of Academic Dishonesty—Intentionally or knowingly helping or attempting to help someone else to commit an act of academic dishonesty, such as knowingly allowing another to copy information during an examination or other academic exercise.

Instructors have the right to determine the appropriate sanction or sanctions for academic dishonesty within their courses up to and including a final grade of “F” in the course. Within 5 calendar days of the event the instructor will inform his/her department head, and the Associate Dean of the Graduate School when the student is a graduate student, in writing of the academic dishonesty charge and sanction.

Procedures for cases involving allegations of academic dishonesty can be found in the student handbook.

CLASS SCHEDULE AND ASSIGNMENTS ARE TENTATIVE AND ARE SUBJECT TO CHANGE DURING THE SEMESTER. YOU WILL BE NOTIFIED OF ANY CHANGES DURING CLASS TIME.

Office of Disability Services

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Math Tutoring Center (usually included in Math department lower division courses)

The Mathematics Tutoring Center (455 Stillwell, http://mathlab.wcu.edu, 227-3830) provides tutoring in all lower-division math and many CS courses, help with mathematical concepts in other disciplines, and workshops on study skills specific to mathematics courses. Tutoring is available on a drop-in basis, 9-5 and 6-9 pm Monday-Thursday, and 9-5 on Friday or by appointment.

Academic Calendar includes dates for all breaks, university closures, final exams, etc. The academic calendar can be found at: http://www.wcu.edu/academics/campus-academic-resources/registrars-office/academic-calendar.asp.
Purpose and Objectives:
The purpose of this course is to provide an introduction to hydrogeology with emphasis on groundwater, groundwater-surface water interactions, geologic controls, water quality, field investigations, and environmental problems. At the end of this course you should

- know, understand, and master fundamental qualitative and quantitative principles of hydrogeology
- know how to approach and solve basic problems in field hydrogeology
- know locations of hydrogeologic data and how to use them in hydrologic investigations
- understand how hydrogeology is interrelated with the geosciences and environmental sciences, as well as with society
- know how to define and address a hydrogeologic research problem using standard methods and data analysis techniques

Course Outline:
The outline below shows course topics and the order that we will address them in Hydrogeology; most topics will require about one week of focus. The course will also have a significant small group research project, which will be intertwined with the course topics over much of the semester.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Chapter in Fetter*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to hydrogeology and course</td>
<td>1</td>
</tr>
<tr>
<td>Set-up: Western Carolina Hydrologic Research Station</td>
<td></td>
</tr>
<tr>
<td>Hydrologic cycle with emphasis on stream flow</td>
<td>2</td>
</tr>
<tr>
<td>Hydrogeologic properties of earth materials</td>
<td>3</td>
</tr>
<tr>
<td>Darcy’s Law and principles of groundwater flow</td>
<td>4</td>
</tr>
<tr>
<td>Groundwater flow solutions: flow nets, regional flow systems, and modeling</td>
<td>4.11-4.14, 7</td>
</tr>
<tr>
<td>Stream, groundwater, and ecosystem interactions</td>
<td>7, 7.6</td>
</tr>
<tr>
<td>Hydrogeologic settings</td>
<td>8</td>
</tr>
<tr>
<td>Groundwater flow to wells</td>
<td>5</td>
</tr>
<tr>
<td>Water chemistry—introduction</td>
<td>9</td>
</tr>
<tr>
<td>Groundwater Contamination &amp; Water quality</td>
<td>10</td>
</tr>
<tr>
<td>Hydrology management</td>
<td>11</td>
</tr>
</tbody>
</table>

*** Cumulative Final Exam on Monday, December 8th, 8:30-11 ***

* The chapters listed in Fetter are those most directly related to the topic we will be discussing. In some cases, the entire chapter will not be directly relevant to our class. In addition to readings in Fetter, there will be outside readings.


Course Overview:
Many of the principles and concepts of hydrogeology are difficult and require hands-on effort for full comprehension. Furthermore, many of the principles and concepts of hydrogeology are conveyed quantitatively. Thus, to maximize the value of this course to your education, your full participation (e.g. attendance, preparedness, effort, attitude) in the course is essential. Field investigations, student research projects, homework, and other problem solving exercises will make up a significant part of our exploration of hydrogeology. There is a very practical side to this too: hydrogeology is embedded into many of our nation’s
Exams will consist of essays, quantitative problems, and short answer questions; exams may include a take-home portion.

Grading:
Labs, a research project, homework, etc. will make up a significant portion of this course; because of this, we will only have two full exams (a midterm and a final). In addition to the two exams, there will be several mastery quizzes. The focus of quizzes will be on skills (e.g. problems) rather than concepts and will be mostly based on homework. The date of the midterm will be set at least one week in advance of the exam.

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25 % Midterm Exam
30 % Final Exam (cumulative)
30 % Research Project
15 % Class & Lab assignments, quizzes, class participation & preparedness

All work submitted for this course must meet minimum college-level requirements with respect to writing, clarity, and completeness. Work submitted that does not meet minimum expectations will not be accepted for evaluation, but may be corrected and resubmitted with a late penalty (see below).

All work must be turned in on the assigned due dates by 5:00 pm to be considered for full credit. Late work that is not excused will be penalized at 10% per day (including Saturday and Sunday). All out-of-class written assignments, unless stated otherwise, must be typed, 12 point font, double-spaced, and have one inch margins. All references used must be cited in a standard reference format. A general exception to required typing is problem solving homework. All written work should be neat and clearly labeled so I can evaluate your work. Problems involving math should show all work and have all units labeled.

Grades and point scale*: 100-97%: A+, 96-93%: A, 92-90%: A-, 89-87%: B+, 86-83%: B, 82-80%: B-, 79-77%: C+, 76-73%: C, 72-70%: C-, 69-60%: D, <60%: F

*In order to pass the course (i.e. earn a grade of D- or higher), you must have a passing score (>60%) for your exam average and non-exam average (ex. labs & research).

Attendance and Expectations:
I expect each of you to attend all classes unless you have an excused absence, although I will not directly count attendance in your grade. This course is being taught for you—not for me. Your presence, your preparedness, and your participation in all classes are critical to your success in the course as well as the success of the class. There will be no make-up work permitted for unexcused absences. Blackboard will be used increasingly over the semester as the course builds. If you have suggestions for helpful information on Blackboard to support your success, just let me know.

➢ Bring your text and a calculator to all class and lab meetings.

Hydrogeology Lab:
Many of our labs will be field labs and will study/research some aspect of hydrogeology at WCU utilizing campus groundwater wells and hydrology equipment. In addition, because this course involves the study of water, you can count on getting wet (Also, you can count on getting dirty). The point is be prepared for the field--lab time can go miserably slow for the unprepared. Most labs will require a standard lab report write-up; the details for the lab reports will be described in our first lab. Probable lab activities are *Lab determination of hydraulic conductivity, moisture, porosity; *stream discharge measurement; *Install groundwater wells; *Determine aquifer parameters (bail and pump test); *Conduct geophysical survey and dilution tracing experiment; *Contaminant movement processes and monitoring; *Computer modeling of groundwater flow systems; *Analysis of groundwater using groundwater-tank models; *Water sampling and chemical analysis *Visit groundwater contamination site
Research Project
You will conduct hydrogeologic research in the class as part of the class. This research is focused around the Western Carolina Hydrologic Research Station (wchrs.wcu.edu) that has been supported by the National Science Foundation (NSF) and NC Dept. of Environment & Natural Resources. This semester, research will be related to evaluation of the interaction of groundwater and stream water in different reaches (geomorphic settings) of the research station. In our opinion, research is the best way to train to a geoscientist. Note that this project is real research—it is part of a larger effort to learn about the region, and we don’t know what the results will be. Some of you may even be able to present the results of your semester’s work at a professional conference. Research will be completed during class, labs and on your own time. More information will be given about this effort as the semester continues.

ACADEMIC INTEGRITY
Western Carolina University, as a community of scholarship, is also a community of honor. Faculty, staff, administrators, and students work together to achieve the highest standards of honesty and integrity. Academic dishonesty is a serious offense at Western Carolina University because it threatens the quality of scholarship and defrauds those who depend on knowledge and integrity. Academic dishonesty includes:

a. Cheating—Intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
b. Fabrication—Intentional falsification of information or citation in an academic exercise.
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d. Facilitation of Academic Dishonesty—Intentionally or knowingly helping or attempting to help someone else to commit an act of academic dishonesty, such as knowing allowing another to copy information during an examination or other academic exercise.

Instructors have the right to determine the appropriate sanction or sanctions for academic dishonesty within their courses up to and including a final grade of “F” in the course. Within 5 calendar days of the event the instructor will inform his/her department head, and the Associate Dean of the Graduate School when the student is a graduate student, in writing of the academic dishonesty charge and sanction. For more information on academic integrity, visit the Student Handbook.

Statement on Group Work and Plagiarism: In the modern work environment we are often called upon work as teams. Teamwork facilitates the exchange of ideas and helps us learn from one another. Different people bring different ideas to the group. However, teamwork does not eliminate the need for personal accountability, and individual responsibility. Some exercises in this course will require you to work in peer groups. Each student is expected to participate fully in the work of the group:

a. It is not acceptable to sit by the sidelines while your group works, and then copy the data or duplicate the results later.
b. It is permissible, and sometimes advisable, for a group to split up work. For example, in a stream profiling lab, two group members might take measurements for a profile while two others take measurements for calculating the velocity of a stream. In this case, the two who gathered profile data may copy velocity from the other two. However, each student is responsible for making all calculations, answering all questions and drawing maps and profiles INDIVIDUALLY, unless specifically stated otherwise in the lab handout.
c. Be warned that excessive similarity among the results of group members may be construed as plagiarism.

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FLUVIAL GEOMORPHOLOGY - COURSE INFORMATION

Instructor:
Dr. Jerry Miller  MW – ST143, 10:10-11 am (Lecture)
Office: ST302  T – ST354, 1:25-3:15 pm (Lab)
Phone: 227-2269  jmiller@wcu.edu

Office Hours: Monday, Wednesday 9-10 or by appointment


Suggested supplemental texts:


Grading:

<table>
<thead>
<tr>
<th>Geol. 410</th>
<th>Geol. 510</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam I: 15 %</td>
<td>Exam I: 10%</td>
</tr>
<tr>
<td>Exam II: 15 %</td>
<td>Exam II: 10%</td>
</tr>
<tr>
<td>Final: 20%*</td>
<td>Final: 20%</td>
</tr>
<tr>
<td>Quizzes: 10 %</td>
<td>Quizzes: 10 %</td>
</tr>
<tr>
<td>Homework &amp; Project: 35%</td>
<td>Homework &amp; Project: 35%</td>
</tr>
<tr>
<td>Class Participation: 5%</td>
<td>Paper: 10 %**</td>
</tr>
<tr>
<td></td>
<td>Class Participation: 5%</td>
</tr>
</tbody>
</table>

*- The final exam is comprehensive. Approximately 20 % of the final will be related to materials covered during Exams I and II. ** In keeping with WCU policy, graduate students will be required to complete additional assignments, including a review of a topic that is related to fluvial geomorphology.

Quizzes may periodically be given will little or no warning. They will generally cover the materials discussed during the previous 2 to 3 lectures, and may include materials contained within the assigned readings (e.g., scientific papers)!

Thursday afternoon class/lab: The best way to learn fluvial geomorphology is to actually do it. The purpose of the labs on Wednesday afternoon is to gain experience in performing basic analyses which are critical to fluvial geomorphology. The expectations for the labs will vary. On some occasions there will
be not be an assigned problem, but on other days, you will be given an assignment that must be turned in
the following week unless otherwise instructed. You should always bring a calculator to lab.

**Field Trip:** You will be applying the methods you learn in the lectures and labs to a field situation as part
of your homework assignments. This year’s projects will likely focus on Big Harris Creek located near
Polkville, NC. Thus, an all day field trip is required for you to collect the necessary data for your project.
I will try to schedule it as soon as possible. The trip will likely be scheduled toward the end of September
or the first to middle of October.

**Attendance:** You are expected to attend class unless you have an excused absents. Although attendance
is not directly counted as part of your grade, there is no doubt that your presence, preparedness, and
participation in all classes and labs are important to your success in this course. Any absence that you
incurred is at your own risk. There will be no make-up work permitted for unexcused absences!

Excused absences are given for a documented and bonafide medical emergency or the death of an
immediate family member. Excused absences are also granted for university events that include
performances and events sanctioned by the Chancellor to promote the image of the university, regularly
scheduled university team competitions (athletic and otherwise) including postseason play (practices and
training sessions are excluded) and student engagements sponsored by the institution and approved by the
Provost (e.g. research presentations and performances at national conferences or events).

If you anticipate missing a high number of classes (i.e. 10% or more of class time) for excused absences,
please discuss this issue with me as soon as possible.

Note that the Instructor has the discretion to cancel a student’s registration for a course if the previously
registered student fails to attend the first class meeting and fails to notify the instructor prior to the end of
the first day of class. Students may re-register for the course on a seats-available basis up through the end
of drop/add (5th day of semester).

Although instructors may drop students for non-attendance, students should not assume that this will
occur. The student is responsible to drop a course, if that is their intent, to avoid a grade of W or F.
Student appeals resulting from emergencies or other extenuating circumstances will be considered on a
case-by-case basis by the department head or in the appropriate dean’s office. Re-registration will not be
permitted for any reason after census day (10th day of semester).

**Makeup Policy**
Assignments must be turned in on time and cannot be made up unless you are given permission by the
instructor. It is possible that you will be allowed to turn in an assignment late, but do not count on it.
Moreover, if you are allowed to turn in an assignment late, there will undoubtedly be a penalty for doing
so. Tests can be made up only with a valid, verifiable excuse (e.g., a doctor’s note), or by prior approval.

**Cell Phone Use**
The use of cell phones in class is PROHIBITED! Simply put, cell phones are a distraction to the other
students in the class and to the instructor. The first time you are caught using one in class, I will give you
a warning. After that, you may be docked half-a-letter-grade for each violation.

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Study Suggestions
(1) Read the assigned chapters in the text (and make up a list of questions regarding these materials) prior to coming to lecture.

(2) Go over your notes on a regular basis - preferably after every lecture. Compare your notes with those of your classmates to insure that they are complete. If you have questions, write them down and bring them to class. We will start every lecture with a question and answer session. If you miss a class, make sure you arrange to borrow another student’s notes. Note that it is your responsibility to find out what was discussed.
# Fluvial Geomorphology

**Fall, 2013**

*Tentative Lecture (Monday/Wed) Schedule*

<table>
<thead>
<tr>
<th>Month/Day</th>
<th>Topic</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monday, Aug., 19</strong></td>
<td>Course Introduction</td>
<td></td>
</tr>
<tr>
<td><strong>Wed., Aug., 21</strong></td>
<td>Paleoflood Video</td>
<td></td>
</tr>
<tr>
<td><strong>Mon., Aug., 26</strong></td>
<td>Modern concepts in geomorphology; equilibrium, thresholds, complex response, and process linkages (lecture and lab)</td>
<td>Ritter et al., chapter 1(p. 2-23) (on reserve in Hunter Library)</td>
</tr>
<tr>
<td><strong>Wed., Aug., 28</strong></td>
<td>Putting fluvial geomorphology to work – environmental issues and stream restoration</td>
<td>Ritter, 1986 (on reserve in Hunter Library)</td>
</tr>
<tr>
<td><strong>Mon., Sept., 2</strong></td>
<td><em>No class (Labor Day)</em></td>
<td>Knighton, p. 96-107</td>
</tr>
<tr>
<td><strong>Wed., Sept., 4</strong></td>
<td>Intro to open channel flow; hydrographs, and the controlling factors</td>
<td>Ritter et al., Chapter 5</td>
</tr>
<tr>
<td><strong>Mon., Sept., 9</strong></td>
<td>Modes of sediment transport; processes of entrainment</td>
<td>Ritter et al., Chapter 6, Sediment transport</td>
</tr>
<tr>
<td><strong>Wed., Sept., 11</strong></td>
<td>Discussion of tractive force, critical bed velocity, and stream power continued</td>
<td>Knighton, p. 107-113; Knighton, p. 118-141</td>
</tr>
<tr>
<td><strong>Mon., Sept. 16</strong></td>
<td>Equal mobility hypotheses; prediction of channel bed scour; bedload transport models</td>
<td>Same as for Sept., 9</td>
</tr>
<tr>
<td><strong>Wed., Sept., 18</strong></td>
<td><em>Exam I</em></td>
<td></td>
</tr>
<tr>
<td><strong>Mon., Sept., 23</strong></td>
<td>Erosion of bedrock channels; bank erosion – processes and mechanisms</td>
<td>Knighton, p. 113-118</td>
</tr>
<tr>
<td><strong>Wed., Sept., 25</strong></td>
<td>Bank erosion models</td>
<td>To be assigned</td>
</tr>
<tr>
<td><strong>Mon., Sept., 30</strong></td>
<td>Channel patterns - meandering rivers</td>
<td>Knighton, p. 205-230</td>
</tr>
<tr>
<td><strong>Wed., Oct., 2</strong></td>
<td>Meandering rivers continued</td>
<td>Same as for Sept. 30</td>
</tr>
<tr>
<td><strong>Mon., Oct., 7</strong></td>
<td><em>Fall Break, no class</em></td>
<td></td>
</tr>
<tr>
<td><strong>Wed., Oct., 9</strong></td>
<td><em>Fall Break, no class</em></td>
<td></td>
</tr>
<tr>
<td><strong>Mon., Oct., 14</strong></td>
<td>Braided and anabranching channels</td>
<td>Ritter et al., chapter 6</td>
</tr>
<tr>
<td><strong>Wed., Oct., 16</strong></td>
<td>Controls on channel slope; reach scale bed configuration and deposits, including pool-riffle and step-pool sequences</td>
<td>Ritter et al., chapter 6</td>
</tr>
<tr>
<td><strong>Mon., Oct., 21</strong></td>
<td>Controls on channel width, depth, and width to depth ratio; hydraulic geometry; regional curves</td>
<td>Ritter et al., chapter 6</td>
</tr>
</tbody>
</table>
### Schedule - continued

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wed., Oct., 23</td>
<td>Review of channel form; review for exam</td>
</tr>
<tr>
<td>Mon., Oct., 28</td>
<td>Exam II</td>
</tr>
<tr>
<td>Wed., Oct., 30</td>
<td>Floodplains definition and formation; Floodplain deposits; terraces</td>
</tr>
<tr>
<td></td>
<td>Miller and Orbock Miller (2007) Chapter 6; Ritter et al., 2006, Chapter 7 (terraces)</td>
</tr>
<tr>
<td>Mon., Nov., 4</td>
<td>Constructing geomorphic histories; dating methods</td>
</tr>
<tr>
<td>Mon., Nov., 11</td>
<td>Channel response and recovery; concept of event ordering</td>
</tr>
<tr>
<td>Wed., Nov., 13</td>
<td>Geomorphic responses to disturbance; methods of assessing channel changes</td>
</tr>
<tr>
<td>Mon., Nov., 18</td>
<td>Geomorphic responses to land-use change; legacy sediments</td>
</tr>
<tr>
<td>Wed., Nov., 20</td>
<td>Common responses to climate change and land-use alterations</td>
</tr>
<tr>
<td>Mon., Nov., 25</td>
<td>Fluvial responses to channelization</td>
</tr>
<tr>
<td>Wed., Nov., 27</td>
<td>No class; Thanksgiving Break</td>
</tr>
<tr>
<td>Mon., Dec., 2</td>
<td>Assessing the impacts of dams</td>
</tr>
<tr>
<td>Mon., Dec., 4</td>
<td>Final thoughts</td>
</tr>
<tr>
<td>Wed., Dec., 11</td>
<td>Final Exam, 8:30-11:00 (in ST143)</td>
</tr>
</tbody>
</table>

Note: schedule may be adjusted slightly during the course of the semester.

### Thursday Lab Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug., 22</td>
<td>No Class</td>
</tr>
<tr>
<td>Aug., 29</td>
<td>Basin morphometry; Horton/Strahler analysis</td>
</tr>
<tr>
<td>Sept., 5</td>
<td>Horizontally integrated method of discharge measurement. Measurement of bed and bank material size distributions</td>
</tr>
<tr>
<td>Sept., 12</td>
<td>Cullowhee Creek data collection and analysis</td>
</tr>
<tr>
<td>Sept., 19</td>
<td>Hydrologic modeling of stage-discharge relations</td>
</tr>
<tr>
<td>Sept., 26</td>
<td>Flood frequency analysis – basic concepts; analyzing flood frequency in ungaged basins with NFF</td>
</tr>
<tr>
<td>Oct., 3</td>
<td>Project discussion and data collection</td>
</tr>
<tr>
<td>Oct., 10</td>
<td>Fall Break, no class</td>
</tr>
<tr>
<td>Oct., 17</td>
<td>Computation of shear stress and particle entrainment</td>
</tr>
<tr>
<td>Oct., 24</td>
<td>Stratigraphic analyses and deposit dating methods</td>
</tr>
<tr>
<td>Oct., 31</td>
<td>Aerial photographic mapping</td>
</tr>
<tr>
<td>Nov., 7</td>
<td>Project analysis</td>
</tr>
<tr>
<td>Nov., 14</td>
<td>Spring Break, no class</td>
</tr>
<tr>
<td>Nov., 21</td>
<td>Project analysis</td>
</tr>
<tr>
<td>Nov., 28</td>
<td>Thanksgiving break, no class</td>
</tr>
<tr>
<td>Dec., 5</td>
<td>Project presentations</td>
</tr>
</tbody>
</table>
GEOL 422 – Sedimentation and Stratigraphy
Spring 2015

Dr. Frank L Forcino
Office: 335 Stillwell
Phone: 277-2888
Email: fforcino@email.wcu.edu
Office Hours: MWF 9am to 10am or by appointment

Lecture: TR 9:30-10:45  322 Stillwell
Lab 1:  T 1:00-2:50      355 Stillwell
Lab 2:  T 3:00-4:50      355 Stillwell

Purpose: This course is intended to provide students with a detailed understanding of sedimentary processes and sedimentary rocks as well as an understanding of stratigraphic principles. Students will act as scientists to describe sedimentary materials, gather and synthesize data, and communicate data. Students will be exposed to geologic field work and learn techniques used by sedimentologists.

Course objectives:
1) Students will understand and describe the processes that go into creating sedimentary rocks and under what conditions various sedimentary rocks form.
2) Students will be able to describe and identify sedimentary rocks and features of sedimentary rocks
3) From observing patterns and changes in a sequence of sedimentary rocks, students will be able to recreate past environments and changes that occur through time and space.
4) Using stratigraphic principles, students will be able to make predictions about past environments where time is missing or outcrops are unavailable


Attendance: Attending class and lab every single day will be extremely important. In addition to the lab section, there will be labs, activities, and discussions during most class times. If you have an unexcused absence, your grade will suffer because you will likely miss a graded assignment. If you have a scheduled absence due to university activities, you must provide me with notice at least one week in advance. Unforeseen but excusable absences (e.g. illness, family emergency) will be evaluated on a case-by-case basis. Make-ups for unexcused absences will not be permitted and any corresponding exam, lab, or activity will receive zero credit.

Labs and Activities: There will be 10 to 15 lab exercises, class activities, readings, or discussions. Most will be completed during class time, but some may have to be completed outside of class.

Field Trip: There will be one mandatory field trip to Kiawah Island, SC. The dates are Friday February 20 through Sunday February 22. The project resulting from this trip will be worth 5% of your grade. We will be examining deposition and sedimentation of a barrier island. You will be working in groups to complete a transect of the island, create a cross section of the island, create and examine a ground penetrating radar image of the transect, and collect and describe sediment samples across the transect.
Grading:

<table>
<thead>
<tr>
<th>35%</th>
<th>Labs and Activities</th>
<th>There will be 10 – 15 total.</th>
</tr>
</thead>
<tbody>
<tr>
<td>40%</td>
<td>Exams / Quizzes</td>
<td>Mid-term Exam (10%) – Rocks, depositional environments, thin sections, fossils</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quizzes (15% total)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Final Exam (15%)</td>
</tr>
<tr>
<td>25%</td>
<td>Projects</td>
<td>Sand Story (5%)</td>
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<td></td>
<td></td>
<td>Evaporite Experiment (5%)</td>
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<tr>
<td></td>
<td></td>
<td>Kiawah Island Field Trip Project (5%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Book Cliff Hills Virtual Field Trip (5%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Permian Reef (5%)</td>
</tr>
</tbody>
</table>

Make-up Exams: If you miss an exam for any reason, you must present an acceptable and documented excuse to make it up. The make-up test may differ in format and content from the regularly scheduled test.

Make-up Labs or Activities: If a lab or activity is missed due to an excused absence, I will do my best to help you make up that work. However, some labs and activities will only be available for completion during the class meeting. In those cases, the lab or activity will be waived, and you (the student) will be responsible for knowing that material for the exam.

Personal Electronics: Cellphone use is not permitted in the classroom, unless otherwise specified. Please silence or turn off phones so they do not disrupt class. You are encouraged to bring laptops or tablets to class, but they may only be used to take notes and for class activities. If taking notes on a computer, you must email me the notes at the end of the lecture period. Unpermitted cellphone, tablet, or computer use will result in the instructor taking the device away for the remainder of the class period.

Group Work: Many exercises in this course will require you to work in groups. It is permissible, and often advisable, for a group to split up duties. However, each student is responsible for making all calculations, answering all questions and drawing diagrams INDIVIDUALLY, unless specifically stated otherwise. Students should neither dominate the group, nor rely on the group to complete the activity. Failure to participate fully and fairly in group activities may result in a lower grade.

Projects: You must complete (and hand in) all five projects in order to get a passing grade in the course. Everyday late will result in a 5% decrease in the project grade. If the project is handed in incomplete (or clearly poorly completed), it will be handed back to the student for completion. During that span, the project is considered late, and the grade will decrease accordingly.
Faculty Expectations of Students/Course Policies:

Accommodations for Students with Disabilities: Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to the Office of Disability Services. All information is confidential. Please contact the Office of Disability Services at (828) 227-3886 or come by Suite 135 Killian Annex for an appointment.

Academic Integrity Policy
"I will practice personal and academic integrity" – WCU Community Creed
Western Carolina University (WCU) strives to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. Any violation of the Academic Integrity Policy is a violation of the Code of Student Conduct (see dsce.wcu.edu for more information).

Violations of the Academic Integrity Policy include:

- **Cheating** - Using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
- **Plagiarism** - Representing the words or ideas of someone else as one’s own in any academic exercise.
- **Fabrication** - Creating and/or falsifying information or citation in any academic exercise.
- **Facilitation** - Helping or attempting to help someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another to copy information during an examination)

Faculty members have the right to determine the appropriate sanction(s) for violations of the Academic Integrity Policy within their courses, up to and including a final grade of “F” in the course. Students will be notified, in writing, of any Academic Integrity Policy allegation and have the right to respond to the allegation. The full text of the WCU Academic Integrity Policy, Process, and the Faculty Reporting Form can be found online at: academicintegrity.wcu.edu. Please visit studysmart.wcu.edu for further information.

Student Support Services
Student Support Services provides support to students who are either first-generation, low-income or those who have disclosed a disability with: academic advising, mentoring, one-on-one tutorial support, and workshops focused on career, financial aid and graduate school preparation. You may contact SSS at (828) 227-7127 or email sssprogram@wcu.edu for more information. SSS is located in the Killian Annex, room 138.
Specific Learning Outcomes
Students will be able to:

- Make basic observations and interpretations of depositional and diagenetic history from outcrops, hand samples, and thin sections and predict future trends based on evaluation of the stratigraphic record.
- When presented with a problem involving sediments/sedimentary rocks, recommend tools and additional data needed to solve the problem.
- Take data and formulate a hypothesis and test their hypothesis.
- Solve problems in sedimentary geology that involve limited data and require work at different scales (grain to basin).
- Ask questions about sedimentary geology and, once a question is asked, know what data is needed to answer the question.
- Pose questions to test hypotheses.
- Interpret the origin of sedimentary rocks and make predictions.
- Interpret depositional environments based on observed sedimentological data.
- Make reproducible and accurate descriptions of sedimentary rocks, bedforms, and textures.
- Be skilled observers and recorders
- Measure a stratigraphic section and/or describe a sediment core.
- Interpret a stratigraphic cross-section using lithostratigraphy.
- Describe carbonate and siliciclastic rocks in outcrop, hand sample, and thin section.
- Recognize the distinction between observation and interpretation.
- Critically evaluate the literature about sedimentary geology.
- Understand the fundamentals properties of sedimentary rocks and stratigraphic principles.
- Understand basic concepts such as origin of textures, bedding in a general sense, trace fossils.
- Analyze trace fossil assemblages to infer sediment properties and depositional conditions of the host rock.
- Communicate their interpretations of a sedimentary deposition effectively and clearly using written and oral methods.
- Synthesize data and communicate it well both in writing and orally.
- Demonstrate an ability to read and interpret professional geology literature.
Tentative Schedule:

<table>
<thead>
<tr>
<th>WEEK</th>
<th>DAY</th>
<th>DATE</th>
<th>TOPIC</th>
<th>LAB or PROJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>T</td>
<td>13-Jan</td>
<td>Introduction to the course, Clastic Textures</td>
<td>Sand Story</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>15-Jan</td>
<td>Clastic Textures</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>T</td>
<td>20-Jan</td>
<td>Conglomerates and Breccias, Sandstones</td>
<td>Clastic Sed Rocks Lab</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>22-Jan</td>
<td>Sandstones, Mudrocks</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>T</td>
<td>27-Jan</td>
<td>Chemical and biogenic rocks, Evaporites</td>
<td>Siliciclastic thin sections</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>29-Jan</td>
<td>Chemical and biogenic rocks, Carbonate sediments and sedimentation</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>T</td>
<td>3-Feb</td>
<td>Sand Story results presentations</td>
<td>Evaporite Experiment</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>5-Feb</td>
<td>Carbonate Rocks, Carbonate Rocks Lab</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>T</td>
<td>10-Feb</td>
<td>Depositional systems, Facies, and Walther’s Law</td>
<td>Carbonate thin sections</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>12-Feb</td>
<td>Sedimentary structures, Trace Fossils</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>T</td>
<td>17-Feb</td>
<td>Marine environments interpretation lab – siliciclastic, shallow to deep (deep water sedimentation debate)</td>
<td>Fossils</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>19-Feb</td>
<td>Marginal marine environments, Tidal and Beach</td>
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<td>F</td>
<td>20-Feb</td>
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<td></td>
<td>Sat</td>
<td>21-Feb</td>
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<td>Sun</td>
<td>22-Feb</td>
<td></td>
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<tr>
<td>7</td>
<td>T</td>
<td>24-Feb</td>
<td>Advising Day – No class meeting</td>
<td>No Lab Meeting</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>26-Feb</td>
<td>Kiawah Island Field Trip Projects</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>T</td>
<td>3-Mar</td>
<td>Terrestrial sed environments – rivers, deltas (delta paleoenvironment activity / lab)</td>
<td>Mid-term Exam</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>5-Mar</td>
<td>Carbonate Rock Environment Interpretation Lab</td>
<td></td>
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<tr>
<td>9</td>
<td>T</td>
<td>10-Mar</td>
<td></td>
<td>Spring Break – No class meeting</td>
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<td></td>
<td>R</td>
<td>12-Mar</td>
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<tr>
<td>10</td>
<td>T</td>
<td>17-Mar</td>
<td>Books Cliff Project Introduction</td>
<td>No official meeting: Kiawah Island Field Trip Project</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>19-Mar</td>
<td>SE GSA – No class meeting</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>T</td>
<td>24-Mar</td>
<td>Stream deposition lab</td>
<td>Stream deposition lab</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>26-Mar</td>
<td>Kiawah Island Field Trip Project Presentations and write ups due</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>T</td>
<td>31-Mar</td>
<td>Books Cliff Project</td>
<td>Books Cliff Project</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>2-Apr</td>
<td>Holiday – No class meeting</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>T</td>
<td>7-Apr</td>
<td>Present results of Evaporite Experiment, write up due</td>
<td>Books Cliff Project</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>9-Apr</td>
<td>Stratigraphy, Books Cliff Project due</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>T</td>
<td>14-Apr</td>
<td>Stratigraphy, Sequence stratigraphy</td>
<td>Permian Reef Project</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>16-Apr</td>
<td>Biostratigraphy, Chemostatigraphhy</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>T</td>
<td>21-Apr</td>
<td>Magnetostratigraphy, Chronostratigraphhy</td>
<td>Permian Reef Project</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>23-Apr</td>
<td>Core Descriptions, Well Logs</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>T</td>
<td>28-Apr</td>
<td>Core Descriptions, Well Logs, Permian Reef Project</td>
<td>Permian Reef Project</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>30-Apr</td>
<td>Permian Reef Project Due</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>6-May</td>
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</tr>
</tbody>
</table>

**Kiawah Island Field Trip**

**Spring Break – No class meeting**

**Final Exam:** Wednesday May 6 at 12:00 pm
COURSE INFORMATION
Geology 423/523
Contaminated Rivers: Assessment, Remediation, and Restoration

Dr. Jerry R. Miller
Office: ST 302
Spring 2015
Ph.: 828-227-2269
Lecture: ST 143, TTh 12:30-1:45
Office Hrs: TTh 11-12 or by
Email: jmiller@wcu.edu
appointment (my door is always open)

Course Objectives
We will explore the integration of hydrology, geomorphology, and geochemistry to effectively
assess, remEDIATE, and/or restore streams and rivers contaminated by hydrophobic contaminants
such as trace metals (lead, mercury, zinc, cadmium). By the end of the course, you should have
an understanding of the primary processes through which contaminants are dispersed from point
and non-point sources of pollution, the methods used to monitor the rate of contaminant transport
in rivers, the mechanism involved in the retention and release of contaminants from sedimentary
deposits, the techniques used to map contaminant hotspots, and the various methods used to
remediate and/or clean up contaminated rivers, thereby reducing the potential environmental
impacts on both human and ecosystem health.

Geomorphological-Geochemical Approach to Site Assessment and Remediation. Springer.

--- The textbook was written specifically for this course and you will be expected to keep up with
the reading assignments. Both exam and quiz questions may pertain to materials within the
assigned readings which were not discussed in class! The book can be rented from the
bookstore.

Additional Readings

Extra Credit Assignment: Lydia Denworth, 2009. Toxic Truth: A Scientist, a Doctor, and the
Battle over Lead, Beacon Press.

Grading:
Exam I: 15 % Homework & Reading: 15 %
Exam II: 15 % Project: 10 %
Final: 20 %* Participation: 10 %
Quizzes: 15 %**

*- The final exam is comprehensive. Approximately 20 % of the final will be related to materials covered during the
Midterm. ** - Quizzes will be given about once a week and may or may not be announced. Be prepared to take them
on a regular basis.
Field Trip: **One, one-day field trip is required.** You will be collecting the samples required for your course projects. I am hoping that the field trip will be on Saturday, March 21, but it will depend on whether and other factors.

**Lecture Notes/Figures:** PowerPoint materials presented in class will be made available via Blackboard, in most instances, before class. It may be very useful to print these slides and take notes directly on the printed figures.

**Twitter Account:** Everyone participating in the course will be required to create a Twitter account if you do not already have one. To create an account, go to: [https://twitter.com/](https://twitter.com/). Once you have an account, bring it to class.

Once everyone in the class has an account, I will add you to a Twitter list called Contaminated Rivers. This will allow us to communicate with everyone in the class via Twitter. Note that I will distribute important class materials via Twitter, and you will be required to ‘converse’ via Twitter on a regular basis.

**Study Suggestions**

(1) Go over your notes on a regular basis - preferably after every lecture. Compare your notes with those of your friends to insure that they are complete. If you have questions, write them down and bring them to class. Or, alternatively, send them out as a tweet for your classmate to answer. We will start every lecture with a question and answer session. **If you miss a class, make sure you arrange to borrow another student’s notes. Note that it is your responsibility to find out what was discussed.**

**Accommodations for Students with Disabilities:**
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<table>
<thead>
<tr>
<th>Lecture</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 13</td>
<td>Course overview</td>
</tr>
<tr>
<td>Jan. 15</td>
<td>Dealing with uncertainty in applied/environmental science</td>
</tr>
<tr>
<td>Jan. 20</td>
<td>Introduction - river investigations and costs; definitions and guiding principles of the geomorphological-geochemical approach</td>
</tr>
<tr>
<td>Jan. 22</td>
<td>Types of pollutants; regional and national surveys of water quality</td>
</tr>
<tr>
<td>Jan. 27</td>
<td>Sediment-contaminant relations; physical partitioning of trace metals; <em>Group Presentations on pollutant types and importance to riverine ecosystems</em></td>
</tr>
<tr>
<td>Jan. 29</td>
<td>Precipitation-dissolution reactions; <em>Group Presentations on pollutant types and importance to riverine ecosystems</em></td>
</tr>
<tr>
<td>Feb. 3</td>
<td>Sorption-desorption processes; cation exchange processes</td>
</tr>
<tr>
<td>Feb. 5</td>
<td>Chemical partitioning between chemically reactive substrates</td>
</tr>
<tr>
<td>Feb. 10</td>
<td>Trace metal speciation; factors controlling chemical mobility; review for Exam I</td>
</tr>
<tr>
<td>Feb. 12</td>
<td>Exam I</td>
</tr>
<tr>
<td>Feb. 17</td>
<td>Introduction to basin hydrology; methods for measuring discharge and sampling of the water column</td>
</tr>
<tr>
<td>Feb. 19</td>
<td>Temporal variations in dissolved and contaminated particle movement associated with flood events; system hysteresis</td>
</tr>
<tr>
<td>Feb. 24</td>
<td>Advising Day – no class</td>
</tr>
<tr>
<td>Feb. 26</td>
<td>Load calculations</td>
</tr>
<tr>
<td>March 3</td>
<td>Determining contaminant sources via synoptic sampling methods</td>
</tr>
<tr>
<td>March 5</td>
<td>Introduction to channel hydraulics as well as sediment entrainment and transport</td>
</tr>
<tr>
<td>March 10</td>
<td>Spring Break – no class</td>
</tr>
<tr>
<td>March 12</td>
<td>Spring Break – no class</td>
</tr>
<tr>
<td>March 17</td>
<td>Reach scale variations in contaminant concentrations within the channel bed; implications to sampling protocols</td>
</tr>
<tr>
<td>March 19</td>
<td>Factors controlling downstream distribution of contaminants</td>
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<tr>
<td>March 24</td>
<td>Locating contaminant sources using spatial variations in contaminant patterns</td>
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<tr>
<td>March 26</td>
<td>Use of geochemical tracers for source determination</td>
</tr>
<tr>
<td>March 31</td>
<td>Exam II; Finalize channel bed contamination and review for Exam II</td>
</tr>
<tr>
<td>April 2</td>
<td>No Class</td>
</tr>
<tr>
<td>April 4</td>
<td>No Class</td>
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<tr>
<td>April 7</td>
<td>Floodplain – definition and formative processes</td>
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<tr>
<td>April 9</td>
<td>Contaminant distribution within floodplain deposits</td>
</tr>
<tr>
<td>April 14</td>
<td>Construction of contaminant histories and source determination</td>
</tr>
<tr>
<td>April 16</td>
<td>Introduction to Remediation – discussion of dredging and excavation; natural monitored recover</td>
</tr>
<tr>
<td>April 21</td>
<td>Habitat and channel reconstruction and restoration</td>
</tr>
<tr>
<td>April 23</td>
<td>Other extraction methods (photoremediation, electrokinetics, vitrification)</td>
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<tr>
<td>April 28</td>
<td>In situ containment (capping, phytostabilization, solidification and stabilization)</td>
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<tr>
<td>April 29</td>
<td>Project Presentations</td>
</tr>
<tr>
<td>May 7</td>
<td>Final Exam – 3:00 to 5:30</td>
</tr>
</tbody>
</table>

Note: schedule may be adjusted slightly during the course of the semester.
Instructor: Dr. Ben Tanner  
Office: Stillwell 307  
Office Hours: MWF 10-11; R 12:20-1:20  
Phone: 227-3915  
E-mail: btanner@email.wcu.edu  
Course Text: Mitsch and Gosselink (2007), Wetlands  
Class Meeting Time: W, F 3:00 – 4:15 McKee 116

COURSE DESCRIPTION AND GOALS
Wetlands are important components of the landscape that provide a refuge for a diversity of plant and animal species. Wetlands also play a role in flood mitigation, storm abatement, aquifer recharge, and they provide a “natural filter” by removing excess nutrients and toxic materials from the water. Despite their importance, wetland destruction has been a significant problem historically. This course will cover many issues dealing with wetlands and wetland science including wetland delineation, hydrology, and biogeochemistry. The course will consist of a mixture of readings from several texts, lectures on important topics, field-based exercises, journal article reviews, and class discussion. There will be several fieldtrips over the course of the semester that will allow students to directly explore the topics that are covered in class. At the end of the course you should have a fundamental understanding of how wetlands are defined, how we identify them in the field, what functions they serve, how they function internally, how we derive environmental information from them, and what the societal issues are concerning wetlands and their preservation.

GRADING

<table>
<thead>
<tr>
<th>Component</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tests (2)</td>
<td>50%</td>
</tr>
<tr>
<td>Assignments</td>
<td>35%</td>
</tr>
<tr>
<td>Journal Article Reviews</td>
<td>10%</td>
</tr>
<tr>
<td>Participation</td>
<td>5%</td>
</tr>
</tbody>
</table>

Mid-term and final worth 25% each.
Field and lab-based exercises will be assigned over the course of the semester and will be due 1 week after they are introduced. Specific details and expectations will be communicated when the exercises are assigned.
You will be assigned journal article readings over the course of the semester and will be required to turn in a 1 page (12 point font, double-spaced) summary of the articles. Also, you will be responsible (as a group) for leading a discussion of one of the articles.

Attendance, field trip participation, and participation in discussion and group work will be considered.

100-94%: A, 93-90%: A-, 86-87%: B+, 86-83%: B, 82-80%: B-, 79-77%: C+, 76-73%: C, 72-70%: C-, 69-60%: D, <60%: F

GRADUATE STUDENT ASSIGNMENTS
In keeping with WCU policy, graduate students will be required to complete several additional assignments. For a portion of the “assignment” score, graduate students are required to complete the field-based assignments (17.5% of the 35% indicated) but are additionally required to construct and turn in a grant-style proposal of an original research idea (GSA Style) on a topic that is related to wetlands (the other 17.5%). Additionally, each graduate student will be expected to lead 1 journal article discussion over the course of the semester (as an individual and not as part of a group) for a portion of their journal article review grade.

FIELD TRIPS
All field trips for the course are mandatory. You will be given an alternative assignment if you cannot attend one of the field trips, but this needs to be arranged in advance.

MAKEUP POLICY
Since assignments are given a week in advance of their due date, they must be turned in on time and cannot be made up. Tests can be made up only with a valid, verifiable excuse (i.e. doctor’s note).

FORMAT FOR ASSIGNMENTS
All written assignments must be typed unless I tell you otherwise. Also, please proof read all assignments to make sure that they are free of careless mistakes. I will deduct points for sloppy work.

A NOTE ON CLASSROOM ETIQUETTE
I strive to maintain a learning environment that is comfortable and free from distraction. Electronic devices must be put away before the beginning of class. If you are waiting on an important call (e.g. family member in the hospital), please see me before class for special arrangements. Also, please do what is necessary before class so that you do not have to step out (for water, bathroom, etc.) during class, especially during testing. Students leaving the room during testing will be required to turn their test in to be graded before exiting the classroom.
ACADEMIC HONESTY POLICY
(Complete policy can be found within the undergraduate catalog – several important points are included here)

Students, faculty, staff, and administrators of Western Carolina University (WCU) strive to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. While academic in scope, any violation of this policy is by nature, a violation of the Code of Student Conduct and will follow the same conduct process.

Violations of the Academic Integrity Policy include:
Cheating - Using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
Fabrication – Creating and/or falsifying information or citation in any academic exercise.
Plagiarism - Representing the words or ideas of someone else as one’s own in any academic exercise.
Facilitation - Helping or attempting to help someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another to copy information during an examination)

Faculty members have the right to determine the appropriate sanction(s) for violations of the Academic Integrity Policy within their courses, up to and including a final grade of “F” in the course. Within five (5) days of the instructor’s knowledge of the alleged violation of the Academic Integrity Policy, the instructor will inform his/her department head in writing of the allegation and proposed sanction(s).

Subsequent procedures for cases involving allegations of academic dishonesty can be found in the student handbook.

Office of Disability Services

Accommodations for Students with Disabilities: Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to the Office of Disability Services. All information is confidential. Please contact the Office of Disability Services at (828) 227-3886 or come by Suite 135 Killian Annex for an appointment.

Student Support Services

Student Support Services provides support to students who are either first-generation, low-income or those who have disclosed a disability with: academic advising, mentoring, one-on-one tutorial support, and workshops focused on career, financial aid and graduate school preparation. You may contact SSS at (828) 227-7127 or email sssprogram@wcu.edu for more information. SSS is located in the Killian Annex, room 138.

Writing and Learning Commons (WaLC)

The Writing and Learning Commons (WaLC), located in BELK 207, provides free small-group course tutoring, one-on-one writing tutoring and academic skills consultations, and online writing and learning resources for all students. All tutoring sessions take place in the WaLC or in designated classrooms on campus. To schedule tutoring appointments, log in to TutorTrac from the WaLC homepage (http://walc.wcu.edu) or call 828-227-2274. Distance students and students taking classes at Biltmore Park are encouraged to use Smarthinking and the WaLC’s online resources. Students may also take advantage of writing tutoring offered at the Biltmore Park campus on certain days of the week; call 828-227-2274 or log in to TutorTrac and select “Biltmore Park Writing Tutoring” for availabilities. Math Tutoring Center (usually included in Math department lower division courses)

The Mathematics Tutoring Center (455 Stillwell, http://mathlab.wcu.edu, 227-3830) provides tutoring in all lower-division math and many CS courses, help with mathematical concepts in other disciplines, and workshops on study skills specific to mathematics courses. Tutoring is available on a drop-in basis, 9-5 and 6-9 pm Monday-Thursday, and 9-5 on Friday or by appointment.

Academic Calendar includes dates for all breaks, university closures, final exams, etc. The academic calendar can be found at: http://www.wcu.edu/academics/campus-academic-resources/registrars-office/academic-calendar.asp.

CLASS SCHEDULE AND ASSIGNMENTS ARE TENTATIVE AND ARE SUBJECT TO CHANGE DURING THE SEMESTER. YOU WILL BE NOTIFIED OF ANY CHANGES DURING CLASS TIME
Geology 465/565: Environmental Geochemistry

Instructor: Dr. Ben Tanner  
Office: Stillwell 307  
Office Hours: MWF 10-11:00am; M 12:10-1:10pm  
e-mail: btanner@email.wcu.edu  
Phone: 227-3915  
Also by appointment or “drop in”

Course Text: G.N. Eby (2004), Principles of Environmental Geochemistry, Thomson

Class Meeting Time: MW 9:05–9:55am Stillwell 425; F 1:25-3:15pm Stillwell 425 and ST314 (when announced)

COURSE DESCRIPTION AND OBJECTIVES
This course will demonstrate the interrelated nature of the sciences by tying together aspects of geology, chemistry, and biology in the detection and solution of environmental problems. We will learn and apply stable isotope analysis, organic geochemical analysis, and bulk chemical analysis to topics including environmental contaminants, element cycling, water/rock interactions, environmental reconstruction, climate change and other environmental issues. We will also study equilibrium thermodynamics and kinetics, acid-base equilibria, and oxidation-reduction reactions in order to apply these principles to environmental issues. We will have the opportunity to use an inductively coupled plasma-atomic emission spectrometer, a gas chromatograph-mass spectrometer, an x-ray diffractometer, and a CNS elemental analyzer. Students should leave the course with an improved knowledge of how to apply chemical techniques in the investigation of past and present environments and environmental change. Students will also become familiar with some of the literature on this topic and will gain hands-on experience with practical applications of concepts to real-world problems. In order to meet these objectives, this course will consist of a mixture of lecture, lab, discussion of journal articles, and student projects.

GRADING

<table>
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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Tests (2)</td>
<td>50%</td>
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<tr>
<td>Assignments</td>
<td>30%</td>
</tr>
<tr>
<td>Journal Article Reviews</td>
<td>10%</td>
</tr>
<tr>
<td>Final Presentation</td>
<td>10%</td>
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Mid-term and final worth 25% each. Several in and out of class assignments and labs will be due over the course of the semester. Specific details and expectations will be communicated when the exercises are introduced.

You will be assigned journal article readings over the course of the semester and will be required to turn in a 1 page (12 point font, double-spaced) summary of the articles. Also, you will be responsible (as a group) for leading a discussion of one of the articles. Journal article reviews will be graded using check (85%), check minus (70%) and check plus (100%). Half hearted attempts with major portions missing will be returned without grading (0%).

Group presentations will result from in depth analysis of a lab topic. I will set aside class time to form groups for this project and will let each group pick a particular lab topic to focus on. Specific details and expectations will be communicated when the assignment is introduced.

100-94%: A, 93-90%: A-, 89-87%: B+, 86-83%: B, 82-80%: B-, 79-77%: C+, 76-73%: C, 72-70%: C-, 69-60%: D, <60%: F

GRADUATE STUDENT ASSIGNMENTS
In keeping with WCU policy, graduate students will be required to complete several additional assignments. For a portion of the “assignment” score, graduate students are required to complete the field-based assignments (15% of the 30% indicated) but are additionally required to construct and turn in a grant-style proposal of an original research idea (GSA Style) on a topic that is related to environmental geochemistry (the other 15%). Additionally, each graduate student will be expected to lead 1 journal article discussion over the course of the semester (as an individual and not as part of a group) for a portion of their journal article review grade.

FIELD TRIPS
The course fieldtrip is mandatory. Students with a schedule conflict or a valid excuse can complete an alternative assignment.

MAKEUP POLICY
Since assignments are given a week in advance of their due date, they must be turned in on time and cannot be made up. Tests can be made up only with a valid, verifiable excuse (i.e. doctor’s note).
FORMAT FOR ASSIGNMENTS

All written assignments must be typed unless I tell you otherwise. Also, please proof read all assignments to make sure that they are free of careless mistakes. Problem sets can be done by hand (these do not need to be typed). I will deduct points for sloppy work.

A NOTE ON CLASSROOM ETIQUETTE

I strive to maintain a learning environment that is comfortable and free from distraction. Electronic devices must be put away before the beginning of class. If you are waiting on an important call (e.g. family member in the hospital), please see me before class for special arrangements. Also, please do what is necessary before class so that you do not have to step out (for water, bathroom, etc.) during class, especially during testing. Students leaving the room during testing will be required to turn their test in to be graded before exiting the classroom.

COMPOSITION CONDITION MARKS

A student whose written work in any course fails to meet acceptable standards will be assigned a composition-condition (CC) mark by the instructor on the final grade report. All undergraduates who receive two CC grades prior to the semester in which they complete 110 hours at Western Carolina University are so notified by the registrar and are required to pass English 300 or English 401 before they will be eligible for graduation. This course must be taken within two semesters of receiving the second CC and must be passed with a grade of C (2.0) or better.

ACCOMODATIONS FOR STUDENTS WITH DISABILITIES

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CLASS SCHEDULE AND ASSIGNMENTS ARE TENTATIVE AND ARE SUBJECT TO CHANGE DURING THE SEMESTER. YOU WILL BE NOTIFIED OF ANY CHANGES DURING CLASS TIME
GEOLOGY 471: Tectonics  Fall 2014

Instructor:  
Dr. Cheryl Waters-Tormey  
Office: 308 Stillwell Building  
Phone: 227-3696  
Email: cherylwt@email.wcu.edu

Class:  
MWF 11:15-12:05

Office hours:  
Mon 3:30-4:30;  
Tues 9:30-10:30;  Fri 10-11

ASSESSMENT:  
Exams 1-2  
Cumulative final exam  
Concept & vocabulary checks  
Portfolio, mid-term & final checks  
Discussion participation  
Presentation & extended abstract

20% (10% each)  
15%  
5%  
10% (5% each)  
30% (est. 6% each)  
20% (10% each)

Text:  
+ supplemental readings from journals and supporting texts

FIELD TRIP:  October 3-5, Great Smoky Mtns and eastern Appalachian Foreland Basin

Course description:  History and development of tectonic concepts; geometry and kinematics of plate mosaic; evolution of modern and ancient orogenic belts. Plate tectonic theory is a foundation of modern geology. The study of active plate boundaries, plate tectonic processes and history involves almost all geologic disciplines (e.g., sedimentology, petrology, paleontology, structural geology, geochemistry, geochronology, geophysics, geodesy). In this course, we learn how geologists combine these geologic “tools” to understand how tectonic boundaries works and to interpret tectonic history. We will start with an overview of the existing plate tectonic theory and questions, a review/overview of the most common geologic tools. We will then explore different tectonic settings using studies of active and ancient plate boundaries.

Learning Objectives:
• To understand fundamental aspects of tectonic settings and theory, as the unifying idea underlying geoscience;
• To learn how to read and understand science journal articles;
• To analyze and relate different datasets to answer tectonic questions and determine tectonic history; and
• To develop the ability to write and talk about tectonic processes and history to an audience of peers and professional mentors.

Materials for class and lab, and technical competency requirements:
You will need a 3-ring binder for a portfolio of notes, handouts and journal articles. Normal and colored pencils/pens will be helpful in drawing sketches in your notes for class, and for some activities. You will also need to understand the basics of using Adobe Acrobat, Blackboard, Google Earth, and Microsoft Office utilities and applications. The WCU IT offices provide support for most of these at their Help Desk in the basement of the library.

Successfully managing your time
As a 400 level course, and one covering the unifying idea behind geoscience, this course is designed to strengthen and stretch your understanding of geology and approaches to this science. Based on the ideal “full time” course load at WCU (12 credit hours), you are expected on average to work ~2 hours per credit outside class meetings (in this case, up to 6 hours per week). Please manage your time accordingly. To minimize stress for all of us, please do not wait to work on assignments the day they’re due. First, careful thoughtful work cannot be done in a rush. Check the schedule on my door and posted in Blackboard for the best times to catch me outside my regular office hours.
Grading and assessment
1. **Active participation:** DON’T BE SHY! It is critical that you are current on the class notes, review them to find sticking points, finish readings before class and then **actively participate** in discussions and/or activities. Asking and answering questions and contributing ideas raises what you absorb in class, makes you confident speaking in front of a group, and helps you develop better professional vocabulary. Once we start discussions of journal articles, this practice will be a big help. For assessment, I will rate your participation for every class discussion using a rubric we’ll discuss in class a few weeks in advance.

2. **Exams:** Exams 1-2 will focus on the prior ~6 weeks, and be mostly short answer. The cumulative final will also include a reading comprehension component based on a journal article. The final may be partly take-home.

3. **Portfolio:** You will compile all your notes, handouts, readings, exams, presentation and abstract materials into a well-organized portfolio, designed and labeled to be useful in your career. Work on this happens every day of the semester. I will provide a sample rubric early on, and rubrics for the mid-semester and final portfolios.

4. **Concept and vocabulary checks:** These will be unannounced activities in class or due the next class day based on concepts and vocabulary-based search-and-answer tasks. Expect on average 1 per week. Usually these will be scored as ✓+ (A), ✓ (B), ✓ - (C), or 0 (not turned in or minimal effort).

5. **Presentation and abstract:** As a final project, you will prepare a 15 minute presentation showing how 3 datasets have been combined to answer a tectonics question for a region or event of your choice. If this is a geographic area we cover in class, you will need to cover datasets from different toolkits than what was used in the journal article assigned. You will also write an extended (2 pages) abstract summarizing the presentation.

**Extra credit:** Since there are many opportunities to build your grade over the semester, there will be no extra credit assignments offered. Exceptions **may** be geology department talks and extra credit questions on exams. So, do your best on all assignments and exams!

**5th week grading:** I will assign a “U” as a 5th week grade if you have any zero’s, low participation or several absences by this time. These are usually indicators of a downward trajectory that should be identified early.

**Letter grading scale:** 100-98 A+; 97-94 A; 93-90 A-; 89-88 B+; 87-84 B; 83-80 B-; 79-78 C+; 77-74 C; 73-70 C-; 69-68 D+; 67-64 D; 63-60 D-; <60 F

**POLICIES**

**Student conduct and academic integrity** (Please also see Student Handbook.)

"**I will practice personal and academic integrity**" – WCU Community Creed

Western Carolina University strives to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. Any violation of the Academic Integrity Policy is a violation of the Code of Student Conduct (see [dsce.wcu.edu](http://dsce.wcu.edu) for more information).

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Faculty members have the right to determine the appropriate sanction(s) for violations of the Academic Integrity Policy within their courses, up to and including a final grade of “F” in the course. Students will be notified, in writing, of any Academic Integrity Policy allegation and have the right to respond to the allegation. The full text of the WCU Academic Integrity Policy, Process, and the Faculty Reporting Form can be found online at: academicintegrity.wcu.edu. Please visit studysmart.wcu.edu for further information.

**Statement on Group Work and Plagiarism:** In the modern work environment we are often called upon work as teams. Teamwork facilitates the exchange of ideas and helps us learn from one another. Different people bring
different ideas to the group. However, teamwork does not eliminate the need for personal accountability and individual responsibility. Some exercises in this course will require you to work in peer groups. Each student is expected to participate fully in the work of the group, meaning:

- It is not acceptable to sit by the sidelines while your group works, and then copy the ideas, data or duplicate the results later.
- It is permissible, and sometimes advisable, for a group to split up work. For example, for journal articles, a group can split up figures to each focus on first, and then work together on a final interpretation. Unless I explicitly say so, each student is responsible for doing each part of every assignment INDIVIDUALLY and in their own words.
- Be warned that excessive similarity among the results of group members most likely will be considered plagiarism on all the group members’ part.

I do expect groups to share ideas and thoughts, but everyone must participate fairly. I may reduce the grade of any student who does not fully participate in group work. If you have any questions about what is appropriate to share and what is not, ASK ME.

Problems with Blackboard and internet access outside of class time – few excuses!!

WCU students are expected to be familiar with basic software (e.g., internet browsers, Microsoft Office, Adobe Acrobat), basic internet and email functions (e.g., uploading/downloading files, “advanced” internet searches), and basic computer functions (e.g., folder and document management, installing freeware, keeping virus protection updated). **Plan ahead to get the technical help you expect to need for each assignment.** The campus IT help desk and Tutoring centers (see links below) are open virtually every day to help you.

**Internet access issues, software problems, poor basic internet/computer skills, and other standard technical competencies will not be accepted as excuses for missed or late assignments.** I know unavoidable issues do come up, so to request an extension, you must contact me no later than 3 hours before an assignment is due to see if I will give you permission to turn it in later. Be familiar with the many places where internet access is offered on and near campus so that you have a back-up plan in case the closest internet access point goes down. Blackboard (hosted on an off-campus server) and local campus servers occasionally go down. If this happens, faculty receive notification, and I will adjust deadlines as needed and alert you in class and/or over email.

Policy regarding laptop use, multitasking in class, use of cell phones, etc.

It is your responsibility to participate fully in class time: you have my full attention and I need yours! Multitasking must be avoided during class. Therefore, all electronic devices used for communication or amusement must be off during class time. Please see me within the first week of class if there is a specific need of yours, or let me know outside of class during the semester if there are special short-term circumstances. **Laptops for note-taking are permitted,** although there will be many days where computer note-taking will not suffice! I will ban them for everyone if there is evidence of other uses during class time ... it distracts you and your neighbors, and ultimately reduces learning.

Participation, attendance and deadlines

We have a working relationship this semester. You expect me to be prepared for class and mentor you towards success. I expect you to actively participate during and beyond class time, and make your best effort. The easiest way to make decisions about how you participate and meet deadlines is to treat this as if this a job: be on time and do good work. Unexecused absences from scheduled activities result in 0% for the activity. If the absence is excused (see the policies below), and depending on the activity/assignment, it will be omitted from your grade calculation or you will have to make it up by a deadline I set. **Discussion days with your peers and I, and the preparatory work itself, are BOTH critical learning tools, so generally, missing a discussion means the grade being omitted. Regardless of whether your absence is excused or not, you are responsible for the thinking, concepts and skills practice.**

Provide to me notice of a scheduled absence due to **university activities at least one week in advance.** Meet with me to clarify how this policy applies to you before the 3rd week of the semester.
Contact the Provost’ office for the required form and procedures to request an excused absence due to religious observances (http://www.wcu.edu/about-wcu/leadership/office-of-the-provost/index.asp). The WCU deadline is usually 2-3 weeks prior to the proposed absence. You should discuss it with me at least a week in advance.

LATE WORK – NOT ACCEPTED!!
Late work is NOT accepted except in extreme cases, and only then if you follow the policy below.

REQUESTS FOR AN EXTENSION OR AN EXCUSED ABSENCE
Reasonable requests for extensions or excused absences are evaluated on a case by case basis. Examples include illness and family emergencies. Please also re-read the Blackboard/internet policy above. The earlier you contact me (preferably, the day before) the more likely you will get permission. I will respond as soon as possible. To request an extension, contact me no later than 3 hours before an assignment is due. To request an excused absence, contact me no later than 7:30 a.m. the morning of the exam or activity. Exam make ups will usually be the following school day.

Unavoidable class cancellation policy (e.g., weather problems):
I will post an announcement on Blackboard by 30 minutes before class, or in extreme cases by a note on the classroom door, if a class or activity is canceled (for example, due to weather or instructor sickness). There will be instructions posted on Blackboard for alternate places to meet and/or for alternate activities as a substitute. If you have lost internet connection, you may call the GNR department office at 227-7367. Use this last option very sparingly.
Helpful resources on campus and online

Geology faculty web page:  [http://www.wcu.edu/9565.asp](http://www.wcu.edu/9565.asp)

Academic Support Resources

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The Mathematics Tutoring Center in Stillwell 455 provides drop-in tutoring for math courses and math-related content across the curriculum. Students who need help with software, technology, or eBriefcase should contact the Technology Commons on the ground floor of Hunter Library where students can access training via one-on-one appointments, walk-ups, workshops, and online tutorials.

Additional Student Support Services

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For this course, I want to support you in every way I can. I encourage you to stay in touch with me throughout the semester regarding course-related accommodations you may need or would like to try, or concerns about your accommodation plan in general. This is especially the case for field trips, field activities, group projects, and exam proctoring, as changing logistics for these may require advance planning. Requesting and planning for alternative testing accommodations with the ODS requires at least 3 business days; please notify me as well ASAP because this may require samples, maps, etc., to be delivered to the testing venue before the day of the exam.
**TENTATIVE WEEKLY SCHEDULE**

*This schedule is subject to change without notice and may be updated weekly due to weather or to accommodate faculty or student needs. You’ll be notified about schedule changes during class meeting times and/or via Blackboard.*

Please also regularly check Blackboard for readings, handouts, specific assignments and due dates.

***Supplementary readings and web-based information will be assigned in class and posted on Blackboard.***

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<thead>
<tr>
<th>Week of</th>
<th>Topic</th>
<th>Readings</th>
<th>Notable dates</th>
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</thead>
<tbody>
<tr>
<td>8/18, 8/25</td>
<td>Overview of earth’s formation, whole earth seismic;</td>
<td>Ch. 14-15 &amp; suppl.</td>
<td>8/27: Presentation assignment overview</td>
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<td>Plate tectonic theory &amp; motion;</td>
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<td>Current plate velocity models;</td>
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<td>Plate-moving forces hypotheses</td>
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<td>9/1, 9/8, 9/15</td>
<td>Paleomagnetic and other constraints on past motions;</td>
<td>Suppl., Ch. 13</td>
<td>9/5: Presentation topic due (region or event &amp; time period)</td>
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<td></td>
<td>Other geologic toolkits in active tectonic settings;</td>
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<td></td>
<td>Overview/review of other common geologic toolkits</td>
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<tr>
<td>9/22, 9/29</td>
<td>Overview of journal article approach;</td>
<td>Suppl., Ch. 16</td>
<td><strong>Exam 1 ~ 9/24,</strong> confirmed 1 week in advance; Journal article 1</td>
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<td><em>Intracontinental and intraoceanic divergence</em></td>
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<td><em>Field trip Oct. 4-5</em></td>
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<td>10/6, 10/20</td>
<td>Subduction and continental convergence;</td>
<td>Ch. 17-18</td>
<td>Journal articles 2-3</td>
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<td></td>
<td>Back-arc settings</td>
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<td>10/27, 11/3</td>
<td><em>Recommended: Submit bibliography draft 10/27;</em></td>
<td>Ch. 19</td>
<td><strong>Bibliography due 10/31,</strong> Exam 2 ~ 11/5, confirmed 1 week in advance; Journal article 4</td>
</tr>
<tr>
<td></td>
<td>Foreland basins and fold-thrust belts;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tectonic terrane concept, continental accretion, craton mystery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/10, 11/17, 11/24</td>
<td>Supercontinent history, paleogeography (focus on E. U.S. and North America Cordillera); Archean to Paleoproterozoic “tectonics” debate</td>
<td>Suppl., 22.4, 22.1, 22.6</td>
<td>Journal article 5</td>
</tr>
<tr>
<td>12/1</td>
<td>Student presentations, peer evaluations</td>
<td>--</td>
<td>Presentation due 12/1</td>
</tr>
</tbody>
</table>

**Final cumulative exam: Monday, Dec. 8, 3-5pm**

**Extended abstract due 4pm, Dec. 10**
**Instructor:** Dr. Cheryl Waters-Tormey  
Office: 308 Stillwell Building  
Phone: 227-3696 (or dial 3696 on campus)  
Email: cherylwt@email.wcu.edu

**Class:** Fridays 9:05 – 9:55  
Stillwell 355

**Office hours:**  
Mondays, 11-1  
Tuesdays, 9:30-10:30  
or by appointment

### ASSESSMENT:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance &amp; participation</td>
<td>40%</td>
</tr>
<tr>
<td>Exercises, reflections</td>
<td>40%</td>
</tr>
<tr>
<td>Networking activity</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**Readings:**  
Supplemental readings and online resources will be given in class

### REQUIRED ACTIVITY (choose one of those below)

*We will talk about logistics and payment options in class.*

- An approved networking activity, initiated yourself, OR
- AAPG or SEGSA in April (must be registered)
- AEG dinner or other activity with a regional/local organization

### COURSE DESCRIPTION

This seminar is designed for geology majors ~1.5 years before they plan to graduate, although all are welcome. We’ll learn about what job sectors undergraduate geology majors enter and post-undergraduate education. We’ll practice strategies for networking, job searching, and evaluating career choices in class and online. We’ll also meet a few geologists at various points in their careers, who will talk about the field of geology they work in, day to day life in their jobs, and the career path they’ve followed. Seminar participants will also develop examples of graduate school and job applications to use as drafts for later.

### LEARNING OBJECTIVES:

- Working knowledge of career resources for geoscientists both on campus and online
- Familiarity with a wide range of career options stemming from an undergraduate geology major
- Complete examples of graduate school and job application materials

### MATERIALS FOR CLASS:

You'll need a way to take notes during the seminar meetings and access to the internet outside of class.

### EXPLANATION OF GRADING AND ASSESSMENT:

*You'll get out of this seminar what you put into it!!*

1. **Attendance & participation:** It is expected that you will actively engage in the course. Since the whole point of this seminar is learning in your peer group, having discussions and answering questions, and interacting with our speakers, consistent attendance and active participation are essential! Exceptions to the attendance requirement due to extreme circumstances must be requested and approved before 7:30 AM the day of the class, activity or deadline. I will give you a 5-week evaluation (A, B, C, etc.) and a final grade. **You will be assessed using these categories:** timeliness, participation (attendance, actively taking part in tasks and discussions, following instructions), preparedness (aware of purpose of each seminar meeting, brings questions or suggestions to the discussion), effort (independent thinking, clearly trying to learn and helping peers to do the same). **I will drop one unexcused absence.**

2. **Exercises and reflections:** You’ll do several independent activities outside of class to help you explore the different parts of this seminar and develop materials for job and graduate school applications.
Assignments will be graded using these categories: 10/10 points = specific, thoughtful responses and/or useful information; 5/10 points = results barely meet expectations, somewhat useful; 0/3 points = no results OR too vague to be useful OR not turned in. No late work will be excepted, unless you have requested an extension at least 3 hours in advance, and can demonstrate extreme need. I will drop your lowest exercise/reflection grade.

3. Networking activity: During the first 1-2 weeks, we will go over several opportunities this semester for interacting with professionals including networking. The activity must be approved by me by the end of week 12.

4. Letter grading scale: 100-98 A+; 97-94 A; 93-90 A-; 89-88 B+; 87-84 B; 83-80 B-; 79-78 C+; 77-74 C; 73-70 C-; 69-68 D+; 67-64 D; 63-60 D-; <60 F

CLASS POLICIES: Please read the complete policies posted on Blackboard.

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**TENTATIVE SCHEDULE**

*This schedule is subject to change without notice and may be updated weekly. You’ll be notified about schedule changes during class meeting times and/or via email.*

Some speakers may not be able to come to our class time. Their visits will be rescheduled at the end of the day on Friday or another day, and we won’t meet during our normal class time.

<table>
<thead>
<tr>
<th>Meeting</th>
<th>Topics</th>
<th>Assignment for the next week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 17</td>
<td>Overview, upcoming deadlines to consider</td>
<td>3, 5, and 10 year plan; career goals</td>
</tr>
<tr>
<td>Jan. 24</td>
<td>Typical career paths and timelines for undergraduate geoscience majors</td>
<td>Biggest strength/weakness</td>
</tr>
<tr>
<td>Jan. 31</td>
<td>Job searches, resume/CV strategies; importance of references</td>
<td>Draft of complete resume; example of job advertisement</td>
</tr>
<tr>
<td>Feb. 7</td>
<td>Resume/CV peer review</td>
<td>Revised resume</td>
</tr>
<tr>
<td>Feb. 14</td>
<td>Translating job advertisements, cover letter strategies, “handshake” materials</td>
<td>Cover letter draft, handshake materials drafts</td>
</tr>
<tr>
<td>Feb. 21</td>
<td>Advising Day 2/25: coursework strategies, planning the next 12 months, ASBOG licensure</td>
<td>Graduate school selections and why</td>
</tr>
<tr>
<td>Feb. 28</td>
<td>Graduate school overview, GREs, how to look into it</td>
<td>Cover letter finals</td>
</tr>
<tr>
<td>Mar. 7</td>
<td>No class meeting (research graduate schools)</td>
<td>Graduate school reflection; Revised 3 year plan, 12 month plan</td>
</tr>
<tr>
<td>Mar. 14</td>
<td>Spring break</td>
<td>--</td>
</tr>
<tr>
<td>Mar. 21</td>
<td>No class meeting (Piedmont field trip)</td>
<td>TBA</td>
</tr>
<tr>
<td>Mar. 28</td>
<td>Field camp explanation and discussion</td>
<td>TBA</td>
</tr>
<tr>
<td>Apr. 4</td>
<td>Speaker</td>
<td>Network activity proposal due</td>
</tr>
<tr>
<td>Apr. 11</td>
<td>Speaker (may double up a different week because of SEGSA)</td>
<td>Speaker reflection questions; revised 5 year plan</td>
</tr>
<tr>
<td>Apr. 18</td>
<td>Easter Break</td>
<td>--</td>
</tr>
<tr>
<td>Apr. 25</td>
<td>Speaker</td>
<td>Speaker reflection questions</td>
</tr>
<tr>
<td>May 2</td>
<td>Speaker Required attendance at Geology program seminar</td>
<td>Speaker reflection questions</td>
</tr>
<tr>
<td>Final exam time: Tuesday, May 6, 8:30-11</td>
<td>Final reflection; Revised 3, 5, and 10 year plans</td>
<td></td>
</tr>
</tbody>
</table>
Seminar Format:
Our seminar will have a format similar to many research working groups. A key difference between a regular class and this seminar is the responsibility you have to our collective learning and research goals as well as the responsibility you have to the education of your peers. Individually and collectively you will be responsible for reading papers, presenting papers to the class, collecting and analyzing data, leading research discussions, and presenting results and interpretations in a variety of formats. Also, as stated above, the research problem we will study is open-ended (the research outcome and, to a lesser extent, the path to that outcome are not fully known). As such, the precise direction and schedule we will take in our seminar is dependent upon a lot of variables that cannot be anticipated over a 14-week period. After establishing an initial research plan, we will continually assess the plan to assure that it still provides the best path to achieve our objectives.

Seminar Plan and Project:
To meet the research objectives of our seminar, our course will consist of four phases:
I. Topic background, literature research, and research design
II. Field and lab data collection
III. Data analysis
IV. Written report and oral presentation
Our semester will culminate with a formal research report and oral presentation.
Evaluation:
35% Assignments (data collection & analysis, short papers, presentations, leading of discussions, quizzes?, etc.)
25% Seminar Participation (e.g. attendance, preparedness, responsibility, initiative, quality of contribution)
40% Final paper & presentation

All late work will be penalized 20% per day including weekends.

Schedule: Obviously, we have class every Friday afternoon, but we likely have additional meetings. These meetings may be for short organizational meetings earlier in the week, lab work, or for field work. We’ll set a firmer schedule in the next week or two after we have defined our research approach. Seminar dates are below.

We are planning a multiday trip to a regional university to use their hydrogen-oxygen isotope lab to analyze samples—details to follow.

Attendance and Expectations:
We expect each of you to attend all classes unless you have an unavoidable, excused absence. Each class meeting represents one week of the course. Missing class will negatively impact your grade because you will miss during class discussion, lab activities, and field visits. In addition, it will negatively impact the educational experience of your peers.

Blackboard will be used increasingly over the semester as the course builds. If you have suggestions for helpful information on Blackboard to support your success, just let us know.

ACADEMIC INTEGRITY
Western Carolina University, as a community of scholarship, is also a community of honor. Faculty, staff, administrators, and students work together to achieve the highest standards of honesty and integrity. Academic dishonesty is a serious offense at Western Carolina University because it threatens the quality of scholarship and defrauds those who depend on knowledge and integrity. Academic dishonesty includes:

a. Cheating—Intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise.

b. Fabrication—Intentional falsification of information or citation in an academic exercise.

c. Plagiarism—Intentionally or knowingly representing the words or ideas of someone else as one’s own in an academic exercise.

d. Facilitation of Academic Dishonesty—Intentionally or knowingly helping or attempting to help someone else to commit an act of academic dishonesty, such as knowingly allowing another to copy information during an examination or other academic exercise.

Instructors have the right to determine the appropriate sanction or sanctions for academic dishonesty within their courses up to and including a final grade of “F” in the course. Within 5 calendar days of the event the instructor will inform his/her department head, and the Associate Dean of the Graduate School when the student is a graduate student, in writing of the academic dishonesty charge and sanction. For more information on academic integrity, visit the Student Handbook.
**Statement on Group Work and Plagiarism:** In the modern work environment we are often called upon work as teams. Teamwork facilitates the exchange of ideas and helps us learn from one another. Different people bring different ideas to the group. However, teamwork does not eliminate the need for personal accountability, and individual responsibility. Some exercises in this course will require you to work in peer groups. Each student is expected to participate fully in the work of the group:

a. It is not acceptable to sit by the sidelines while your group works, and then copy the data or duplicate the results later.

b. It is permissible, and sometimes advisable, for a group to split up work. *For example,* in a stream profiling lab, two group members might take measurements for a profile while two others take measurements for calculating the velocity of a stream. In this case, the two who gathered profile data may copy velocity from the other two. However, each student is responsible for making all calculations, answering all questions and drawing maps and profiles INDIVIDUALLY, unless specifically stated otherwise in the lab handout.

c. Be warned that excessive similarity among the results of group members may be construed as plagiarism.

We do expect groups to share ideas and thoughts, but everyone must participate fairly. If you have any questions about what is appropriate to share and what is not, ASK US.

**Office of Disability Services**

Accommodations for Students with Disabilities: Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to the Office of Disability Services. All information is confidential. Please contact the Office of Disability Services at (828) 227-3886 or come by Suite 135 Killian Annex for an appointment.

**Student Support Services**

Student Support Services provides support to students who are either first-generation, low-income or those who have disclosed a disability with: academic advising, mentoring, one-on-one tutorial support, and workshops focused on career, financial aid and graduate school preparation. You may contact SSS at (828) 227-7127 or email sssprogram@wcu.edu for more information. SSS is located in the Killian Annex, room 138.

**Writing and Learning Commons (WaLC)**

The Writing and Learning Commons (WaLC), located in BELK 207, provides free small-group course tutoring, one-on-one writing tutoring and academic skills consultations, and online writing and learning resources for all students. All tutoring sessions take place in the WaLC or in designated classrooms on campus. To schedule tutoring appointments, log in to TutorTrac from the WaLC homepage (walc.wcu.edu) or call 828-227-2274. Distance students and students taking classes at Biltmore Park are encouraged to use Smartthinking and the WaLC’s online resources. Students may also take advantage of writing tutoring offered at the Biltmore Park campus on certain days of the week; call 828-227-2274 or log in to TutorTrac and select “Biltmore Park Writing Tutoring” for availabilities.

**The Mathematics Tutoring Center** (455 Stillwell, http://mathlab.wcu.edu, 227-3830) provides tutoring in all lower-division math and many CS courses, help with mathematical concepts in other disciplines, and workshops on study skills specific to mathematics courses. Tutoring is available on a drop-in basis, 9-5 and 6-9 pm Monday-Thursday, and 9-5 on Friday or by appointment.

**Academic Calendar** includes dates for all breaks, university closures, final exams, etc. The academic calendar can be found at: http://www.wcu.edu/academics/campus-academic-resources/registrars-office/academic-calendar.asp.
Research Objective: Assess the down-drift impacts of groin installation on wetland loss, Hunting Island, SC.

Course Objectives:
The primary purpose of this course is for you to apply your skills and knowledge of the geosciences toward the solution of an open-ended research problem. In doing this, you should gain improved understanding and skills in literature survey, problem definition and hypothesis development, research design, data collection, data analysis, and scientific presentation. This will be a challenging but fun course. This is real science!

Format:
The senior thesis will very likely not have a format similar to many courses that you have taken thus far at Western. A key difference between a regular class and this project is the responsibility you have to the learning and research goals. You will be responsible for reading and presenting papers, collecting and analyzing data, leading research discussions, and presenting results and interpretations in a variety of formats. Since this course is research intensive, much of the work that you will do will be completed outside of regular class meetings. The amount of work that you put into this course will be significant if you expect to do well (this is your senior capstone!). Also, as stated above, the research problem we will study is open-ended; the research outcome and, to a lesser extent, the path to that outcome are not fully known. As such, the precise direction and schedule we will take in our seminar is dependent upon a lot of variables that cannot be anticipated at this point.

Grading
Your course grade will be based on the completion of lab work, the submission of acceptable report drafts and a final draft, and presentation of your results to the department.

100-94%
93-90%
90-89%
89-88%
88-87%
87-86%
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9-8%
8-7%
7-6%
6-5%
5-4%
4-3%
3-2%
2-1%
1-0%
0-0%
Facilitation - Helping or attempting to help someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another to copy information during an examination)

Faculty members have the right to determine the appropriate sanction(s) for violations of the Academic Integrity Policy within their courses, up to and including a final grade of “F” in the course. Within five (5) days of the instructor’s knowledge of the alleged violation of the Academic Integrity Policy, the instructor will inform his/her department head in writing of the allegation and proposed sanction(s).

Subsequent procedures for cases involving allegations of academic dishonesty can be found in the student handbook.

Schedule: The schedule over the course of the semester will be determined by research direction and problems as they come up. “Hard” due dates are as follows.

“Hard” Due Dates: 12/11 (Final Report), 12/6 (Most likely date for final presentation), 11/22 (Presentation draft due, 2nd draft of report), 11/8 (1st draft of report)
Appendix 3.4: Course syllabi – NRCM

NRCM 140 – Natural Resource Conservation and Management - Andry Einzig 100
NRCM 140 Honors – Kelly 106
NRCM 210 – Methods in Natural Resource Management - Bates 113
NRCM 320 – Soil Conservation - Kelly 118
NRCM 330 – Introduction to Wildlife Ecology and Management - Davis 126
NRCM 344 – Applied GIS - Davis 129
NRCM 351 – Forest Ecology - DeWald 134
NRCM 352 – Forest Resource Management - Kloeppe 137
NRCM 371 – Intro to Landscape Ecology - Davis 141
NRCM 420 – Soil Genesis and Classification - Kelly 145
NRCM 440 – Integrated Resource Management - Bates and Styers 152
NRCM 451 – Foundations of Silviculture - Bates 155
NRCM 452 – Forest Management - Bates 161
NRCM 460 – Watershed Management - Kelly 165
NRCM 472 – Advanced Geospatial Analysis - Styers 171
NRCM 480 – Research in NRCM - DeWald 174
NRCM 480 – Independent Study in Remote Sensing - Styers 175
NRCM 483 – Prescribed Fire as a Management Tool - Bates 177
I. Rationale/Purpose
Students will gain a basic understanding of how natural resources are affected by human activity. Throughout the duration of the course, we will examine why natural resources must be managed, methods for managing said resources, and differing viewpoints on how natural resources should or should not be managed.

II. Course Aim
The aim of this course is to introduce students to topics related to the conservation and management of Earth's natural resources: soil, water, air, wildlife, energy sources, etc. By the end of the course, students will:
- Understand the principles of sustainability.
- Know how humans impact the earth and its natural resources.
- Have knowledge of the different schools of thought surrounding natural resource management.
- Become familiar with the various pieces of legislature regarding natural resource conservation.
- Obtain awareness of what actions can be taken on a personal level to minimize impact on the earth.

III. Course Materials

IV. Faculty Expectations of Students/Course Policies
--Statement on Academic Integrity (including plagiarism):
WCU Academic Integrity Policy
This policy addresses academic integrity violations of undergraduate and graduate students. Students, faculty, staff, and administrators of Western Carolina University (WCU) strive to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. While academic in scope, any violation of this policy is by nature, a violation of the Code of Student Conduct and will follow the same conduct
process (see Article VII.B.1.a.). If the charge occurs close to the end of an academic semester or term or in the event of the reasonable need of either party for additional time to gather information timelines may be extended at the discretion of the Department of Student Community Ethics (DSCE). Violations of the Academic Integrity Policy include:

**Cheating** - Using or attempting to use unauthorized materials, information, or study aids in any academic exercise.

**Fabrication** - Creating and/or falsifying information or citation in any academic exercise.

**Plagiarism** - Representing the words/ideas of someone else as one’s own in any academic exercise.

**Facilitation** - Helping someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another to copy information during an examination).

Faculty members have the right to determine the appropriate sanction(s) for violations of the Academic Integrity Policy within their courses, up to and including a final grade of “F” in the course. Within five (5) days of the instructor’s knowledge of the alleged violation of the Academic Integrity Policy, the instructor will inform his/her department head (Associate Dean of the Graduate School) in writing of the allegation and proposed sanction(s).

**Statement on late and/or makeup assignments and exams**
Exams/quizzes can be made up if I am contacted before the day of the exam/quiz and the student has a legitimate excuse for missing the exam/quiz. **No exceptions.**
Assignments receive a 10% reduction for each day late and receive a “0” if they are more than 3 days late.

**Statement of expectations for attendance and participation**
I expect students to be present and to actively participate in discussions and activities. Expect attendance to be taken at random via brief, unannounced quizzes. All of this is included in your class participation and effort grade (easy points!). If you are unable to attend class for any reason, feel free to contact me via e-mail before class time to communicate your situation.

**Statement of classroom behavior**
Please be considerate to your fellow students. We want to create an environment of mutual respect where everyone feels welcome to contribute and learn. The class will frequently be surveyed for opinions, debates, and values regarding natural resources. It is important that we respect the opinions of all and that we value the diversity of a range of beliefs during our discussions.

### V. Grading Procedures

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Total Possible Points</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance/Attendance</td>
<td>50</td>
<td>Attendance quizzes, in-class activities</td>
</tr>
<tr>
<td>Quizzes (10)</td>
<td>100</td>
<td>Covering weekly topics (10 points each)</td>
</tr>
<tr>
<td>Exam 1</td>
<td>100</td>
<td>Covering Lessons 1 - 7</td>
</tr>
<tr>
<td>Exam 2</td>
<td>100</td>
<td>Covering Lessons 8 - 14</td>
</tr>
<tr>
<td>Final Exam</td>
<td>100</td>
<td>Remaining Lessons - Comprehensive</td>
</tr>
<tr>
<td>Final Project</td>
<td>100</td>
<td>Final Project</td>
</tr>
<tr>
<td><strong>Total Possible Points</strong></td>
<td><strong>550</strong></td>
<td><strong>Total Possible Points</strong></td>
</tr>
</tbody>
</table>
Letter grades will be assigned according to the following:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 – 100</td>
<td>A</td>
</tr>
<tr>
<td>80 – 89</td>
<td>B</td>
</tr>
<tr>
<td>70 – 79</td>
<td>C</td>
</tr>
<tr>
<td>60 – 69</td>
<td>D</td>
</tr>
<tr>
<td>59 and below</td>
<td>F</td>
</tr>
</tbody>
</table>

Composition-Condition Marks: A student whose written work in any course fails to meet acceptable standards will be assigned a composition-condition (CC) mark by the instructor on the final grade report. All undergraduates who receive two CC grades prior to the semester in which they complete 110 hours at Western Carolina University are so notified by the registrar and are required to pass English 300 or English 401 before they will be eligible for graduation. This course must be taken within two semesters of receiving the second CC and must be passed with a grade of C (2.0) or better.

VII. Bonus Opportunities:
Throughout the semester opportunities for bonus may become available. These opportunities may include relevant departmental talks and presentations, documentary screenings, litter clean-up, etc. I will let you know when these opportunities are available.

VIII. Tentative Schedule (Subject to change to adjust with pace of semester and student needs)

<table>
<thead>
<tr>
<th>Date</th>
<th>Coverage/ Lessons</th>
<th>Assignments/Activities/Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday, Aug 19</td>
<td>Course Introduction</td>
<td></td>
</tr>
<tr>
<td>Thursday, Aug 21</td>
<td>L1: What is Natural Resource Management?</td>
<td></td>
</tr>
<tr>
<td>Tuesday, Aug 26</td>
<td>L2: Sustainable Economics</td>
<td></td>
</tr>
<tr>
<td>Thursday, Aug 28</td>
<td>L3: Ethics and Critical Thinking</td>
<td>Quiz 1 (Lessons 1 and 2)</td>
</tr>
<tr>
<td>Tuesday, Sept 2</td>
<td>L4: Ecology</td>
<td></td>
</tr>
<tr>
<td>Thursday, Sept 4</td>
<td>L5: Global Population</td>
<td>Quiz 2 (Lessons 3 and 4)</td>
</tr>
<tr>
<td>Tuesday, Sept 9</td>
<td>L6: Soils</td>
<td></td>
</tr>
<tr>
<td>Thursday, Sept 11</td>
<td>L7: Pest Management</td>
<td>Quiz 3 (Lessons 5, 6, and 7)</td>
</tr>
<tr>
<td>Tuesday, Sept 16</td>
<td>Exam Review Day</td>
<td></td>
</tr>
<tr>
<td>Thursday, Sept 18</td>
<td>Exam 1</td>
<td>(Lessons 1-7)</td>
</tr>
<tr>
<td>Tuesday, Sept 23</td>
<td>Film/Activity Day</td>
<td>Attendance required</td>
</tr>
<tr>
<td>Thursday, Sept 25</td>
<td>L8: Sustainable Agriculture</td>
<td></td>
</tr>
<tr>
<td>Tuesday, Sept 30</td>
<td>Sustainable Ag Doc</td>
<td>Attendance required</td>
</tr>
<tr>
<td>Thursday, Oct 2</td>
<td>L9: Aquatic Ecosystems Pt. 1</td>
<td></td>
</tr>
<tr>
<td>Tuesday, Oct 7</td>
<td>L9: Aquatic Ecosystems Pt. 2</td>
<td>Quiz 4 (Lesson 8)</td>
</tr>
<tr>
<td>Thursday, Oct 9</td>
<td>L10: Forests</td>
<td>Quiz 5 (Lesson 9)</td>
</tr>
<tr>
<td>Tuesday, Oct 14</td>
<td>No Class – Fall Break!</td>
<td></td>
</tr>
<tr>
<td>Thursday, Oct 16</td>
<td>No Class – Fall Break!</td>
<td></td>
</tr>
<tr>
<td>Tuesday, Oct 21</td>
<td>L11: Rangeland Management</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Event</td>
<td>Notes</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------------------------------</td>
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</tr>
<tr>
<td>Thursday, Oct 23</td>
<td>L12: Wildlife/Species Extinction</td>
<td>Quiz 6 (Lessons 10 and 11)</td>
</tr>
<tr>
<td>Tuesday, Oct 28</td>
<td>No Class – Advising Day</td>
<td></td>
</tr>
<tr>
<td>Thursday, Oct 30</td>
<td>Film/Activity Day</td>
<td>Attendance required</td>
</tr>
<tr>
<td>Tuesday, Nov 4</td>
<td>L13: Water Resources</td>
<td></td>
</tr>
<tr>
<td>Thursday, Nov 6</td>
<td>L14: Air Pollution</td>
<td>Quiz 7 (Lessons 12 and 13)</td>
</tr>
<tr>
<td>Tuesday, Nov 11</td>
<td>Exam 2</td>
<td>Exam 2 (Lessons 8-14)</td>
</tr>
<tr>
<td>Thursday, Nov 13</td>
<td>View Bag It</td>
<td></td>
</tr>
<tr>
<td>Tuesday, Nov 18</td>
<td>Finish Bag It and discuss/Group Meeting Day</td>
<td>Quiz 8 (20 points on film)</td>
</tr>
<tr>
<td>Thursday, Nov 20</td>
<td>Group Presentations</td>
<td>Quiz 9 (Lesson 14)</td>
</tr>
<tr>
<td>Tuesday, Nov 25</td>
<td>Group Presentations</td>
<td></td>
</tr>
<tr>
<td>Thursday, Nov 27</td>
<td>No Class – Thanksgiving!</td>
<td>No Class – Thanksgiving!</td>
</tr>
<tr>
<td>Tuesday, Dec 2</td>
<td>L15: Sustainable Energy</td>
<td></td>
</tr>
<tr>
<td>Thursday, Dec 4</td>
<td>Final Exam</td>
<td>Final Exam</td>
</tr>
</tbody>
</table>

--Office of Disability Services
Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to the Office of Disability Services. All information is confidential. Please contact the Office of Disability Services at (828) 227-3886 or come by Suite 135 Killian Annex for an appointment.

--Student Support Services
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--Writing and Learning Commons (WaLC)
Electronic format (with hyperlinks):
The Writing and Learning Commons (WaLC), located in BELK 207, provides free small-group course tutoring, one-on-one writing tutoring and academic skills consultations, and online writing and learning resources for all students. All tutoring sessions take place in the WaLC or in designated classrooms on campus. To schedule tutoring appointments, log in to TutorTrac from the WaLC homepage (walc.wcu.edu) or call 828-227-2274. Distance students and students taking classes at Biltmore Park are encouraged to use Smarthinking and the WaLC’s online resources. Students may also take advantage of writing tutoring offered at the Biltmore Park campus on certain days of the week; call 828-227-2274 or log in to TutorTrac and select “Biltmore Park Writing Tutoring” for availabilities.
--Print format:
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”Like winds and sunsets, wild things were taken for granted until progress began to do away with them. Now we face the question whether a still higher ‘standard of living’ is worth its cost in things natural, wild and free.”

-- Aldo Leopold 1949 - American author, scientist, ecologist, forester, and environmentalist

Professor: Dr. Charley Kelly Office: 336 Stillwell Building, cnkelly@email.wcu.edu, 828-227-3817

Office Hours: MWF 10:00-11:00 + by appointment

I. Rationale/Purpose
Students will develop a basic understanding of natural resources, and will investigate relationships between those resources and society while exploring issues and conflicts related to their management. (3) Lecture credits.

*This course meets a C5. Physical & Biological Sciences Liberal Studies requirement*

II. Course Aims and Objectives:

• The aim of this course is to introduce students to topics related to the management, conservation and sustainable use, and conflicts associated with Earth’s natural resources. These include soil, water, air, vegetation, wildlife, and energy resources.
• We will examine physical and living resources, their current condition and threats, and how we measure and sustainably manage these resources.
• We will create awareness about what *YOU* can do to help ensure we maintain sufficient resources for future generations. Class activities include readings, writings, discussions, videos, group data collection and summary, and indoor and outdoor activities.

• Liberal Studies learning goals:
  o Demonstrate the ability to locate, analyze, synthesize, and evaluate information;
  o Demonstrate the ability to interpret and use numerical, written, oral, and visual data;
  o Demonstrate the ability to read with comprehension, and to write and speak clearly, coherently, and effectively as well as to adapt modes of communication appropriate to an audience;
  o Demonstrate the ability to critically analyze arguments;
  o Demonstrate the ability to recognize behaviors and define choices that affect lifelong well-being;
  o Demonstrate an understanding of:
Past human experiences and ability to relate them to the present;
Different contemporary cultures and their interrelationships;
Issues involving social institutions, interpersonal and group dynamics, human development and behavior, and cultural diversity;
Scientific concepts and methods as well as contemporary issues in science and technology;
Cultural heritage through its expressions of wisdom, literature and art and their roles in the process of self and social understanding.

- Demonstrate an excitement for and love of learning

III. Course Materials

Course readings:


Additional readings, videos, and assignments will be posted to the course Blackboard page as the semester progresses. It is your responsibility to learn how to access and use these resources on Blackboard.

IV. Faculty Expectations of Students/Course Policies

Statement on Academic Integrity (including plagiarism):
This policy addresses academic integrity violations of undergraduate and graduate students. Students, faculty, staff, and administrators of Western Carolina University (WCU) strive to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. While academic in scope, any violation of this policy is by nature, a violation of the Code of Student Conduct and will follow the same conduct process (see Article VII.B.1.a.). If the charge occurs close to the end of an academic semester or term or in the event of the reasonable need of either party for additional time to gather information timelines may be extended at the discretion of the Department of Student Community Ethics (DSCE).

Violations of the Academic Integrity Policy include:

- Cheating - Using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
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- Facilitation - Helping or attempting to help someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another to copy information during an examination)

Faculty members have the right to determine the appropriate sanction(s) for violations of the Academic Integrity Policy within their courses, up to and including a final grade of “F” in the
Within five (5) days of the instructor’s knowledge of the alleged violation of the Academic Integrity Policy, the instructor will inform his/her department head (Associate Dean of the Graduate School when the student is a graduate student) in writing of the allegation and proposed sanction(s).

The Academic Integrity Policy and Faculty Reporting Form can be found online at http://dsce.wcu.edu.

Please refer to the student handbook regarding the policies and consequences of academic honesty at Western Carolina University.

**V. Statement on late and/or makeup assignments:**

All assignments need to be handed in on time (unless you have a legitimate excuse that is approved prior to the deadline posted). Assignments will receive a 10% reduction for each day late and receive a “0” if more than 1 week late. **Exams can only be made up** only if I am contacted at least by the day before the exam (before 4 PM) and the student has a legitimate excuse for missing the exam.

**VI. Attendance and Participation**

Attendance is expected and weekly in-class activities will count as part of your Assignments grade. You are expected to be in class and actively participating in group discussions and assignments.

**VII. Statement of classroom behavior**

**Turn off phones and laptops before entering the class.** - Anyone caught using a phone or any internet capable device during an exam or any in-class exercises without approval will receive a “0” for that exam grade.

- **Everyone’s opinion counts in this classroom.** We will create an environment of mutual respect, where each student will feel able to contribute and learn. We will frequently be surveying the class for opinions, debates, and values regarding controversial issues in natural resource conservation and management. It is important that we respect the opinions of all and value the diversity of a range of beliefs during our discussions.

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VIII. Grading Procedures:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage of Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab exercises/Participation</td>
<td>20</td>
<td>In-class group exercises and associated homework.</td>
</tr>
<tr>
<td>Homework assignments</td>
<td>20</td>
<td>Short essays from assigned questions regarding supplemental material and readings.</td>
</tr>
<tr>
<td>Group projects</td>
<td>15</td>
<td>Group projects require team participation, additional research, and class presentation of outcomes.</td>
</tr>
<tr>
<td>Exams (2)</td>
<td>30</td>
<td>Two exams during the semester.</td>
</tr>
<tr>
<td>Final Examination</td>
<td>15</td>
<td>Final exam – non-comprehensive</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td></td>
</tr>
<tr>
<td>Grade</td>
<td>Letter</td>
<td>Quality Points</td>
</tr>
<tr>
<td>---------</td>
<td>--------</td>
<td>----------------</td>
</tr>
<tr>
<td>99-100</td>
<td>A+</td>
<td>4.0</td>
</tr>
<tr>
<td>92-98</td>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>90-91</td>
<td>A-</td>
<td>3.67</td>
</tr>
<tr>
<td>88-89</td>
<td>B+</td>
<td>3.33</td>
</tr>
<tr>
<td>82-87</td>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>80-81</td>
<td>B-</td>
<td>2.33</td>
</tr>
<tr>
<td>78-79</td>
<td>C+</td>
<td>2.33</td>
</tr>
<tr>
<td>72-77</td>
<td>C</td>
<td>2.0</td>
</tr>
<tr>
<td>70-71</td>
<td>C-</td>
<td>1.67</td>
</tr>
<tr>
<td>68-69</td>
<td>D+</td>
<td>1.33</td>
</tr>
<tr>
<td>62-67</td>
<td>D</td>
<td>1.0</td>
</tr>
<tr>
<td>60-61</td>
<td>D-</td>
<td>0.67</td>
</tr>
<tr>
<td>60 or lower</td>
<td>F</td>
<td>0</td>
</tr>
</tbody>
</table>

Please note that a C- grade is less than satisfactory and may not meet particular program and/or course requirements.

**Composition-Condition Marks.** A student whose written work in any course fails to meet acceptable standards will be assigned a composition-condition (CC) mark by the instructor on the final grade report. All undergraduates who receive two CC grades prior to the semester in which they complete 110 hours at Western Carolina University are so notified by the registrar and are required to pass English 300 or English 401 before they will be eligible for graduation. This course must be taken within two semesters of receiving the second CC and must be passed with a grade of C (2.0) or better.

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**IX. Tentative Course Schedule**

*May change to accommodate guest presenters & student needs*

Please access additional online course material via **Blackboard** as assigned and follow all posted instructions to find readings and supplemental material necessary to complete the posted assignments.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Activity</th>
<th>Textbook Chapter Assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan. 12</td>
<td>Course Intro</td>
<td>Chapter 1 – Approaches to NRM</td>
</tr>
<tr>
<td>1</td>
<td>Jan. 14-16</td>
<td>Easter Island and Sustainability</td>
<td>Chapter 1 – Approaches to NRM</td>
</tr>
<tr>
<td>2</td>
<td>Jan. 19</td>
<td><strong>MLK Day – No Class</strong></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Jan. 21-26</td>
<td>Scientific method and Natural Resource Conservation and Management</td>
<td>Chapter 1 – Approaches to NRM</td>
</tr>
<tr>
<td>3</td>
<td>Jan. 28-30</td>
<td>Resource Consumption and Your Carbon Footprint</td>
<td>Chapter 1 – Approaches to NRM</td>
</tr>
<tr>
<td>4</td>
<td>Feb. 2-6</td>
<td>Ecosystems, Biomes, Ecosystem Goods and Services, and Biodiversity</td>
<td>Chapter 3 – Lessons from Ecology</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chapter 15 – Plant and Animal Extinction</td>
</tr>
<tr>
<td>5</td>
<td>Feb. 9</td>
<td><strong>EXAM 1</strong></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Feb. 11-13</td>
<td>Soil Conservation and Management</td>
<td>Chapter 6 – The Nature of Soils</td>
</tr>
<tr>
<td>6</td>
<td>Feb. 16-20</td>
<td>Water Resources-Oceans, Streams, Wetlands, and Riparian Zones</td>
<td>Chapter 9 – Aquatic Environments</td>
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<tr>
<td></td>
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<td></td>
<td>Chapter 10 – Managing Water Resources</td>
</tr>
<tr>
<td>7</td>
<td>Feb. 23-27</td>
<td>Forest and Wildlife Resources and Management</td>
<td>Chapter 14 – Forest Management</td>
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<tr>
<td></td>
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<td>Chapter 16 – Wildlife Management</td>
</tr>
<tr>
<td>8</td>
<td>Mar. 2-4</td>
<td>Sustainable Agriculture Resource Management-Soil, Water, Nutrients, and Pollinators</td>
<td>Chapter 7 – Soil Conservation and Sustainable Agriculture</td>
</tr>
<tr>
<td>8</td>
<td>Mar. 6</td>
<td><strong>EXAM 2</strong></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Mar. 9-13</td>
<td><strong>SPRING BREAK – No classes</strong></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Mar. 16</td>
<td>Air Quality, Pollution, and Regulation</td>
<td>Chapter 18 – Air Pollution</td>
</tr>
<tr>
<td>10</td>
<td>Mar. 18-20</td>
<td>Invasive Species - Problems and Management</td>
<td></td>
</tr>
<tr>
<td>11-14</td>
<td>Mar. 23-10</td>
<td>Energy Resources – Past, Present, and Future</td>
<td>Chapter 22 – Non-renewable Energy Resources</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chapter 23 – Creating a Sustainable System of Energy</td>
</tr>
<tr>
<td>Date</td>
<td>Activity</td>
<td>Notes</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------------------------------</td>
<td>--------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Apr. 13-17</td>
<td>Minerals and Mining – Past, Present, and Future</td>
<td>Chapter 21 – Minerals, Mining, and a Sustainable Society</td>
<td></td>
</tr>
<tr>
<td>Apr. 18</td>
<td>SATURDAY – Tuck River Clean-up!</td>
<td>Details of project will be given</td>
<td></td>
</tr>
<tr>
<td>Apr. 20</td>
<td>No class – make-up day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apr. 22-24</td>
<td>Community Involvement</td>
<td></td>
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<tr>
<td>Apr. 27 – May 1</td>
<td>A Sustainable Future and Course Review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 4-8</td>
<td>FINAL EXAM DURING SCHEDULED EXAM TIME</td>
<td></td>
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</tr>
</tbody>
</table>
Instructor: Peter Bates  
341 Stillwell  
227-3914  
bates@email.wcu.edu

Office hours:  
2:30 to 3:30 Monday  
1:30 to 2:30 Friday  
or by appointment

Class meeting times:  
Lecture:  
Sec. 01: M, W, F 10:10 to 11:00 ST322  
Sec. 02 M, W, F 11:15 to 12:05 ST322

Labs:  
Sec. 30: M 12:30 – 2:20, McKee G13 (Lab instructor: Diane Styers)  
Sec. 31: M 2:30 – 4:20, McKee G13 (Lab instructor: Diane Styers)

Course Objectives and its role in the NRCM curriculum:  
The purpose of this course is to introduce students to some of the basic concepts and skills that are fundamental to many aspects of natural resource conservation and management. As such, this course serves as the prerequisite for many upper-level NRCM courses, and we will cover material from each of the concentration areas – Forest Resources and Soil and Water Conservation. The course also provides a broad overview of NRCM topics for students from other majors. Students will be exposed to the following during the course of the semester:

- Natural resource management principles, definitions, and concepts
- Measurement of key environmental variables
- The operation of commonly used equipment
- Data collection, analysis, summarization, and reporting
- Descriptive statistics and hypothesis testing
- Written and oral communication

Required Text:  
There is no required text for this course; however material will be drawn from a number of other sources. Handouts and pdf’s will be distributed to the class on a regular basis, and it is important that students maintain these handouts in an organized fashion. Copies of all assignments, handouts, and PowerPoint slides from lectures will be available on Blackboard.

Required Supplies:  
- Calculator: Either a Texas Instruments TI-30X-IIS (preferred) or Casio fx-260. These are available at the University Bookstore, Staples, Office Depot, Wal-Mart or online for about $15. These are non-programmable calculators and are the only calculators that can be used during quizzes and exams.
- Protractor with straight edge marked in 1/10 of inch
- Rite-in-the-rain© notebook (available at the bookstore) that will serve as a field notebook
Evaluation:

Five midterm exams: ....................................................................................................................35%
Final Exam ...................................................................................................................................15%
Course field trip (October 3-5) .................................................................................................... 5%
In-class assignments ......................................................................................................................10%
Group assignments ......................................................................................................................10%
Lab exercises ................................................................................................................................20%
Lab practical ..................................................................................................................................5%
100%

For all practical purposes, the following final percentages will guarantee the corresponding grades: ≥ 93=A, ≥ 90=A-, ≥ 87=B+, ≥ 83=B, ≥ 80=B-, etc.

Midterm exams will concentrate on material covered since the previous midterm exam, though students will be responsible for major concepts presented earlier. Midterm exams will be given during Friday class periods at about 3 week intervals. Students will be able to drop their lowest midterm exam score. Exams will consist primarily of definitions, problems, and short answer questions designed to evaluate your understanding of the material presented. Since your lowest midterm exam grade will be dropped, there will be no make-up exams. Midterm exams are tentatively scheduled for the following dates:

- Sept. 6 and 27
- Oct. 25
- Nov. 8
- Dec. 2

The final exam will be comprehensive. Final exams are scheduled as follows:

- Sec. 01: Wed. Dec. 11, 8:30-11:00
- Sec. 02: Mon. Dec. 9, 3:00 – 5:30

The course field trip (Thurs Oct. 3 through Sat. Oct. 5, followed by fall break): is designed to allow students to see natural resource conservation and management in action. We will travel throughout the region visiting with resource managers from a variety of agencies. Many are alumni from the NRCM program. The field trip is a required element of this class. There is a significant make-up assignment for those unable to attend the field trip that includes a written report and a class presentation.

In-class assignments are designed to help student practice and apply concepts being discussed or to evaluate students’ understanding of course materials. These assignments may be in the form of a short quiz, or individual or small group activity. The lowest in-class assignment grade for each student will be dropped. These assignments may not be announced ahead of time. Students who are absent from class will receive a 0 for that assignment unless the absence was previously approved.

Group assignments are out-of-class homework assignments are designed to promote collaborative learning between students. Assignments will be given at regular intervals, and small groups of students will work on the assignments together. Each member of the group will complete the assignment individually. In generally, each member of the group will share the lowest grade received. Again, a major purpose of these assignments is to promote peer learning.

Lab exercises are intended to illustrate and reinforce some of the concepts discussed in class and to provide students with practical applications of natural resources management procedures and techniques. You will learn more about lab procedures and protocols during lab.
**Attendance policy:** Attendance will not be taken during lecture. Students are responsible for all material presented during lecture and lab periods. Students who miss lecture must arrange to get lecture notes from other students. Attendance during labs is required since most labs cannot be made up. Students who miss lab will be assigned a 0 for that lab exercise unless arrangements have been made ahead of time.

**Academic dishonesty:** Students, faculty, staff, and administrators of Western Carolina University (WCU) strive to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. While academic in scope, any violation of this policy is by nature, a violation of the Code of Student Conduct and will follow the same conduct process (see Article VII. I.a.). If the charge occurs close to the end of an academic semester or term or in the event of the reasonable need of either party for additional time to gather information timelines may be extended at the discretion of the Department of Student Community Ethics (DSCE).

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- **Facilitation** - Helping or attempting to help someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another to copy information during an examination)

**General:** I expect students to reflect a certain degree of professionalism in both their assignments and their conduct. Assignments that are deemed unprofessional can be penalized up to 25% of the value of the assignment. *All assignments must be neat, clearly legible, and well organized.* Professional student conduct will include being prepared for class and acting professionally during class periods and lab exercises.

*Please keep cell phones turned off and out of site during class. The use of all tobacco products is prohibited during class.*
Other University Resources

The **Writing and Learning Commons** (WaLC), located in BELK 207, provides free small-group course tutoring, one-on-one **writing tutoring**, and online **writing** and **learning** resources for all students. To schedule tutoring appointments, log in to TutorTrac from the WaLC homepage ([http://walc.wcu.edu/](http://walc.wcu.edu/)) or call 828-227-2274. All tutoring sessions take place in the WaLC or in designated classrooms on campus. Distance students and students taking classes at Biltmore Park are encouraged to use **Smarthinking** and WaLC’s online resources.

The **Mathematics Tutoring Center** in 455 Stillwell provides drop-in tutoring for math and computer science. Students who need help with software, technology, or **eBriefcase** support should visit **ClassTIPS** on the ground floor of Hunter Library in the **Technology Commons**. Class TIPS provides support to students via one-on-one appointments, walk-ups, workshops, and online tutorials.

**Accommodations for Students with Disabilities:** Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to Disability Services. All information is confidential. Please contact the Office of Disability Services for more information at (828) 227-3886 or **lalexis@wcu.edu**. You may also visit the office’s website: [http://disability.wcu.edu](http://disability.wcu.edu).
<table>
<thead>
<tr>
<th>Week of</th>
<th>Topic areas</th>
<th>Lab topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 19</td>
<td>Course overview: Introduction to natural resources and conservation, resource management strategies, decision-making</td>
<td>Lab procedures and overview</td>
</tr>
<tr>
<td>Aug. 26</td>
<td>Maps and geospatial analysis: Maps and map components, distance</td>
<td>Investigating renewable natural resources and using GPS</td>
</tr>
<tr>
<td>Sept. 2</td>
<td>Direction, topography, geospatial description</td>
<td>No Lab – Labor Day</td>
</tr>
<tr>
<td>Sept. 9</td>
<td>Measurements and descriptive statistics</td>
<td>Topographic maps, compasses, clinometers</td>
</tr>
<tr>
<td>Sept. 16</td>
<td>Forest inventory with fixed area plots</td>
<td>Tree height and diameter</td>
</tr>
<tr>
<td>Sept. 23</td>
<td>Forest stand dynamics; Silvics and silviculture</td>
<td>Fixed radius plot forest inventory</td>
</tr>
<tr>
<td>Sept. 30</td>
<td>Forest stand dynamics; Silvics and silviculture</td>
<td>Spreadsheets I – Introduction to Excel</td>
</tr>
<tr>
<td>Oct. 7</td>
<td>FALL BREAK</td>
<td></td>
</tr>
<tr>
<td>Oct. 14</td>
<td>Water as a renewable resource, the hydrologic cycle, water pollution</td>
<td>Stream discharge and habitat characterization</td>
</tr>
<tr>
<td>Oct. 21</td>
<td>Water classification, water quality parameters, aquatic health</td>
<td>Assessing stream habitat quality using macro-invertebrates</td>
</tr>
<tr>
<td>Oct. 28</td>
<td>The scientific method, hypothesis testing, simple linear regression</td>
<td>Lab practical – test of field equipment use</td>
</tr>
<tr>
<td>Nov. 4</td>
<td>Soils: Soils and soil components, soil forming factors</td>
<td>Spreadsheets II – Regression analysis</td>
</tr>
<tr>
<td>Nov. 11</td>
<td>Soil characterization and interpretation</td>
<td>Soil profile description</td>
</tr>
<tr>
<td>Nov. 18</td>
<td>Soil characterization and interpretation</td>
<td>Wildlife habitat assessment</td>
</tr>
<tr>
<td>Nov. 25</td>
<td>Landscape ecology and wildlife habitat: Landscape and habitat elements</td>
<td>Landscape ecology</td>
</tr>
<tr>
<td>Dec. 2</td>
<td>Wrap-up and review</td>
<td>No lab scheduled</td>
</tr>
</tbody>
</table>
NRM 320 -- Soil Conservation

Spring 2014

Lecture: WF 9:05 – 9:55, McKee Room 220
Lab: Th 1:25 – 3:20, Stillwell 143

“Essentially, all life depends upon the soil... There can be no life without soil and no soil without life; they have evolved together.”

-- Charles E. Kellogg, 1938. USDA Chief Soil Scientist

Professor: Dr. Charley Kelly
Office: 336 Stillwell Building,
cnkelly@email.wcu.edu,
828-227-3817

Office Hours: MWF 10:00-11:00 + anytime by appointment

I. Rationale/Purpose

The purpose of this course is to familiarize students with the complex of factors important in the maintenance, enhancement, and analysis of soil resources for environmental management and productivity.

II. Course Aims and Objectives:

- Aims The aims of this course are to introduce, discuss, analyze, evaluate, and predict the impact of soil management, conservation, and restoration on ecosystem health and productivity.

  By the end of this course, students will:

  o Understand the value and intensity of soil resource usage and productivity locally, nationally, and internationally

  o Understand the process and impact of water, wind, and other contributing factors to soil erosion and its implications for long-term soil fertility and environmental impacts

  o Know and recommend soil conservation strategies and structures for maintaining and restoring ecosystems impacted by disturbance and degraded soils

  o Appreciate the implications of soil conservation practices on water quality and aquatic ecosystems and the value of maintaining and restoring water resources

  o Demonstrate an excitement of learning, understanding, and appreciation of the need for soil conservation and management.

III. Course Resources
I will post additional resources to the course Blackboard page as the semester goes on.

**IV. Faculty Expectations of Students/Course Policies**

- **Statement on Accommodations for students with disabilities:** Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities. Students who require disability services or reasonable accommodations must identify themselves as having a disability and provide current diagnostic documentation to Disability Services. All information is confidential. Please contact Disability Services for more information at (828) 227-2716 or 144 Killian Annex.

- **Statement on Academic Integrity (including plagiarism):**

  **Academic Honesty Policy** Western Carolina University, as a community of scholarship, is also a community of honor. Faculty, staff, administrators, and students work together to achieve the highest standards of honesty and integrity. Academic dishonesty is a serious offense at Western Carolina University because it threatens the quality of scholarship and defrauds those who depend on knowledge and integrity. Academic dishonesty includes:

  a. **Cheating**—Intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise.

  b. **Fabrication**—Intentional falsification of information or citation in an academic exercise.

  c. **Plagiarism**—Intentionally or knowingly representing the words or ideas of someone else as one’s own in an academic exercise.

  b. **Facilitation of Academic Dishonesty**—Intentionally or knowingly helping or attempting to help someone else to commit an act of academic dishonesty, such as knowingly allowing another to copy information during an examination or other academic exercise.

Instructors have the right to determine the appropriate sanction or sanctions for academic dishonesty within their courses up to and including a final grade of “F” in the course. Within 5 calendar days of the event the instructor will inform his/her department head, and the Associate Dean of the Graduate School when the student is a graduate student, in writing of the academic dishonesty charge and sanction.

Please refer to the student handbook regarding the policies and consequences of academic honesty at Western Carolina University.

- **Statement on late and/or makeup assignments** Each day that papers are late will result in a reduction of 15% per day. Papers that are more than three days late will automatically receive an F. Exams can only be made up if I am contacted at least by the day before the exam (before 4 PM) and the student has a legitimate excuse for missing the exam.

- **Statement of expectations for attendance and participation** I expect students to be in class and actively participating in discussions and activities. I may call on you to offer an answer, your opinion, or some insight. If you are doing a group or in-class exercise and someone is not participating in the work, please let me know so that we can make sure that everyone is doing their share to meet the stated learning goals.

- **Statement of classroom behavior**
** Turn off phones and laptops before entering the class.** - Anyone caught using a phone or any internet capable device during an exam or any in-class exercises without approval will receive a “0” for that exam grade.

- **Everyone’s opinion counts in this classroom.** We will create an environment of mutual respect, where each student will feel able to contribute and learn. We will frequently be surveying the class for opinions, debates, and values regarding controversial issues in natural resource conservation and management. It is important that we respect the opinions of all and value the diversity of a range of ideals during our discussions.

- **Statement of weather policy** If the University closes for inclement weather, class will be canceled. If there is another reason to cancel class, then I will notify everyone by email.

**Composition-Condition Marks.** A student whose written work in any course fails to meet acceptable standards will be assigned a composition-condition (CC) mark by the instructor on the final grade report. All undergraduates who receive two CC grades prior to the semester in which they complete 110 hours at Western Carolina University are so notified by the registrar and are required to pass English 300 or English 401 before they will be eligible for graduation. This course must be taken within two semesters of receiving the second CC and must be passed with a grade of C (2.0) or better.

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### VIII. Grading Procedures:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage of Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab exercises/Participation</td>
<td>30</td>
<td>Lab exercises and assignments.</td>
</tr>
<tr>
<td>Weekly quizzes/Participation</td>
<td>10</td>
<td>10 Weekly quizzes on lectures, labs, and readings</td>
</tr>
<tr>
<td>Friday Discussions</td>
<td>10</td>
<td>Participation in discussions from weekly readings</td>
</tr>
<tr>
<td>Exams (2)</td>
<td>30</td>
<td>Two exams during the semester.</td>
</tr>
<tr>
<td>Final Examination</td>
<td>20</td>
<td>Final exam – comprehensive</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td></td>
</tr>
<tr>
<td>Grade</td>
<td>Letter</td>
<td>Quality Points</td>
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<tr>
<td>-----------</td>
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</tr>
<tr>
<td>99-100</td>
<td>A+</td>
<td>4.0</td>
</tr>
<tr>
<td>92-98</td>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>90-91</td>
<td>A-</td>
<td>3.67</td>
</tr>
<tr>
<td>88-89</td>
<td>B+</td>
<td>3.33</td>
</tr>
<tr>
<td>82-87</td>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>80-81</td>
<td>B-</td>
<td>2.33</td>
</tr>
<tr>
<td>78-79</td>
<td>C+</td>
<td>2.33</td>
</tr>
<tr>
<td>72-77</td>
<td>C</td>
<td>2.0</td>
</tr>
<tr>
<td>70-71</td>
<td>C-</td>
<td>1.67</td>
</tr>
<tr>
<td>68-69</td>
<td>D+</td>
<td>1.33</td>
</tr>
<tr>
<td>62-67</td>
<td>D</td>
<td>1.0</td>
</tr>
<tr>
<td>60-61</td>
<td>D-</td>
<td>0.67</td>
</tr>
<tr>
<td>60 or lower</td>
<td>F</td>
<td>0</td>
</tr>
</tbody>
</table>

Please note that a C- grade is less than satisfactory and may not meet particular program and/or course requirement.
### IX. Tentative Course Schedule

**May change to accommodate guest presenters & student needs**

Please access online course material via **Blackboard (BB)** and follow all posted instructions to find readings and supplemental material necessary to complete the posted assignments.

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Wed. Lecture topic</th>
<th>Textbook Chapter Assigned</th>
<th>Thur. Lab</th>
<th>Friday Discussion Leaders</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan. 15-17</td>
<td>Intro and Historical perspectives</td>
<td>Ch. 1</td>
<td>#1 Intro to soil and Ecosystem services</td>
<td>Dr. Kelly</td>
</tr>
<tr>
<td>2</td>
<td>Jan. 22–Jan. 24</td>
<td>Factors of soil formation, profiles, and horizons</td>
<td>Soil formation and Soil profiles readings (BB)</td>
<td>#2 Soil Surveys</td>
<td>Addington, Bagwell</td>
</tr>
<tr>
<td>3</td>
<td>Jan. 29-Jan. 31</td>
<td>Soil classification and orders</td>
<td>Soil orders reading (BB)</td>
<td>#3 Intro to soil taxonomy</td>
<td>Balke, Barnett</td>
</tr>
<tr>
<td>4</td>
<td>Feb. 5-Feb. 7</td>
<td>Soil texture, density, porosity</td>
<td>Soil density reading (BB)</td>
<td>#4 Land classification</td>
<td>Chaffin, Cook</td>
</tr>
<tr>
<td>5</td>
<td>Feb. 12-Feb. 14</td>
<td>Soil fertility and nutrient cycling</td>
<td>Soil properties and nutrient availability (BB)</td>
<td>#5 Soil fertility</td>
<td>Crawley, Fitzgerald</td>
</tr>
<tr>
<td>6</td>
<td>Feb. 19-Feb. 21</td>
<td>Soil loss – wind and water erosion</td>
<td>Ch. 4</td>
<td>#6 Modeling predictions of erosion</td>
<td>Exam 1</td>
</tr>
<tr>
<td>7</td>
<td>Feb. 26-Feb. 28</td>
<td>Infiltration and runoff</td>
<td>Ch. 13</td>
<td>#7 Infiltration</td>
<td>Franklin, Gatton</td>
</tr>
<tr>
<td>8</td>
<td>Mar. 5-Mar. 7</td>
<td>Predicting soil loss</td>
<td>Ch. 6</td>
<td>#8 Field predictions of erosion</td>
<td>Griggs, Howard</td>
</tr>
<tr>
<td>9</td>
<td>Mar. 10-Mar. 14</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td><strong>Spring Break – no classes</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td>Mar. 19-Mar. 21</td>
<td>Forest management and soil conservation-harvest methods</td>
<td>Ch. 12-4</td>
<td>#9 Forest Site Quality Index (FSQI)</td>
<td>Johnston, Jones</td>
</tr>
<tr>
<td>11</td>
<td>Mar. 26-Mar. 28</td>
<td>Forest management and soil conservation-roads and culverts</td>
<td></td>
<td>#10 Road and culvert design</td>
<td>Exam 2</td>
</tr>
<tr>
<td>12</td>
<td>Apr. 2-Apr. 4</td>
<td>Agriculture and soil conservation</td>
<td>Ch. 8</td>
<td>#11 Agricultural soil conservation</td>
<td>Kowal, Lindsey</td>
</tr>
<tr>
<td>13</td>
<td>Apr. 9-Apr. 11</td>
<td>Wetlands and water quality</td>
<td>Ch. 9</td>
<td>#12 Wetlands</td>
<td>Moffit, Nelson, Powell</td>
</tr>
<tr>
<td>14</td>
<td>Apr. 16-Apr. 18</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td><strong>Easter Break – no classes</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>15</td>
<td>Apr. 23-</td>
<td>Conservation structures</td>
<td>Ch. 10</td>
<td>#13 Streams and Riparian</td>
<td>Ray, Seychelles,</td>
</tr>
<tr>
<td>Date</td>
<td>Event</td>
<td>Chapter</td>
<td>Topic</td>
<td>Authors</td>
<td></td>
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<tr>
<td>--------</td>
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<td>--------------------------------</td>
<td></td>
</tr>
<tr>
<td>Apr. 25</td>
<td>Reclamation of disturbed soils</td>
<td>Ch. 11</td>
<td>#14 Restoration approaches</td>
<td>Street, Whaley, Wineberg</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Apr. 30-May 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>May 5-May 9</td>
<td>Final Exam Week</td>
<td></td>
<td>Take-home Final Exam</td>
<td></td>
</tr>
</tbody>
</table>
Readings for Friday discussions:

Discussion leaders for the week will lead the class by describing the reading (environmental problem, research questions/hypotheses, research approach/methods, results, and take-home message). Leaders will then pose discussion questions to the class (can be specific about the reading, or questions about the larger context of the issues covered in lecture or lab). **Turn in typed summary of the paper and 4 discussion questions.

**The rest of the class will come prepared with one discussion question from the reading as well to turn in. Participation points will be awarded**


Week 6: No reading – Exam 1


Week 9: No reading – Spring Break


Week 11: No reading – Exam 2


Week 14: No reading – Easter Break

I. Purpose

To provide an introduction to the major ecological concepts involved in the management of natural resources for wildlife management.

NOTE: This class is being developed as a designated service learning course at WCU. This will require student to spend 15 hours working with a community stakeholder on some project related to wildlife, habitat, management etc.

II. Course Objectives:

Students will be able to apply critical thinking skills to the understanding of ecologic, economic, and ethical aspects of wildlife management and conservation.

III. Course Materials

- Required text(s): Conservation of Wildlife Populations by L. Scott Mills.
- Other readings will be provided as needed.

IV. Expectations of Students/Course Policies (Amendments will be announced in class)

- Attend and be engaged in class. Attendance is not mandatory but some activities will be completed in class or lab and can’t easily be made up. Excessive absences will impact your grade.
- Complete assignments on time. Late work will be penalized 20% of the total points possible for each day late. After 5 days the assignment will receive a grade of zero.
- Exams, in class-exercises and quizzes are not available for make up. If you MUST miss an exam make arrangements ahead of time to take it early.
- Be COURTEOUS to other students AND the instructor. This includes but IS NOT LIMITED TO getting to class on time, avoid excessive talking, keeping cell phone OFF etc. Put simply, avoid things that interfere with my teaching or student learning.
- Academic Integrity: You are encouraged to share ideas, discuss questions, and work together with your classmates in such a way as to further your individual and collective understanding and proficiency of the concepts and skills presented in this course. However, I expect each of you to submit original, independent work and adhere to the policies set forth in the University Catalog and Student Handbook. Academic dishonesty of any kind is not acceptable. Be sure to cite all work and ideas that
are not your own and reference all citations. See the University Writing Center website for information regarding plagiarism. Failure to comply with the University policy on academic integrity can result in a zero for the specific assignment, a failing grade for the course, University disciplinary action or any combination thereof.

What you should expect from me:

- I am readily available to answer questions and help with assignments. I have office hours but feel free to stop by at any time or call/email to set up an appointment. NOTE: Talk to me as soon as you are having problems or questions. If you wait until the day before something is due or the end of the semester to ask for help there will be little I can do for you.

- I will strive to get your graded work back to you in a timely fashion. Handing assignments in on time and in a presentable fashion will help with this tremendously.

- Expectations (i.e. such as what you need to “know” for a test or quiz) are clear. Grading and course policies are implemented fairly.

Writing Assistance: The Writing Center which is located on the first floor of Hunter Library assists students with papers and written assignments. See their website for additional information at www.wcu.edu/WritingCenter

Accommodations for Students with Disabilities: Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities. Students who require disability services or reasonable accommodations must identify themselves as having a disability and provide current diagnostic documentation to Disability Services. All information is confidential. Please contact Disability Services for more information at (828) 227-2716, jallexis@wcu.edu or 144 Killian Annex.

V. Grading Procedures: With the exception of some in class exercises used for discussions, all work will be graded and returned to you. Assignments will be designed to provide a variety of approaches to learning.

<table>
<thead>
<tr>
<th>% of Grade</th>
<th>Grading</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>Hourly Exams (3)</td>
</tr>
<tr>
<td>40</td>
<td>Quizzes, Assignments, Labs, Reports etc.</td>
</tr>
</tbody>
</table>

Scale: Grades will be assigned according to the scale shown below.

<table>
<thead>
<tr>
<th>Percentage Grade</th>
<th>Letter grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93-100</td>
<td>A</td>
</tr>
<tr>
<td>90 – 92</td>
<td>A-</td>
</tr>
<tr>
<td>87 – 89</td>
<td>B+</td>
</tr>
<tr>
<td>83 – 86</td>
<td>B</td>
</tr>
<tr>
<td>80 – 82</td>
<td>B-</td>
</tr>
<tr>
<td>77 – 79</td>
<td>C+</td>
</tr>
<tr>
<td>73 – 76</td>
<td>C</td>
</tr>
<tr>
<td>70 – 72</td>
<td>C-</td>
</tr>
<tr>
<td>67–69</td>
<td>D+</td>
</tr>
<tr>
<td>63–66</td>
<td>D</td>
</tr>
<tr>
<td>60–62</td>
<td>D-</td>
</tr>
<tr>
<td>Below 60</td>
<td>F</td>
</tr>
</tbody>
</table>
### Tentative Course Outline and Lab Schedule

Dates may need to be changed depending on weather, field trips, guest speakers etc. I’ll announce these in class but be sure to also CHECK YOUR WCU EMAIL

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Reading Assignment, Labs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon, Aug 19</td>
<td>Introduction to Wildlife and NRCM</td>
<td></td>
</tr>
<tr>
<td>Wed, Aug 21</td>
<td>Major Wildlife Taxonomic Groups</td>
<td></td>
</tr>
<tr>
<td>Mon, Aug 26</td>
<td>Introduction to Populations, Ecology and Wildlife Study Design</td>
<td>Mills Chapters 1-2. LAB: Habitat Variables and Basic Needs of Species</td>
</tr>
<tr>
<td>Wed, Aug 28</td>
<td>Introduction to Ecology and Wildlife Study Design</td>
<td></td>
</tr>
<tr>
<td>Mon, Sep  2</td>
<td>University Closed – Labor Day</td>
<td></td>
</tr>
<tr>
<td>Wed, Sep 4</td>
<td>Ecology and Wildlife Study Design Continued</td>
<td></td>
</tr>
<tr>
<td>Mon, Sep 9</td>
<td>Ecology and Wildlife Study Design Continued</td>
<td>LAB: Introduction to Sampling and Sample Design</td>
</tr>
<tr>
<td>Wed, Sep 11</td>
<td>Ecology and Wildlife Study Design Wrap Up</td>
<td></td>
</tr>
<tr>
<td>Mon, Sep 16</td>
<td>Introduction to Populations and Population Ecology</td>
<td></td>
</tr>
<tr>
<td>Wed, Sep 18</td>
<td>Populations and Population Ecology—describing populations</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>Wed, Sep 25</td>
<td>Populations and Population Ecology—vital rates</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>Mon, Sep 30</td>
<td>Wrap up/Review: Populations and Population Ecology—Genetics</td>
<td>TEST 1 taken during lab time</td>
</tr>
<tr>
<td>Wed, Oct  2</td>
<td>Introduction to Population Processes—Predicting Population Growth</td>
<td>Chapter 5</td>
</tr>
<tr>
<td>Mon, Oct  7</td>
<td>Fall Break – No Classes</td>
<td>No Lab</td>
</tr>
<tr>
<td>Wed, Oct 9</td>
<td>Fall Break – No Classes</td>
<td></td>
</tr>
<tr>
<td>Mon, Oct 14</td>
<td>Population Processes—Predicting Population Growth Chapter 5</td>
<td>LAB: Field Sampling/Monitoring Methods I</td>
</tr>
<tr>
<td>Wed, Oct 16</td>
<td>Population Structure/Demographics</td>
<td>Chapter 6</td>
</tr>
<tr>
<td>Mon, Oct 21</td>
<td>Population Structure/Demographics</td>
<td>LAB: Field Sampling/Monitoring Methods II</td>
</tr>
<tr>
<td>Wed, Oct 23</td>
<td>Density Dependent Population Change</td>
<td>Chapter 7</td>
</tr>
<tr>
<td>Mon, Oct 28</td>
<td>Density Dependent Population Change</td>
<td>LAB: Wildlife Data Management</td>
</tr>
<tr>
<td>Wed, Oct 30</td>
<td>Predation and wildlife populations</td>
<td>Chapter 8</td>
</tr>
<tr>
<td>Mon, Nov  4</td>
<td>Predation and wildlife populations</td>
<td>Chapter 8</td>
</tr>
<tr>
<td>Wed, Nov  6</td>
<td>Community Dynamics</td>
<td>LAB: Wildlife Data Analyses</td>
</tr>
<tr>
<td>Mon, Nov 11</td>
<td>Community Dynamics</td>
<td>Chapter 10</td>
</tr>
<tr>
<td>Wed, Nov 13</td>
<td>Genetic Variation and Fitness</td>
<td>LAB: TBA</td>
</tr>
<tr>
<td>Mon, Nov 18</td>
<td>Wrap up/Review</td>
<td>TEST 2: Taken during lab time</td>
</tr>
<tr>
<td>Wed, Nov 20</td>
<td>Applied Wildlife Management and Conservation</td>
<td>Chapter 11 and supplemental</td>
</tr>
<tr>
<td>Wed, Nov 27</td>
<td>Thanksgiving – No Classes</td>
<td></td>
</tr>
<tr>
<td>Mon, Dec  2</td>
<td>Applied Wildlife Management and Conservation</td>
<td>Chapter 13</td>
</tr>
<tr>
<td>Wed, Dec  4</td>
<td>Applied Wildlife Management and Conservation</td>
<td>No Lab</td>
</tr>
<tr>
<td>Wed, Dec 11</td>
<td>Final Exam 8:30-11:00</td>
<td>Room: TBA</td>
</tr>
</tbody>
</table>
I. Purpose: The purpose of this class is to allow you to develop the knowledge and the skills required to apply GIS tools and analyses methods to the study, conservation and management of natural resources and ultimately to be able to apply concepts and methods to real world problems INDEPENDENTLY.

II. General Course Objectives (More detailed objectives will be provided in class): By the end of this course students should be able to:

- Develop a spatial question (i.e. purpose statement or research question) applying geospatial analysis to a realistic scientific (NRCM) problem.
- Develop a set of measurable objectives needed to address the problem or answer the research question.
- Develop a sequence of GIS methods suitable for meeting scientific/research objectives
- For the major GIS methods covered in this class be able to describe the purpose of each and the type of information/output as (and how it may relate to spatial questions, objectives and the overall problem)
- Be able to generate the necessary outputs from GIS analysis (maps, tables, graphs, calculations etc.) needed for data analysis and interpretation and application of results.

III. Tips for Success: Given the amount of information, and the complexity of GIS software the best advice I can give for this class is:

- Don’t let the work get ahead of you—if you wait until the day an assignment is due then something WILL go wrong. This will only add to the frustration and takes away from learning.

- Always keep in mind the purpose of your work and the question you’re asking. As you’ll hear me say ad nauseum: If you don’t know what you need the GIS program to do, you’ll have no way of knowing whether it’s done it!

- The weekly labs are intended to give you practice with the software and concepts and often can be finished in a lab session. HOWEVER, don’t just rush through them to finish. GIS is like learning a big clunky out of tune instrument and takes PRACTICE. Each new concept depends on earlier ones. Racing to finish an exercise might mean you get out of class sooner but remember you WILL need to use each method or apply each concept later.

- Try to have some fun with the problem solving. GIS is a lot like a big puzzle.
• Ask for help when you need it. The course builds on itself so telling me the day something is due that “I didn’t understand” is too late.

III. Course Materials

• Required text(s): Required text(s): Bolstad, P. 2005. GIS Fundamentals: A First Text on Geographic Information Systems.
• Other readings will be provided as needed.

IV. Expectations of Students/Course Policies (Amendments will be announced in class)

• ATTENDANCE: As with any class your work will reflect the amount of time you put into the course. While I don’t have a formal attendance requirement I do penalize for late work and view it as YOUR responsibility to ensure that you catch up on any materials or assignments missed.
• LATE WORK: Late work will be penalized 20% of the total points possible for each day late. After 5 days the assignment will receive a grade of zero.
• If you MUST miss an exam or other assignment due in class please make arrangements ahead of time to take it early.
• Be COURTEOUS to other students AND the instructor. This includes but IS NOT LIMITED TO getting to class on time, avoid excessive talking, keeping cell phone OFF and not browsing the web during lectures etc.
• Put simply; avoid things that interfere with my teaching or student learning.

ACADEMIC INTEGRITY: Students, faculty, staff, and administrators of Western Carolina University (WCU) strive to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. While academic in scope, any violation of this policy is by nature, a violation of the Code of Student Conduct and will follow the same conduct process (see ArticleVII.B.1.a.). If the charge occurs close to the end of an academic semester or term or in the event of the reasonable need of either party for additional time to gather information timelines may be extended at the discretion of the Department of Student Community Ethics (DSCE).

http://catalog.wcu.edu/content.php?catoid=20&navoid=346#honestypolicy

Violations of the Academic Integrity Policy include:

• Cheating - Using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
• Fabrication – Creating and/or falsifying information or citation in any academic exercise.
• Plagiarism - Representing the words or ideas of someone else as one’s own in any academic exercise.
• Facilitation - Helping or attempting to help someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another to copy information during an examination)
According to WCU regulations: “Faculty members have the right to determine the appropriate sanction(s) for violations of the Academic Integrity Policy within their courses, up to and including a final grade of “F” in the course.”

My general policy is that a score of zero be assigned for the work in question although I consider each case and sanction individually. Depending on the severity of the offence and the impact on student grades these incidents are to be reported in each case.

I sincerely hope this will not be an issue but unfortunately it does occur. Generally some in class activities and projects might have a group-work component (i.e. data collection) but I very seldom if ever assign group grades for any major assignments, tests, quizzes or written reports. It is MUCH easier just to avoid these things in the first place. If you have questions regarding my policy for any given assignment (group vs. individual work) please ask.

What you should expect from me:

- I am readily available to answer questions and help with assignments. I have office hours but feel free to stop by at any time or call/email to set up an appointment. NOTE: Talk to me as soon as you are having problems or questions. If you wait until the day before something is due or the end of the semester to ask for help there will be little I can do for you.

- I will strive to get your graded work back to you in a timely fashion. Handing assignments in on time and in a presentable fashion will help with this tremendously.

- Expectations (i.e. such as what you need to “know” for a test or quiz) are clear. Grading and course policies are implemented fairly.

Use of the GIS Lab: Priority use of the GIS lab is for those students enrolled in the GIS or Remote Sensing courses. Occasionally, other classes will use the lab though it will be open regularly for you to work on class projects. Specific hours will be posted. NOTE: Use of the lab for other class work, email, internet etc. is fine UNLESS it interferes with someone else’s access for GIS or Remote Sensing related work.

Accommodations for Students with Disabilities: Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to Disability Services. All information is confidential. Please contact the Office of Disability Services for more information at (828) 227-3886 or lalexis@wcu.edu You may also visit the office’s website: disability.wcu.edu
V. Grading Procedures: With the exception of some in class exercises used for discussions, all work will be graded and returned to you. Assignments will be designed to provide a variety of approaches to learning.

<table>
<thead>
<tr>
<th></th>
<th>Percent</th>
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</thead>
<tbody>
<tr>
<td>Lab Exercises (Pass/Fail)</td>
<td>10</td>
</tr>
<tr>
<td>Exams (2)</td>
<td>30</td>
</tr>
<tr>
<td>Skills Assessments</td>
<td>30</td>
</tr>
<tr>
<td>Final Project</td>
<td>30</td>
</tr>
</tbody>
</table>

Grading Scale: Grades will be assigned according to the scale shown below.

<table>
<thead>
<tr>
<th>Percentage Grade</th>
<th>Letter grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93–100</td>
<td>A</td>
</tr>
<tr>
<td>90 – 92</td>
<td>A-</td>
</tr>
<tr>
<td>87 – 89</td>
<td>B+</td>
</tr>
<tr>
<td>83 – 86</td>
<td>B</td>
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<tr>
<td>80 – 82</td>
<td>B-</td>
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<tr>
<td>77 – 79</td>
<td>C+</td>
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<td>73 – 76</td>
<td>C</td>
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<td>70 – 72</td>
<td>C-</td>
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<td>67–69</td>
<td>D+</td>
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<td>63–66</td>
<td>D</td>
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<tr>
<td>60–62</td>
<td>D-</td>
</tr>
<tr>
<td>Below 60</td>
<td>F</td>
</tr>
<tr>
<td>Date</td>
<td>Topic</td>
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<td>------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>Tues, Jan 13</td>
<td>Introduction to GIS</td>
</tr>
<tr>
<td>Thurs, Jan 15</td>
<td>Geospatial data and spatial questions</td>
</tr>
<tr>
<td>Tues, Jan 20</td>
<td>Geospatial data and spatial questions</td>
</tr>
<tr>
<td>Thurs, Jan 22</td>
<td>Geospatial data and spatial questions</td>
</tr>
<tr>
<td>Tues, Jan 27</td>
<td>Introduction to Coordinate and Projection Systems</td>
</tr>
<tr>
<td>Thurs, Jan 29</td>
<td>Vector Data and Attribute Tables</td>
</tr>
<tr>
<td>Tues, Feb 3</td>
<td>Vector Data and Analyses Tools</td>
</tr>
<tr>
<td>Thurs, Feb 5</td>
<td>Vector Data and Analyses Tools</td>
</tr>
<tr>
<td>Tues, Feb 10</td>
<td>Vector Data and Attribute Tables</td>
</tr>
<tr>
<td>Thurs, Feb 12</td>
<td>Vector Data and Analyses Tools</td>
</tr>
<tr>
<td>Tues, Feb 17</td>
<td>Vector Data and Analyses Tools</td>
</tr>
<tr>
<td>Thurs, Feb 19</td>
<td>TEST 1: Geospatial Data, Spatial Questions, Vector Data Management</td>
</tr>
<tr>
<td>Tues, Feb 24</td>
<td>Advising Day—No Classes</td>
</tr>
<tr>
<td>Thurs, Feb 26</td>
<td>Introduction to Raster Analyses</td>
</tr>
<tr>
<td>Tues, Mar 3</td>
<td>Introduction to Raster Analyses</td>
</tr>
<tr>
<td>Thurs, Mar 5</td>
<td>Introduction to Raster Analyses</td>
</tr>
<tr>
<td>Tues, Mar 10</td>
<td>Introduction to Raster Analyses</td>
</tr>
<tr>
<td>Thurs, Mar 12</td>
<td>Spring Break—No Classes</td>
</tr>
<tr>
<td>Tues, Mar 17</td>
<td>Raster Data and Analyses</td>
</tr>
<tr>
<td>Thurs, Mar 19</td>
<td>Predictive Modeling</td>
</tr>
<tr>
<td>Tues, Mar 24</td>
<td>Advising Day – No Classes</td>
</tr>
<tr>
<td>Thurs, Mar 26</td>
<td>GIS Data Management</td>
</tr>
<tr>
<td>Tues, Mar 31</td>
<td>GIS Data Management</td>
</tr>
<tr>
<td>Thurs, Apr 2</td>
<td>No classes</td>
</tr>
<tr>
<td>Tues, Apr 7</td>
<td>Applied GIS</td>
</tr>
<tr>
<td>Thurs, Apr 9</td>
<td>TEST 2: Raster Analyses and Spatial Modeling</td>
</tr>
<tr>
<td>Tues, Apr 14</td>
<td>Applied GIS</td>
</tr>
<tr>
<td>Thurs, Apr 16</td>
<td>Applied GIS</td>
</tr>
<tr>
<td>Tues, Apr 21</td>
<td>Applied GIS</td>
</tr>
<tr>
<td>Thurs, Apr 23</td>
<td>Applied GIS</td>
</tr>
<tr>
<td>Tues, Apr 28</td>
<td>Applied GIS</td>
</tr>
<tr>
<td>Thurs, Apr 30</td>
<td>Applied GIS</td>
</tr>
<tr>
<td>Wed, May 6</td>
<td>PROJECT PRESENTATIONS</td>
</tr>
</tbody>
</table>
Learning Outcomes:
Students will demonstrate their understanding of:
1. how tree species respond to micro-environmental factors including light, temperature, water and soil characteristics;
2. relationships within and between woody plant species in communities;
3. the role of disturbance and change within forest ecosystems;

Students will practice:
1. applying forest ecology principles to sustainable forestry practices including uses such as carbon sequestration and cellulosic biofuels production;
2. evaluating forest management decisions in light of ecological principles;
3. critical thinking, reading and writing; applying scholarly information and methods to understand complex issues; oral communication; integrating concepts; and teamwork involved with solving forest ecological problems


Evaluation:

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<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>3 Exams</td>
<td>50%</td>
</tr>
<tr>
<td>Technical Reports</td>
<td>50%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

NOTE: class assignments are used to round final grades up (if done well), or down (if done poorly or missing)

A+ = >98%, A = 93-98%, A- = 90-92%, B+ = 87-89%, B = 83-86%, B- = 80-82%, C+ = 77-79%, C = 73-76%, C- = 70-72%, D+ = 67-69%, D = 63-66%, D- = 60-62%, F = <60%

Exams concentrate on material covered since the last exam, though students will be responsible for major concepts presented earlier. Exams are take-home, essay question format. Questions are designed to evaluate students’ ability to integrate and apply the material presented to solve an ecological problem. Late exams will not be accepted.

Laboratory Exercises are intended to illustrate and reinforce concepts discussed in class. Labs where data are collected will require students to write a formal scientific report. Late reports will only be accepted with prior approval of the instructor. Writing quality counts significantly in report grade and it is STRONGLY suggested you visit the writing center prior to turning your reports in. A template for technical reports will be handed out in class and reports will be graded based on completeness, scientific merit and writing quality.

Assignments (in-class and homework) are designed to help you evaluate how well you are understanding lecture material and reading assignments. These assignments can not be made up; students who are not present will receive a 0.
**Attendance Policy:** Students are responsible for all material presented during lecture and lab periods and as per WCU policy. It is NOT the instructor’s responsibility to get materials, etc. to a student who has missed class. Attendance during labs is required because labs involve working in teams.

**Expectations:** I expect students to practice professionalism during class, during inventory data collection and in their work turned in. Professional conduct includes being prepared for class (i.e., reading assigned materials and reviewing recent notes before each class, etc.), acting appropriately during laboratory and in class (i.e., no checking cell phones, no talking while others are talking, being respectful of others), being on time, etc. My goal is to present useful information in an understandable format; create assignments that help synthesize information and return them in a timely fashion; be fair to all students. I expect you to work to your potential by coming to class prepared to be actively involved in your education; asking questions, studying, completing assignments, and taking responsibility for your performance.

**Cell Phones:** must be turned OFF (not on vibrate) during class.

**Tobacco Products:** the use of all types of tobacco products is NOT allowed during class, which includes when we are outside for lab. This includes chewing tobacco and vaping.

**Academic Integrity:** You are encouraged to share ideas, discuss questions, and work together with your classmates to further your individual and collective understanding and proficiency of the concepts and skills presented in this course. **However**
- Each person must submit original, independent work and adhere to the policies set forth in the University Catalog and Student Handbook.
- This means that when you are doing the actual writing, you should be doing it by yourself and NOT sharing with your peers.
- Lab reports from different students containing similar text will receive zeros.
- You are NOT allowed to work with each other for any part on the take-home exams.

Academic dishonesty of any kind is not acceptable. Be sure to cite all work and ideas that are not your own and reference all citations. See the University Writing Center website for information regarding plagiarism. Failure to comply with University policies may result in a zero for the assignment, failure of the course, disciplinary action at the University level, or any combination of the three.
# Tentative Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture/Lab Topic</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 12</td>
<td>Lab: Technical Report Guidelines, Genetic Report Instructions</td>
<td></td>
</tr>
<tr>
<td>Jan 13 &amp; 15</td>
<td>Lecture: Cell Review, Adaptation – Genetic Basis</td>
<td>Chap. 4 &amp; Slide Set</td>
</tr>
<tr>
<td>Jan 19</td>
<td>No Lab: MLK Holiday, set up Phenology Study</td>
<td></td>
</tr>
<tr>
<td>Jan 20 &amp; 22</td>
<td>Lecture: Adaptation – Light, Genetic Report Due 1/20</td>
<td>Chap. 8</td>
</tr>
<tr>
<td>Jan 26</td>
<td>Lab: Site Quality Report Instructions, Tech Report Practice Due</td>
<td></td>
</tr>
<tr>
<td>Jan 27 &amp; 29</td>
<td>Lecture: Adaptation – Temperature</td>
<td>Chap. 7 &amp; 9</td>
</tr>
<tr>
<td>Feb 2</td>
<td>Lab: Site Quality Data Manipulation</td>
<td></td>
</tr>
<tr>
<td>Feb 3 &amp; 5</td>
<td>Lecture: Adaptation – Water</td>
<td>Chap. 6 &amp; 7</td>
</tr>
<tr>
<td>Feb 9</td>
<td>Lab: Communities Report Instructions, Site Quality Report Due</td>
<td></td>
</tr>
<tr>
<td>Feb 10 &amp; 12</td>
<td>Lecture: Nutrients</td>
<td>Chap. 11</td>
</tr>
<tr>
<td>Feb 17</td>
<td><strong>Exam #1 DUE (Jan. 12 – Feb. 12 materials)</strong></td>
<td><strong>Study Hard</strong></td>
</tr>
<tr>
<td>Feb 16</td>
<td>Lab: Inventory Instructions</td>
<td></td>
</tr>
<tr>
<td>Feb 17 &amp; 19</td>
<td>Lecture: Soils</td>
<td>Chap. 11</td>
</tr>
<tr>
<td>Feb 23</td>
<td>Lab: Succession Report Instructions, Communities Report Due</td>
<td></td>
</tr>
<tr>
<td>Feb 24</td>
<td>No Lecture: Advising Day</td>
<td></td>
</tr>
<tr>
<td>Feb 26</td>
<td>Lecture: Site Evaluation</td>
<td></td>
</tr>
<tr>
<td>Mar 2</td>
<td>Lab: Inventory Practice Plot</td>
<td></td>
</tr>
<tr>
<td>Mar 3 &amp; 5</td>
<td>Lecture: Populations</td>
<td>Chap. 15</td>
</tr>
<tr>
<td>Mar 9 – 12</td>
<td>No Class: Spring Break</td>
<td></td>
</tr>
<tr>
<td>Mar 16</td>
<td>Lab: Biodiversity Report Instructions, Succession Report Due</td>
<td></td>
</tr>
<tr>
<td>Mar 17 &amp; 19</td>
<td>Lecture: Communities</td>
<td>Chap. 15</td>
</tr>
<tr>
<td>Mar 23</td>
<td>Lab: Inventory</td>
<td></td>
</tr>
<tr>
<td>Mar 24 &amp; 26</td>
<td>Lecture: Disturbance – Succession</td>
<td>Chap. 16 &amp; 17</td>
</tr>
<tr>
<td>Mar 31</td>
<td><strong>Exam #2 DUE (Feb. 16 – Mar. 26 materials)</strong></td>
<td><strong>Study Hard</strong></td>
</tr>
<tr>
<td>Mar 30</td>
<td>Lab: Wildlife Report Instructions, Biodiversity Report Due</td>
<td></td>
</tr>
<tr>
<td>Mar 31</td>
<td>Lecture: Disturbance – Fire</td>
<td>Chap. 16 &amp; 12</td>
</tr>
<tr>
<td>April 2</td>
<td>No Class: Easter Holiday</td>
<td></td>
</tr>
<tr>
<td>Apr 6</td>
<td>Lab: Inventory</td>
<td></td>
</tr>
<tr>
<td>Apr 7 &amp; 9</td>
<td>Lecture: Biodiversity</td>
<td>Chap. 20</td>
</tr>
<tr>
<td>Apr 13</td>
<td>Lab: Inventory</td>
<td></td>
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<tr>
<td>Apr 14 &amp; 16</td>
<td>Lecture: Ecological Forestry, Wildlife Report Due 4/14</td>
<td>Chap. 21</td>
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<tr>
<td>Apr 20</td>
<td>Lab: Inventory</td>
<td></td>
</tr>
<tr>
<td>Apr 21 &amp; 23</td>
<td>Lecture: Teakettle Experiment</td>
<td>DVD, Handouts</td>
</tr>
<tr>
<td>Apr 27</td>
<td>Lab: Phenology Report Due</td>
<td></td>
</tr>
<tr>
<td>Apr 28 &amp; 30</td>
<td>Lecture: Carbon Sequestration</td>
<td>Handouts</td>
</tr>
<tr>
<td>Wed., May 6</td>
<td><strong>Comprehensive Final Exam: Noon – 2:30 pm</strong></td>
<td><strong>Study Hard</strong></td>
</tr>
</tbody>
</table>
“A nation without children would face a hopeless future; a country without trees is almost as helpless.”

Theodore Roosevelt (1858-1919), 26th President of the United States

Fall 2013
Lectures: Monday and Wednesday 9:05-9:55 AM 425 Stillwell
Labs: Tuesday 1:30 to 3:20 PM 143 Stillwell

Professor: Brian Kloeppel, 110C Cordelia Camp Building, bkloeppel@wcu.edu, 828-227-3173
Office Hours: Monday 10:00-11:00 AM, Wednesday 8:00-9:00 AM, and by appointment

I. Rationale/Purpose
The purpose of this course is to become familiar and confident with the use of basic forest measurements and apply them to:

- Forest land areas including compass and map skills and basic surveying methods
- Individual tree measurements, including diameter, height, and analysis of tree products, units of measure, and measurement techniques
- Timber volumes in forest tracts including basic timber cruising methods

II. Course Aims and Objectives:
- Aims: The aims of this course are to introduce, discuss, utilize, evaluate, and predict the measurement of land area, trees, biomass volume, timber volume, and specialty products

  By the end of this course, students will:
  - Understand the value and intensity of land survey and tree and forest biometry measurements
  - Understand tree and forest measurement techniques, their appropriate use, and bias
  - Know and recommend forest sampling strategies and the appropriate settings to employ them
  - Know and appreciate the need to succinctly summarize and present the findings from a forest inventory and analysis

- Demonstrate an excitement of learning, understanding, and appreciating the need for accurate and precise land and tree measurements.

III. Course Resources
- I will have two additional resources that I require each student to purchase. I have purchased these in advance and will collect payment from each of you for a total of $10.50.
  - North Carolina Forester’s Field Handbook 2004 edition: $7.50 each
  - Biltmore Stick: $3.00 each
- Lectures, labs, quizzes, and exams will frequently require the use of a calculator. NRCM classes restrict the use of a calculator to a TI-30X-IIS model. This is the same model used in NRM 210 and in NRM 451 so if you do not have one, you may wish to invest in one.
- I will post additional resources to the course blackboard page as the semester goes on. Please learn how to access these resources.

IV. Faculty Expectations of Students/Course Policies
- Statement on Accommodations for students with disabilities:
  Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical
condition and provide current diagnostic documentation to Disability Services. All information is confidential. Please contact the Office of Disability Services for more information at (828) 227-3886. You may also visit the office’s website: disability.wcu.edu

- **Statement on Academic Integrity (including plagiarism):**
  
  **Academic Honesty Policy**

  Western Carolina University, as a community of scholarship, is also a community of honor. Faculty, staff, administrators, and students work together to achieve the highest standards of honesty and integrity. Academic dishonesty is a serious offense at Western Carolina University because it threatens the quality of scholarship and defrauds those who depend on knowledge and integrity. Academic dishonesty includes:

  a. **Cheating**—Intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
  b. **Fabrication**—Intentional falsification of information or citation in an academic exercise.
  c. **Plagiarism**—Intentionally or knowingly representing the words or ideas of someone else as one’s own in an academic exercise.
  d. **Facilitation of Academic Dishonesty**—Intentionally or knowingly helping or attempting to help someone else to commit an act of academic dishonesty, such as knowingly allowing another to copy information during an examination or other academic exercise.

  Instructors have the right to determine the appropriate sanction or sanctions for academic dishonesty within their courses up to and including a final grade of “F” in the course. Within 5 calendar days of the event the instructor will inform his/her department head, and the Associate Dean of the Graduate School when the student is a graduate student, in writing of the academic dishonesty charge and sanction.

  Please refer to the student handbook regarding the policies and consequences of academic honesty at Western Carolina University.

- **Statement on late and/or makeup assignments**

  Each day that laboratory summaries are late will result in a reduction of 50% per day. Lab summaries that are more than two days late will automatically receive a zero. Exams can only be made up if I am contacted at least the day before the exam (before 4 PM) and the student has a legitimate excuse for missing the exam.

- **Statement of expectations for attendance and participation**

  I expect students to be in class on time and actively participating in discussions and activities. I may call on you to offer an answer, your opinion, or some insight. If you are doing a group or in-class exercise and someone is not participating in the work, please let me know so that we can make sure that everyone is doing their share to meet the stated learning goals.

- **Statement of classroom behavior**

  *Please put away your cell phones.* We want to create an environment of mutual respect where students can feel able to contribute and learn. I will frequently be surveying the class for opinions, options, and biases regarding forest measurements. It is important that we respect the opinions of all and that we value the diversity of a range of opinions when discussing forest measurements. Anything that distracts us from this goal is not acceptable and will be discussed with the offending student(s).

- **Statement of weather policy**

  If the University closes for inclement weather, class will be canceled. If there is another reason to cancel class, then I will notify everyone by catamount email.
V. Grading Procedures:
Weekly quizzes are used to encourage students to keep up with the material. They will concentrate on material covered in the readings and during recent lectures and lab periods. Quizzes will start promptly at the beginning of class every Monday and will last approximately 10 minutes. I will drop the two lowest quiz scores over the course. There will be no make-up quizzes for any reason.

Lab exercises are intended to demonstrate and reinforce the concepts discussed in class. Labs will be conducted both inside and outside. In some cases it will be necessary for students to drive short distances off campus. Note that while much of the lab work will be done in teams, as a rule, each individual must submit their own original lab report.

<table>
<thead>
<tr>
<th>Description of Item</th>
<th>Percentage of Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam I</td>
<td>15%</td>
</tr>
<tr>
<td>Exam II</td>
<td>15%</td>
</tr>
<tr>
<td>Labs</td>
<td>30%</td>
</tr>
<tr>
<td>Quizzes, Class Participation</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Letter grades will be assigned according to the following:

<table>
<thead>
<tr>
<th>Percentage Grade</th>
<th>Letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-100</td>
<td>A</td>
</tr>
<tr>
<td>80-89</td>
<td>B</td>
</tr>
<tr>
<td>70-79</td>
<td>C</td>
</tr>
<tr>
<td>60-69</td>
<td>D</td>
</tr>
<tr>
<td>59 and lower</td>
<td>F</td>
</tr>
</tbody>
</table>

Plus (+) and minus (-) grades will be assigned to the highest and lowest two points of each grade category (e.g. 99 and 100 = A+, 90 and 91 = A-, 88 and 89 = B+, 80 and 81 = B-, etc.). The grades of A+, A, A-, B+, B, B-, C+, C, C-, D+, D, D- and F indicate gradations in quality from Excellent to Failure. Please note that a C- grade is less than satisfactory and may not meet particular program and/or course requirements.

Composition-Condition Marks. A student whose written work in any course fails to meet acceptable standards will be assigned a composition-condition (CC) mark by the instructor on the final grade report. All undergraduates who receive two CC grades prior to the semester in which they complete 110 hours at Western Carolina University are so notified by the registrar and are required to pass English 300 or English 401 before they will be eligible for graduation. This course must be taken within two semesters of receiving the second CC and must be passed with a grade of C (2.0) or better.

VI. Course Evaluations:
- Online course evaluations for this course will be tentatively be open from 11 November 2013 to 06 December 2013. Please note that these dates are frequently updated during the semester.

VII. Tentative Course Schedule
May change to accommodate schedules, weather due to outdoor labs, and student needs

Please note that on Saturday, 09 November, we will have a mandatory field day. In exchange for the time for this lab from 9 AM to approximately 3 PM, we will not have labs the last three weeks of class.
<table>
<thead>
<tr>
<th>Day / Date</th>
<th>Lecture Topic</th>
<th>Reading</th>
<th>Lab on Tuesdays</th>
</tr>
</thead>
<tbody>
<tr>
<td>M, 19 August</td>
<td>introduction, abbreviations</td>
<td>1-1 to 1-7; 2-1 to 2-2</td>
<td>Lab #1 - distance</td>
</tr>
<tr>
<td>W, 21 August</td>
<td>Distance</td>
<td>4-1 to 4-5</td>
<td></td>
</tr>
<tr>
<td>M, 26 August</td>
<td>Direction</td>
<td>4-6 to 4-9</td>
<td>Lab #2 - direction</td>
</tr>
<tr>
<td>W, 28 August</td>
<td>&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M, 02 September</td>
<td>Labor Day - no class</td>
<td></td>
<td>Lab #3 - slope</td>
</tr>
<tr>
<td>W, 04 September</td>
<td>area determination</td>
<td>4-10 to -13, 4-16 to -23</td>
<td></td>
</tr>
<tr>
<td>M, 09 September</td>
<td>GPS</td>
<td>4-24 to 4-29</td>
<td>Lab #4 - GPS</td>
</tr>
<tr>
<td>W, 11 September</td>
<td>&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M, 16 September</td>
<td>measuring trees: diameter</td>
<td>7-1 to 7-6</td>
<td>Lab #5 - tree diam. &amp; BA</td>
</tr>
<tr>
<td>W, 18 September</td>
<td>Exam 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M, 23 September</td>
<td>measuring trees: height</td>
<td>7-7 to 7-11</td>
<td>Lab #6 - tree height</td>
</tr>
<tr>
<td>W, 25 September</td>
<td>measuring trees: form &amp; age</td>
<td>7-12 to 7-21</td>
<td></td>
</tr>
<tr>
<td>M, 30 September</td>
<td>units of measure</td>
<td>5-1 to 5-12</td>
<td>Lab #7 - log volume</td>
</tr>
<tr>
<td>W, 02 October</td>
<td>tree volume and weight</td>
<td>8-1 to 8-3</td>
<td>T &amp; S Hardwoods, tent.</td>
</tr>
<tr>
<td>M, 07 October</td>
<td>fall break - no class</td>
<td></td>
<td>fall break - no lab</td>
</tr>
<tr>
<td>W, 09 October</td>
<td>fall break - no class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M, 14 October</td>
<td>tree grading and products</td>
<td>6-17 to 6-30</td>
<td>Lab #8 - tree grading</td>
</tr>
<tr>
<td>W, 16 October</td>
<td>fixed area sampling</td>
<td>10-1 and 10-6 to 10-11</td>
<td></td>
</tr>
<tr>
<td>M, 21 October</td>
<td>point sampling</td>
<td>11-1 to 11-27</td>
<td>Lab #9 - point sampling</td>
</tr>
<tr>
<td>W, 23 October</td>
<td>point sampling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M, 28 October</td>
<td>allometry</td>
<td>Martin et al. 1998</td>
<td>Advising Day - no lab</td>
</tr>
<tr>
<td>W, 30 October</td>
<td>Exam 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M, 04 November</td>
<td>sampling designs</td>
<td>3-4 to 3-11</td>
<td>Lab #10 - sampling design</td>
</tr>
<tr>
<td>W, 06 November</td>
<td>&quot;</td>
<td></td>
<td>Saturday 09 November</td>
</tr>
<tr>
<td>M, 11 November</td>
<td>timber inventories</td>
<td>9-1 to 9-11</td>
<td>Lab - summary of 09 Nov</td>
</tr>
<tr>
<td>W, 13 November</td>
<td>&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M, 18 November</td>
<td>statistical introduction</td>
<td>2-5 to 2-17</td>
<td>no lab</td>
</tr>
<tr>
<td>W, 20 November</td>
<td>Thanksgiving - no class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M, 25 November</td>
<td>stand and stock tables</td>
<td>9-11 (again)</td>
<td>no lab</td>
</tr>
<tr>
<td>W, 37 November</td>
<td>sampling and estimation</td>
<td>3-1 to 3-3</td>
<td></td>
</tr>
<tr>
<td>M, 02 December</td>
<td>student choice lecture</td>
<td>to be determined</td>
<td>no lab</td>
</tr>
<tr>
<td>W, 04 December</td>
<td>review for final exam</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Lab reports will be due at the beginning of lecture on Wed., 8 days following the lab on Tues.

**Final Exam:** Tuesday, 10 December 2013, 8:30 - 11:00 am
I. Purpose

To provide students the knowledge and skills needed to apply spatial aspects of ecology to the evaluation and management of natural resources.

II. Course Objectives:

1. Explain the relationship between landscape scale, pattern, and processes and the functioning of terrestrial ecosystems.

2. Be able to describe and quantify landscape composition, pattern and processes. **

3. Apply landscape ecology concepts to the management of natural resources including forests, soil, water, and wildlife habitat.

**Basic GIS skills required.

III. Course Materials

- Basic Landscape Ecology (2010) by Robert Colson and Maria Tchakerian
- Other readings will be provided as needed.

IV. Expectations of Students/Course Policies

Attendance: I do not take attendance after the first 2 weeks of class however please consider the following

- You are responsible for ALL concepts covered in lecture and lab even if you are absent.
- Tests and in-class assignments or labs are NOT available for makeup unless you have a valid documented excuse and have contacted me either ahead of time or as soon as you get back.
- Late work (out of class assignments) will be penalized 25% of the total points possible for each day late. After 4 days the assignment will receive a grade of zero.

- All written assignments completed outside of class MUST be typed using a standard font.
- Be COURTEOUS to other students AND the instructor. This includes but IS NOT LIMITED TO getting to class on time, avoid excessive talking, keeping cell phone OFF and not browsing the web during lectures etc.
- Put simply, avoid things that interfere with my teaching or student learning.
IV. WCU Academic Integrity Policy: This policy addresses academic integrity violations of undergraduate and graduate students. Graduate students should read inside the parenthesis below to identify the appropriate entities in charge of that step of the process.

Students, faculty, staff, and administrators of Western Carolina University (WCU) strive to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. While academic in scope, any violation of this policy is by nature, a violation of the Code of Student Conduct and will follow the same conduct process (see Article VII.B.1.a.). If the charge occurs close to the end of an academic semester or term or in the event of the reasonable need of either party for additional time to gather information timelines may be extended at the discretion of the Department of Student Community Ethics (DSCE).

Violations of the Academic Integrity Policy include:

- Cheating - Using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
- Fabrication – Creating and/or falsifying information or citation in any academic exercise.
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VI. What you should expect from me:

- I am readily available to answer questions and help with assignments. I have office hours but feel free to stop by at any time or call/email to set up an appointment.
  - This class will emphasize practical applications of course concepts to NRCM. This means you’ll spend much more time applying critical thinking and problem solving skills than memorizing. Talk to me as soon as you are having problems or questions. If you wait until the day before something is due or the end of the semester to ask for help there will be little I can do for you.
  
- I strive to make learning objectives (i.e. such as what you need to “know” for a test or quiz) clear

- Grading and course policies are implemented fairly.
V. Grading Procedures:

Some assignments be in class and used for discussion/demonstration. These are effort based (you were there and completed it) while others will be completed outside of class or lab and graded based upon performance and accuracy.

<table>
<thead>
<tr>
<th>In-Class Exams (3)</th>
<th>Percentage of Final Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
</tr>
<tr>
<td>Exercises, Class Assignments, Quizzes etc.</td>
<td>30</td>
</tr>
</tbody>
</table>

- Exams and Assignments are scored based on points but then converted to a percentage
- Assignments are weighted according to the percentage shown above.
- For example, if your average % score for the 3 class exams is 85% and your labs/assignments was 90% then your final exam grade would be \((0.85*60) + (0.9*40) = 51+36 = 87/100\).

- Your total out of 100 will be graded according to the scale shown below

<table>
<thead>
<tr>
<th>Percentage Grade</th>
<th>Letter grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93–100</td>
<td>A</td>
</tr>
<tr>
<td>90–92</td>
<td>A-</td>
</tr>
<tr>
<td>87–89</td>
<td>B+</td>
</tr>
<tr>
<td>83–86</td>
<td>B</td>
</tr>
<tr>
<td>80–82</td>
<td>B-</td>
</tr>
<tr>
<td>77–79</td>
<td>C+</td>
</tr>
<tr>
<td>73–76</td>
<td>C</td>
</tr>
<tr>
<td>70–72</td>
<td>C-</td>
</tr>
<tr>
<td>67–69</td>
<td>D+</td>
</tr>
<tr>
<td>63–66</td>
<td>D</td>
</tr>
<tr>
<td>60–62</td>
<td>D-</td>
</tr>
<tr>
<td>Below 60</td>
<td>F</td>
</tr>
</tbody>
</table>

**PLEASE NOTE: I do not disclose/discuss grade information by email or phone so if you need to discuss your grade please see me in person.**
## Tentative Schedule Spring 2015

<table>
<thead>
<tr>
<th>DATE</th>
<th>LECTURE TOPIC</th>
<th>READING</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tues, Jan 13</td>
<td>Introduction to Landscape Ecology</td>
<td>Chapter 1</td>
<td></td>
</tr>
<tr>
<td>Thurs, Jan 15</td>
<td>Ecology—overview of major concepts</td>
<td>Chapter 2</td>
<td></td>
</tr>
<tr>
<td>Tues, Jan 20</td>
<td></td>
<td>Chapter 2</td>
<td></td>
</tr>
<tr>
<td>Thurs, Jan 22</td>
<td></td>
<td>Chapter 2</td>
<td></td>
</tr>
<tr>
<td>Tues, Jan 27</td>
<td></td>
<td>Chapter 2</td>
<td></td>
</tr>
<tr>
<td>Thurs, Jan 29</td>
<td></td>
<td>Chapter 3</td>
<td></td>
</tr>
<tr>
<td>Tues, Feb 3</td>
<td>Scale, Pattern and Process</td>
<td>Chapter 3</td>
<td></td>
</tr>
<tr>
<td>Thurs, Feb 5</td>
<td></td>
<td>Chapter 4</td>
<td></td>
</tr>
<tr>
<td>Tues, Feb 10</td>
<td>Describing and Evaluating Landscape Composition (i.e. Land Use-Land Cover)</td>
<td>Chapter 5</td>
<td></td>
</tr>
<tr>
<td>Thurs, Feb 12</td>
<td></td>
<td>Chapter 5</td>
<td></td>
</tr>
<tr>
<td>Tues, Feb 17</td>
<td></td>
<td>Chapter 5</td>
<td></td>
</tr>
<tr>
<td>Thurs, Feb 19</td>
<td>TEST 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tues, Feb 24</td>
<td>ADVISING DAY—NO CLASS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thurs, Feb 26</td>
<td>Quantifying Landscape Pattern</td>
<td>Chapter 5 &amp; 7</td>
<td></td>
</tr>
<tr>
<td>Tues, Mar 3</td>
<td></td>
<td>Chapter 5 &amp; 7</td>
<td></td>
</tr>
<tr>
<td>Thurs, Mar 5</td>
<td></td>
<td>Chapter 5 &amp; 7</td>
<td></td>
</tr>
<tr>
<td>Tues, Mar 10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thurs, Mar 12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tues, Mar 17</td>
<td>Spring Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thurs, Mar 19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tues, Mar 24</td>
<td>Landscape Pattern and Ecologic Processes</td>
<td>Chapter 8-</td>
<td></td>
</tr>
<tr>
<td>Thurs, Mar 26</td>
<td>Fragmentation, Connectivity and Flow in Ecosystems</td>
<td>Chapter 9</td>
<td></td>
</tr>
<tr>
<td>Tues, Mar 31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thurs, Apr 2</td>
<td>No Classes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tues, Apr 7</td>
<td>Review</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thurs, Apr 9</td>
<td>TEST 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tues, Apr 14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thurs, Apr 16</td>
<td>Applications: Composition, Pattern, Process and Conservation and Management</td>
<td>Chapter 10</td>
<td></td>
</tr>
<tr>
<td>Tues, Apr 21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thurs, Apr 23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tues, Apr 28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thurs, Apr 30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thurs, May 7</td>
<td>TEST 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NRM 420 – Soil Genesis and Classification

Fall 2014

Lecture: WF 11:15 – 12:05, McKee Room 112
Lab: Tues. 1:25 – 3:20, Stillwell 314

“Each soil has had its own history. Like a river, a mountain, a forest, or any natural thing, its present condition is due to the influences of many things and events of the past.”


**Professor:** Dr. Charley Kelly   **Office:** 336 Stillwell Building, cnkelly@email.wcu.edu, 828-227-3817

**Office Hours:** MWF 10:00-11:00 + anytime by appointment

I. Rationale/Purpose

The purpose of this course is to familiarize students with the complex of factors influencing soil formation, soil properties, soil classification, and soil fertility.

II. Course Objectives:

- **By the end of this course, students will demonstrate that they:**
  
  o Understand the major soil forming processes that determine soil development.
  
  o Understand how soil morphology influences physical and chemical properties of soil, and the linkages to best management options.
  
  o Understand the US soil classification system and be able to interpret a taxonomic soil description.
  
  o Understand how spatial patterns of soils can be predicted across a landscape.
  
  o Understand how humans can be a large force that influences soil genesis.

III. Course Resources

**Required text:** Soil Genesis and Classification, 5th edition. S.W. Buol, R.J. Southard, R.C. Graham, and P.A. McDaniel.

I will post additional resources to the course Blackboard page as the semester goes on.
IV. Faculty Expectations of Students/Course Policies

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• Statement on late and/or makeup assignments Each day that papers are late will result in a reduction of 15% per day. Papers that are more than three days late will automatically receive an F. Exams can only be made up if I am contacted at least by the day before the exam (before 4 PM) and the student has a legitimate excuse for missing the exam.

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• Statement of classroom behavior

** Turn off phones and laptops before entering the class.** - Anyone caught using a phone or any internet capable device during an exam or any in-class exercises without approval will receive a “0” for that exam grade.

• Statement of weather policy If the University closes for inclement weather, class will be canceled. If there is another reason to cancel class, then I will notify everyone by email.

Composition-Condition Marks. A student whose written work in any course fails to meet acceptable standards will be assigned a composition-condition (CC) mark by the instructor on the final
grade report. All undergraduates who receive two CC grades prior to the semester in which they complete
110 hours at Western Carolina University are so notified by the registrar and are required to pass English
300 or English 401 before they will be eligible for graduation. This course must be taken within two
semesters of receiving the second CC and must be passed with a grade of C (2.0) or better.

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in to TutorTrac and select “Biltmore Park Writing Tutoring” for availabilities.
VIII. Grading Procedures:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage of Grade</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Lab exercises/Participation</td>
<td>30</td>
<td>Lab exercises and assignments.</td>
</tr>
<tr>
<td>Weekly quizzes</td>
<td>10</td>
<td>10 Weekly quizzes on lectures, labs, and readings</td>
</tr>
<tr>
<td>Friday Discussions/Activities</td>
<td>10</td>
<td>Participation in discussions from weekly readings</td>
</tr>
<tr>
<td>Individual Presentation</td>
<td>5</td>
<td>Class Presentation on assigned topic</td>
</tr>
<tr>
<td>Group Presentation</td>
<td>10</td>
<td>Group writing and presentation assignment</td>
</tr>
<tr>
<td>Exams (2)</td>
<td>20</td>
<td>Two exams during the semester.</td>
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<tr>
<td>Final Examination</td>
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<td>Final exam – comprehensive</td>
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<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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<table>
<thead>
<tr>
<th>Grade</th>
<th>Letter</th>
<th>Quality Points</th>
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<tbody>
<tr>
<td>99-100</td>
<td>A+</td>
<td>4.0</td>
</tr>
<tr>
<td>92-98</td>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>90-91</td>
<td>A-</td>
<td>3.67</td>
</tr>
<tr>
<td>88-89</td>
<td>B+</td>
<td>3.33</td>
</tr>
<tr>
<td>82-87</td>
<td>B</td>
<td>3.0</td>
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<tr>
<td>80-81</td>
<td>B-</td>
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<tr>
<td>78-79</td>
<td>C+</td>
<td>2.33</td>
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<td>72-77</td>
<td>C</td>
<td>2.0</td>
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<tr>
<td>70-71</td>
<td>C-</td>
<td>1.67</td>
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<td>68-69</td>
<td>D+</td>
<td>1.33</td>
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<tr>
<td>62-67</td>
<td>D</td>
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<tr>
<td>60-61</td>
<td>D-</td>
<td>0.67</td>
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<tr>
<td>60 or lower</td>
<td>F</td>
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</tbody>
</table>

Please note that a C- grade is less than satisfactory and may not meet particular program and/or course requirement.
# Tentative Course Schedule

*May change to accommodate guest presenters & student needs*

*Please access online course material via Blackboard (BB) and follow all posted instructions to find readings and supplemental material necessary to complete the posted assignments.*

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Tues. Lab Topic</th>
<th>Textbook Chapter Assigned</th>
<th>Wed. Lecture Topic</th>
<th>Friday Discussion/Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aug. 19 – Aug. 22</td>
<td>Ch. 1 - 2</td>
<td>Course Overview – Why we care!</td>
<td>Soil Morphology and Horizons Lecture</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Aug. 26 – Aug. 29</td>
<td>#1 Soil Morphology and Profile Description</td>
<td>Reading on BB</td>
<td>Soil Physics</td>
<td>Soil Physics Discussion</td>
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<tr>
<td>3</td>
<td>Sep. 2 – Sep. 5</td>
<td>#2 Soil Physical Properties</td>
<td>Ch. 4-5</td>
<td>5 Factors of Soil Formation</td>
<td>Regression Analysis Refresher</td>
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<tr>
<td>4</td>
<td>Sep. 9 – Sep. 12</td>
<td>#3 Topographic Catena</td>
<td>Ch. 8 -19 as reference</td>
<td>12 Soil Orders</td>
<td>12 Soil Orders Activity</td>
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<tr>
<td>5</td>
<td>Sep. 16 – Sep. 19</td>
<td>#4 Aspect Catena</td>
<td>Ch. 3</td>
<td>Soil Forming Processes</td>
<td>Soil Forming</td>
</tr>
<tr>
<td>6</td>
<td>Sep. 23 – Sep. 26</td>
<td>#5 Vegetation Catena</td>
<td>Reading on BB</td>
<td>Soil Carbon and Organic Matter</td>
<td>Exam 1</td>
</tr>
<tr>
<td>7</td>
<td>Sep. 30 – Oct. 3</td>
<td>#6 Soil C and Soil Properties</td>
<td>Ch. 7</td>
<td>Soil Taxonomy</td>
<td>Soil Taxonomy</td>
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<tr>
<td>8</td>
<td>Oct. 7 – Oct. 10</td>
<td>#7 Mapping</td>
<td>Ch. 20</td>
<td>Mapping – Spatial Arrangement of Soils</td>
<td>Mapping Discussion</td>
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<tr>
<td>9</td>
<td>Oct. 14 – Oct. 17</td>
<td></td>
<td></td>
<td></td>
<td>--------------------------Fall Break – no classes--------------------------</td>
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<tr>
<td>10</td>
<td>Oct. 21 – Oct. 24</td>
<td>#8 Mapping, cont.</td>
<td>Reading on BB</td>
<td>Management Interpretations</td>
<td>Management Interpretations Discussion</td>
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<tr>
<td>11</td>
<td>Oct. 28 – Oct. 31</td>
<td>Advising Day – No Lab</td>
<td>Reading on BB</td>
<td>Modeling Soil Genesis</td>
<td>Exam 2</td>
</tr>
<tr>
<td>12</td>
<td>Nov. 4 – Nov. 7</td>
<td>#9 Modeling Soil Genesis</td>
<td>Reading on BB</td>
<td>Soil fertility and Chemistry</td>
<td>Modeling Discussion</td>
</tr>
<tr>
<td>13</td>
<td>Nov. 11 – Nov. 14</td>
<td>#10 Soil Fertility and Chemistry</td>
<td>Reading on BB</td>
<td>Hydropedology – Water as a forming factor</td>
<td>Soil Fertility Exercise</td>
</tr>
<tr>
<td>14</td>
<td>Nov. 28 – Nov. 21</td>
<td>Work on group project</td>
<td>Reading on BB</td>
<td>Engineering Soils</td>
<td>Engineering Soils Discussion</td>
</tr>
<tr>
<td>Date</td>
<td>Event</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Nov. 25 – Nov. 28</td>
<td>Thanksgiving – no classes</td>
<td></td>
<td></td>
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<tr>
<td>Dec. 2 – Dec. 5</td>
<td>Peer review of writing</td>
<td></td>
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<td></td>
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<tr>
<td>Dec. 9 – Dec. 12</td>
<td>Final Exam Week</td>
<td></td>
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</tr>
</tbody>
</table>

*Student Presentations -- Anthropedogenesis*
NRM 420 – Soil Genesis and Classification
Assignment 1: Student Presentations

The 5 Factors of Soil Formation
or
The 12 Soil Orders

My assigned topic ______________________________

Overview: Each student will be assigned one of the factors of formation OR the one of the 12 soil orders to research and teach the rest of the class what you learned in a presentation.

Details (5 Factors): Presented in class Wednesday, Sept. 3
What to include in your presentation:
- How your factor changes soil properties.
- What soil properties are generally changed from your factor?
- What is the timescale that your factor moves on?
- Give at least 3 specific examples of your factor.
- Explain how your factor may act to form soils in North Carolina.
- Other interesting details.

Details (12 Soil Orders): Presented in class Wednesday, Sept. 10
What to include in your presentation:
- How your soil order is formed (climatic conditions, processes that form it, vegetation, etc.)
- Where your soil order is likely to be found. Give a map.
- Diagnostic features of your soil order (depth, horizons, properties, etc.). Give a detailed picture.
- Relative age of your soil order (young, old, etc.)
- Relative fertility of your soil order (highly fertile, low fertility)
- Is your soil order in NC? Where and Why/why not do they occur here?
- Does your soil order pose any problems for building, growing, etc?
- Other interesting details.

The presentation should be about 5-7 minutes. I recommend making slides with several detailed images to depict the details listed above. Be sure to be very descriptive. Each student will be responsible for teaching the rest of the class this material. The material will be covered on the exam.

Please upload your slides to Blackboard the day before your presentation.

You will be graded on content and presentation clarity and organization.
- 5% of your final grade.
Instructors:
Pete Bates
341 Stillwell
227-3914
bates@email.wcu.edu

Diane Styers
320 Stillwell
227-3819
dmstyers@email.wcu.edu

Class meeting times:
Lecture: M,F 11:15 to 12:05, ST 143
Lab: W 12:30 to 5:00, ST 143

Course goals and objectives: This is the NRCM capstone course where students integrate and apply skills and techniques learned throughout the NRCM curriculum. NRCM faculty have identified the following goals and objectives for this class:

- **Produce an integrated natural resource conservation and management plan for a specific land parcel.** Creating a management plan is a complex process that requires articulating clear management objectives based on discussions with the landowner, conducting a complete resource assessment, and then creating a comprehensive strategy for achieving those objectives.

- **Work effectively as a member of a team.** This is often one of the most challenging aspects of this course, although it is also one of the most important. It is expected that each individual will (1) contribute to the overall effort, (2) teach and inform their peers, and (3) learn from their peers. We recognize that different students have different strengths and abilities, but it is each student’s responsibility to proactively identify ways that they can contribute effectively.

- **Integrate information from past coursework with additional information as needed to prepare a plan that is sustainable and fully achieves landowner objectives.** No amount of coursework can provide you with all of the information you need to write a management plan of this nature; however, our curriculum is designed to provide you with most of the basic tools. It is expected that you will need to add to your existing knowledge base in order to adequately address the myriad of issues that will arise during the course of this project.

- **Employ critical thinking and problem solving skills.** There is no formula or template for a perfect management plan. You will need to be creative and work through a variety of management options. Your thought process needs to be logical and well-reasoned.

- **Demonstrate effective oral and written communication skills.** Throughout the semester, students will present material both orally and in writing to a variety of audiences. You must be able to present your ideas clearly and concisely.

**Course format and project overview:** This is a project-based course. Once the project has been defined and the timeline established, it will be largely up to the students to determine the work to be done, and when. This year the entire class will work together to prepare a single management plan. Much of the work will be done in groups, though the makeup of groups will change during the course of the semester.

**Project definition:** The class will develop a plan to support portions of Western Carolina University’s 2014 Campus Master Plan. In particular, you will focus on developing strategies that will contribute to creating a sustainable campus. In addition to the WCU campus, the project site will also include the Upper Long Branch watershed and the Wolf Creek Preserve, located on Cullowhee Mountain Road (the project site for last year’s class).

The 2014 Campus Master Plan can be accessed at [http://www.wcu.edu/WebFiles/PDFs/WCU_2014CampusMasterPlan_ScreenRes.pdf](http://www.wcu.edu/WebFiles/PDFs/WCU_2014CampusMasterPlan_ScreenRes.pdf)

It is expected that the process of developing the management plan will be mostly student-driven. Some general guidelines are presented below:

- The class is expected to produce a comprehensive natural resource assessment for the project area that considers soil, water, forest, and wildlife resources, in addition to topography, roads, trails, and other important features. The assessment will be completed through a combination of field work, geospatial analyses, and review of existing information.
- The class is expected to articulate broad management goals for creating a sustainable campus. The class will then need to define a subset of specific management treatments that need to be achieved in order to satisfy the broader goals. A critical component will include developing a series of metrics (things that can be quantified) that can be used to determine whether management goals are being met.
- The plan should focus on potential management scenarios that are consistent with the NRCM curriculum, and thus should consider typical natural resource management issues related to forest, soil, water, and wildlife resources.
- The plan should be feasible and should make good use of the site’s natural resources.
**General Student Expectations:** There will be opportunities for students to establish peer expectations. However, there are some expectations that the instructors view as critical. These include:

- Student attendance and participation during all scheduled meeting times is required. Students who are late or absent will be penalized heavily.

- Students are fully responsible for staying on top of all course requirements. It is your responsibility to check your email and Blackboard announcements regularly. You are also responsible for reading and following directions.

- It is expected that each individual will provide input, and become familiar with, all components of the project. While students with different experiences and backgrounds will likely provide more leadership in some areas, it is not acceptable for the class to divide the project into discrete components. *Each individual must have a working knowledge of the entire project.*

**Evaluation:** Throughout the semester there will be a series of graded assignments. These cannot be described ahead of time since the project specifics have yet to be defined. However, they will take a variety of formats including written reports, oral presentations, and tests. Each assignment will be worth a predetermined number of points. Each student will receive an individual grade for each assignment. *Individual grades for group work will reflect each student’s input and contribution.*

**Peer assessment:** You will assess your peers regularly throughout the semester using a variety of formats. The results may influence individual student grades.

For all practical purposes, the following final percentages will guarantee the corresponding grades: $\geq 93=A$, $\geq 90=A-$, $\geq 87=B+$, $\geq 83=B$, $\geq 80=B-$, etc.

**Key due dates for selected deliverables:**
- **Wednesday, February 18:** Resource assessment oral presentation to NRCM faculty and landowner
- **Monday, March 23 (5:00 PM):** Final resource assessment written report
- **Wednesday, April 8:** Draft oral presentation to NRCM faculty and landowner focusing on management recommendations
- **Monday, April 13 (5:00 PM):** Final management recommendations written report
- **Wednesday, April 22:** Final oral presentation to general audience and draft of final written report
- **Friday, May 1 (5:00 PM):** Final written report
- **Monday, May 4 (3:00 PM):** Review, wrap-up, and final feedback

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Academic Calendar includes dates for all breaks, university closures, final exams, etc. The academic calendar can be found at: http://www.wcu.edu/academics/campus-academic-resources/registrar-office/academic-calendar.asp.
NRM-451
FOUNDATIONS OF SILVICULTURE
Fall 2013

Instructor: Peter Bates
Office hours: 2:30 to 3:30 Monday
341 Stillwell
1:30 to 2:30 Friday
227-3914 or by appointment
bates@email.wcu.edu

Class meeting times:
Lecture: M, W 1:25 to 2:15, MK223
Lab: R 1:25 to 4:15, MK223

Learning outcomes and course role in the NRCM curriculum:
1. Develop a working knowledge of silviculture terminology and silvicultural systems
2. Become familiar with the silvical characteristics of common tree species
3. Be able to recognize southern Appalachian forest community types and understand how they are distributed across the landscape
4. Integrate these concepts in management prescriptions that will contribute to the restoration and sustainable management of the southern Appalachian forests.

It is expected that students enter this course with a proficient knowledge of tree identification, a general understanding of ecological principles, and the ability to collect and summarize basic forest stand data (students should have taken 1 or more of the following courses BIOL-254 Dendrology, NRM-351 Forest Ecology, and NRM-352 Forest Measurements).

Required Text:

Supplementary Resources:
The Society of American Foresters Dictionary of Forestry available online at http://www.dictionaryofforestry.org/ or Google dictionary of forestry.


Others may be added during the semester.
Supplies:

- Calculator: Either a Texas Instruments TI-30X-IIS (preferred) or Casio fx-260. These are the only calculators that can be used during quizzes and exams. These calculators can be purchased for about $15 at Walmart, Staples, or online.

- We have limited copies of the NC Forest Service Forester’s Field Handbook available for purchase ($7.50). These handbooks contain a lot of useful information and we will use them throughout the semester. Students are not required to purchase a handbook, though they are an excellent reference.

Evaluation:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
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<tr>
<td>3 midterm exams</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam (Wednesday December 11, 3:00-5:30)</td>
<td>20%</td>
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<tr>
<td>Class exercises</td>
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<tr>
<td>Lab exercises</td>
<td>20%</td>
</tr>
<tr>
<td>Term project</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

For all practical purposes, the following final percentages will guarantee the corresponding grades: \( \geq 93 = A, \geq 90 = A-, \geq 87 = B+, \geq 83 = B, \geq 80 = B- \), etc.

Midterm Exams will concentrate on material covered since the previous exam, though students will be responsible for major concepts presented earlier. **The final exam will be comprehensive.** Exams will consist primarily of short answer and essay questions that are designed to evaluate your understanding of the material presented. Make-up exams will only be given under extreme circumstances for documented absences where prior arrangements have been made.

Class exercises will consist of a variety of in-class and out-of-class assignments. Some will be completed individually and others will be group projects. In general, students not present for in-class exercises will receive a 0. Late out-of-class assignments will not be accepted.

Lab exercises are intended to illustrate and reinforce some of the concepts discussed in class, as well as to review concepts that are best learned in the field. Labs will be conducted both inside and outside. Reports for each lab exercise will have a due date corresponding to a lecture period. Lab reports will be due at the **beginning** of that lecture. Late lab reports will be accepted for 48 hours, but will be assessed a 25% penalty. Lab reports will not be accepted after 48 hours. Organization and legibility count significantly in the grading of lab reports. All lab reports must be computer generated. When directed, lab reports must follow the current NRCM lab report format guidelines available online at [http://www.wcu.edu/WebFiles/WordDocs/NRCM_Lab_Report_Format_Aug_2008.doc](http://www.wcu.edu/WebFiles/WordDocs/NRCM_Lab_Report_Format_Aug_2008.doc)

The term project will consist of a team project to develop silvicultural prescriptions and a timber harvest plan for a tract of land in Jackson County. We will discuss the project in more detail later in the semester.

Attendance Policy: Students are responsible for all material presented during lecture and lab periods. Students who miss lecture must arrange to get lecture notes from other students.

Attendance during labs is required. Absences can cause severe disruptions since most labs cannot be made up, and many labs will require working in teams. Students who miss lab will be assigned a 0 for that lab exercise.
Academic dishonesty: Students, faculty, staff, and administrators of Western Carolina University (WCU) strive to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. While academic in scope, any violation of this policy is by nature, a violation of the Code of Student Conduct and will follow the same conduct process (see Article VII.1.a.). If the charge occurs close to the end of an academic semester or term or in the event of the reasonable need of either party for additional time to gather information timelines may be extended at the discretion of the Department of Student Community Ethics (DSCE).

Violations of the Academic Integrity Policy include:

- **Cheating** - Using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
- **Fabrication** - Creating and/or falsifying information or citation in any academic exercise.
- **Plagiarism** - Representing the words or ideas of someone else as one’s own in any academic exercise.
- **Facilitation** - Helping or attempting to help someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another to copy information during an examination)

**General:** I expect students to reflect a certain degree of professionalism in both their assignments and their conduct. Assignments that are deemed unprofessional can be penalized up to 25% of the value of the assignment. *All assignments must be neat, clearly legible, and well organized.* Professional student conduct will include being prepared for class and acting professionally during class periods and lab exercises.

*Please keep cell phones turned off and out of site during class. The use of all tobacco products is prohibited during class.*
Other University Resources

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The Mathematics Tutoring Center in 455 Stillwell provides drop-in tutoring for math and computer science. Students who need help with software, technology, or eBriefcase support should visit ClassTIPS on the ground floor of Hunter Library in the Technology Commons. Class TIPS provides support to students via one-on-one appointments, walk-ups, workshops, and online tutorials.

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<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Text Readings</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 19</td>
<td>Overview of silviculture and its role in natural resource conservation &amp; mgmt</td>
<td>Ch. 1</td>
<td>Lab overview</td>
</tr>
</tbody>
</table>
| Aug. 26 | Silvicultural systems
The forest stand
Forest stand dynamics
• Species tolerance
• Forest succession | Ch. 2                 | Dendro review/Forest stand type evaluation |
| Sept. 2 | The concept of site
• Heat, moisture, nutrients, and light | Ch. 9 p 234-255       | Dendro review/Forest stand type evaluation |
| Sept. 9 | • Forest productivity
• Silvics of forest trees | Ch. 4 p 69-79         | Stand development exercise               |
| Sept. 16| Forest Regeneration
• Regeneration ecology | Ch. 7                 | Dendro review/Forest stand type evaluation |
| Sept. 23| • Natural regeneration
• Artificial regeneration | Ch. 10                | Field trip – Bent Creek: Site relationships/chestnut reintroduction |
| Sept. 30| Site preparation
• Mechanical, chemical, and fire | Ch. 8                 | Open                                     |
| Oct. 7  | FALL BREAK                                                             |                       |                                          |
| Oct. 14 | Intermediate stand treatments
• Thinning | Ch. 3
Ch. 4 p 87-93 | Fire effects: quantify regeneration, stem mortality, and fuels |
| Oct. 21 | • Release
• Cleaning
• Liberation | Ch. 6                 | Final project site visit #1: Landowner goals, initial site characterization/stand type descriptions |
| Oct. 28 | Silvicultural Systems
• Plantations | Ch. 11
Ch. 12 | Field trip – NCFS: BMP’s |
| Nov. 4  | • Vegetatively regenerated stands
• Two-aged stands | Ch. 13
Ch. 14 | Wolf Creek Inventory #1: |
| Nov. 11 | • Uneven-aged stands
• Mixed species stands | Ch. 15
Ch. 16 | Wolf Creek Inventory #2: |
| Nov. 18 | Timber harvest planning
Positive Impact Forestry
• Forest protection | Ch. 19 | Final project site visit #2: Final site characterization |
| Nov. 25 | • Forest restoration
• Wildlife habitat | Ch. 20 | Field trip – USFS: Silviculture and harvesting |
| Dec. 2  | Open: Catch-up and review |                       | Final presentations                       |

†Supplemental reading resources will also be assigned
NRM-452
FOREST MANAGEMENT
Spring 2014

**Instructor:**
Peter Bates  
341 Stillwell  
227-3914  
bates@email.wcu.edu

**Office hours:**
1:00 to 2:00 Monday  
1:00 to 2:00 Thursday  
or by appointment

**Class meeting times:**
Lecture: T, R 8:00 to 9:15, ST 425  
Lab: T 1:00 to 2:50, ST 322

**Course Objectives:**
1. Introduce students to forest planning concepts.
2. Acquaint students with the principles and techniques of regulating forest growing stock within the context of sustainable management of natural resources.
3. Conduct and interpret economic analyses of simple forestry projects.
4. Become familiar with emerging issues in forest management including forest certification and managing forests for carbon sequestration.

**Math is used throughout this course, though level of math used is not above college algebra. If you have trouble understanding the math, be sure seek help from the Mathematics Tutoring Center (see below) so that you do not fall behind.**

**Required Text:**

**Required calculator:** A TI-30XIIS calculator is required for this course. These are available at the WCU bookstore, Walmart, Staples, and other outlets, as well as online. You must bring your calculator to class so you can practice working through problems.

**Evaluation:**
3 midterm exams (10% each)  
Final exam  
Class exercises  
Lab exercises

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 midterm exams</td>
<td>30%</td>
</tr>
<tr>
<td>Final exam</td>
<td>15%</td>
</tr>
<tr>
<td>Class exercises</td>
<td>35%</td>
</tr>
<tr>
<td>Lab exercises</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

For all practical purposes, the following final percentages will guarantee the corresponding grades:  ≥ 93=A, ≥ 88=A-, ≥ 85=B+, ≥ 81=B, and ≥ 78=B-, etc.

**Exams** will concentrate on material covered since the last exam, though students will be responsible for major concepts presented earlier. **The final exam will be comprehensive.** Make-up exams will only be given under extreme circumstances for documented absences accepted by the instructor.
Students will be responsible for materials covered during lectures and labs and for readings assigned in Bettinger, as well as, additional reading assignments and handouts assigned during the semester.

**Class exercises** are designed to aid students in keeping up with material throughout the semester. There will likely be one class exercise per week, which can be in the form of (i) short, in-class quizzes, (ii) homework assignments, or (iii) small group exercises.

All quizzes will be announced, and they will be given at the beginning of a class period. Students who are late for class will not be given extra time to complete the quiz.

Students who do not complete a class exercise by the due date will receive a 0 for that exercise. Make up exercises will not be given for any reason; however, I will drop the 2 lowest class exercise scores for each student.

**Lab exercises** are intended to illustrate and reinforce some of the concepts discussed in class. Most labs will consist of working through forest management problems and scenarios and will be conducted inside. Reports for each lab exercise will have a due date corresponding to a lecture period. Lab reports will be due at the beginning of that lecture. Late reports will be accepted until 48 hours after the due date, but will be assessed a 25% penalty. Reports will not be accepted after 48 hours. Keep in mind that turning in a lab report late because you are late for class does not negate the 25% penalty.

Students are required to use spreadsheets whenever possible in the completion of lab exercises and the preparation of lab reports. Many labs will require numerous calculations that can be completed easily using spreadsheets. When creating spreadsheets, be sure they are neat and well organized with columns and other data labeled so that I can understand what you have done. Be sure to format your spreadsheets so they print correctly. This means at the very least that column headings and data must line up, and that page breaks do not occur in random places. Also, you must provide enough information so that I can see what you did. Unless directed otherwise, each student must generate his or her own spreadsheets. Little is learned by submitting a spreadsheet largely created by someone else.

Organization and legibility count significantly in the grading of lab reports. All written answers must be typed on a word processor. Lab reports that are not prepared and presented professionally will be penalized (see below).

**Only hard copies of lab reports will be accepted, unless otherwise indicated**

**Attendance Policy:** Students are responsible for all material presented during lecture and lab periods. Students who miss lecture must arrange to get lecture notes from other students. Attendance during labs is required. Students who miss lab will receive a 0 for any work completed during the lab period. If they miss lab and choose to complete the lab report, they will be eligible to earn up to 50% of the points possible for that lab.

**Academic dishonesty:** Students, faculty, staff, and administrators of Western Carolina University (WCU) strive to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community. While academic in scope, any violation of this policy is by nature, a violation of the Code of Student Conduct and will follow the same conduct process (see Article VII.1.a.). If the charge occurs close to the end of an academic semester or term or in the event of the reasonable need of either party for additional
time to gather information timelines may be extended at the discretion of the Department of Student Community Ethics (DSCE).

Violations of the Academic Integrity Policy include:

**Cheating** - Using or attempting to use unauthorized materials, information, or study aids in any academic exercise.

**Fabrication** - Creating and/or falsifying information or citation in any academic exercise.

**Plagiarism** - Representing the words or ideas of someone else as one’s own in any academic exercise.

**Facilitation** - Helping or attempting to help someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another to copy information during an examination)

**General:** I expect students to reflect a certain degree of professionalism in both their assignments and their conduct. Assignments that are deemed unprofessional can be penalized up to 25% of the value of the assignment. **All assignments must be neat, clearly legible, well organized, and stapled.** Professional student conduct will include being prepared for class and acting professionally during class periods and lab exercises.

**Please keep cell phones turned off and out of site during class. The use of all tobacco products is prohibited during class.**

**Other University Resources**

The **Writing and Learning Commons (WaLC)**, located in BELK 207, provides free small-group course tutoring, one-on-one writing tutoring, and online writing and learning resources for all students. To schedule tutoring appointments, log in to TutorTrac from the WaLC homepage ([http://walc.wcu.edu/](http://walc.wcu.edu/)) or call 828-227-2274. All tutoring sessions take place in the WaLC or in designated classrooms on campus. Distance students and students taking classes at Biltmore Park are encouraged to use Smarthinking and WaLC’s online resources.

The **Mathematics Tutoring Center** in 455 Stillwell provides drop-in tutoring for math and computer science. Students who need help with software, technology, or eBriefcase support should visit ClassTIPS on the ground floor of Hunter Library in the Technology Commons. Class TIPS provides support to students via one-on-one appointments, walk-ups, workshops, and online tutorials.

**Accommodations for Students with Disabilities:** Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to Disability Services. All information is confidential. Please contact the Office of Disability Services for more information at (828) 227-3886 or lalexis@wcu.edu. You may also visit the office’s website: [http://disability.wcu.edu](http://disability.wcu.edu).
<table>
<thead>
<tr>
<th>Module starting date</th>
<th>Module</th>
<th>Topic areas</th>
<th>Reading (in Bettinger)</th>
</tr>
</thead>
</table>
| Jan. 13              | Introduction and review of forest concepts | Overview and scope of forest management  
Characterizing forest condition | Ch. 1                    |
| Jan. 20              | Sustainable forest management planning   | Natural resource sustainability  
Forest regulation and forest structure  
Normal forest model  
Allowable cut estimation  
Area control methods of forest regulation  
Volume control methods of forest regulation | Ch. 9, 10, 11               |
| Feb. 24              | Forest economics and the financial analysis of projects | Compound interest and the time value of money  
Measures of project worth  
Dealing with uncertainty  
Economics and project design  
Inflation  
Ecological economics | Ch.2 Parts III & IV (p 29-51) |
| Apr. 7               | Current paradigms in forest management   | Forest certification  
Carbon sequestration | Ch. 15                    |
| Apr. 28              | Wrap up and review                       |                                                                             |                          |
NRM 460 – Watershed Management

Spring 2015

Lecture: WF 9:05 – 9:55, Coulter 204
Lab: Thursday 2:30 – 4:20, Stillwell 143

"When we try to pick out anything by itself, we find it hitched to everything else in the universe."

— John Muir, from My First Summer in the Sierra

Professor: Dr. Charley Kelly  
Office: 336 Stillwell Building, cnkelly@email.wcu.edu, 828-227-3817

Office Hours: MWF 10:00-11:00 + anytime by appointment

I. Rationale/Purpose

The purpose of this course is to familiarize students with the complexity of factors influencing watershed management for the provision of an adequate and clean water supply.

II. Course Objectives:

By the end of this course, students will demonstrate that they:

- Understand the major pieces of the hydrologic cycle and ecosystem water budgets, and the tools, equipment, and data used to determine each portion of the water budget.

- Understand how land use and surface cover affects water availability and water quality.

- Understand the major parts of a Watershed Management plan and the community of people involved and the actions necessary in enacting such a plan.

- Understand the variety of problems and issues facing watershed managers and the associated Best Management Practices used to maintain water quality.

III. Course Resources


I will post additional resources to the course Blackboard page as the semester goes on.
IV. Faculty Expectations of Students/Course Policies

Statement on Accommodations for students with disabilities: Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities. Students who require disability services or reasonable accommodations must identify themselves as having a disability and provide current diagnostic documentation to Disability Services. All information is confidential. Please contact Disability Services for more information at (828) 227-2716 or 144 Killian Annex.

Statement on Academic Integrity (including plagiarism): Academic Honesty Policy Western Carolina University, as a community of scholarship, is also a community of honor. Faculty, staff, administrators, and students work together to achieve the highest standards of honesty and integrity. Academic dishonesty is a serious offense at Western Carolina University because it threatens the quality of scholarship and defrauds those who depend on knowledge and integrity. Academic dishonesty includes:

a. Cheating—Intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise.

b. Fabrication—Intentional falsification of information or citation in an academic exercise.

c. Plagiarism—Intentionally or knowingly representing the words or ideas of someone else as one's own in an academic exercise.

b. Facilitation of Academic Dishonesty—Intentionally or knowingly helping or attempting to help someone else to commit an act of academic dishonesty, such as knowingly allowing another to copy information during an examination or other academic exercise.

Instructors have the right to determine the appropriate sanction or sanctions for academic dishonesty within their courses up to and including a final grade of "F" in the course. Within 5 calendar days of the event the instructor will inform his/her department head, and the Associate Dean of the Graduate School when the student is a graduate student, in writing of the academic dishonesty charge and sanction.

Please refer to the student handbook regarding the policies and consequences of academic honesty at Western Carolina University.

- Statement on late and/or makeup assignments Each day that papers are late will result in a reduction of 15% per day. Papers that are more than three days late will automatically receive an F. Exams can only be made up if I am contacted at least by the day before the exam (before 4 PM) and the student has a legitimate excuse for missing the exam.

- Statement of expectations for attendance and participation I expect students to be in class and actively participating in discussions and activities. I may call on you to offer an answer, your opinion, or some insight. If you are doing a group or in-class exercise and someone is not participating in the work, please let me know so that we can make sure that everyone is doing their share to meet the stated learning goals.

- Statement of classroom behavior

** Turn off phones and laptops before entering the class.** - Anyone caught using a phone or any internet capable device during an exam or any in-class exercises without approval will receive a "0" for that exam grade.

- Statement of weather policy If the University closes for inclement weather, class will be canceled. If there is another reason to cancel class, then I will notify everyone by email.

Composition-Condition Marks. A student whose written work in any course fails to meet acceptable standards will be assigned a composition-condition (CC) mark by the instructor on the final grade report. All undergraduates who receive two CC grades prior to the semester in which they complete 110 hours at Western Carolina University are so notified by the registrar and are required to pass English 300 or
English 401 before they will be eligible for graduation. This course must be taken within two semesters of receiving the second CC and must be passed with a grade of C (2.0) or better.

**Accommodations for Students with Disabilities:** Western Carolina University is committed to providing equal educational opportunities for students with documented disabilities and/or medical conditions. Students who require reasonable accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to the Office of Disability Services. All information is confidential. Please contact the Office of Disability Services at (828) 227-3886 or come by Suite 135 Killian Annex for an appointment.

**Student Support Services** provides support to students who are either first-generation, low-income or those who have disclosed a disability with: academic advising, mentoring, one-on-one tutorial support, and workshops focused on career, financial aid and graduate school preparation. You may contact SSS at (828) 227-7127 or email sssprogram@wcu.edu for more information. SSS is located in the Killian Annex, room 138.

The [Writing and Learning Commons (WaLC)](http://walc.wcu.edu), located in BELK 207, provides free small-group course tutoring, one-on-one writing tutoring and academic skills consultations, and online writing and learning resources for all students. All tutoring sessions take place in the WaLC or in designated classrooms on campus. To schedule tutoring appointments, log in to TutorTrac from the WaLC homepage ([walc.wcu.edu](http://walc.wcu.edu)) or call 828-227-2274. Distance students and students taking classes at Biltmore Park are encouraged to use [Smarthinking](http://www.smarthinking.com) and the WaLC’s online resources. Students may also take advantage of writing tutoring offered at the Biltmore Park campus on certain days of the week; call 828-227-2274 or log in to TutorTrac and select “Biltmore Park Writing Tutoring” for availabilities.
VIII. Grading Procedures:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage of Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab exercises/Participation</td>
<td>30</td>
<td>Lab exercises and assignments.</td>
</tr>
<tr>
<td>Weekly quizzes</td>
<td>10</td>
<td>10 Weekly quizzes on lectures, labs, and readings</td>
</tr>
<tr>
<td>Friday Discussions/Activities</td>
<td>10</td>
<td>Participation in discussions from weekly readings</td>
</tr>
<tr>
<td>Group Presentation</td>
<td>5</td>
<td>Class Presentation on assigned topic</td>
</tr>
<tr>
<td>Group Project</td>
<td>10</td>
<td>Group writing and presentation assignment</td>
</tr>
<tr>
<td>Exams (2)</td>
<td>20</td>
<td>Two exams during the semester.</td>
</tr>
<tr>
<td>Final Examination</td>
<td>15</td>
<td>Final exam – comprehensive</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grade</th>
<th>Letter</th>
<th>Quality Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>99-100</td>
<td>A+</td>
<td>4.0</td>
</tr>
<tr>
<td>92-98</td>
<td>A</td>
<td>4.0</td>
</tr>
<tr>
<td>90-91</td>
<td>A-</td>
<td>3.67</td>
</tr>
<tr>
<td>88-89</td>
<td>B+</td>
<td>3.33</td>
</tr>
<tr>
<td>82-87</td>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>80-81</td>
<td>B-</td>
<td>2.33</td>
</tr>
<tr>
<td>78-79</td>
<td>C+</td>
<td>2.33</td>
</tr>
<tr>
<td>72-77</td>
<td>C</td>
<td>2.0</td>
</tr>
<tr>
<td>70-71</td>
<td>C-</td>
<td>1.67</td>
</tr>
<tr>
<td>68-69</td>
<td>D+</td>
<td>1.33</td>
</tr>
<tr>
<td>62-67</td>
<td>D</td>
<td>1.0</td>
</tr>
<tr>
<td>60-61</td>
<td>D-</td>
<td>0.67</td>
</tr>
<tr>
<td>60 or lower</td>
<td>F</td>
<td>0</td>
</tr>
</tbody>
</table>

Please note that a C- grade is less than satisfactory and may not meet particular program and/or course requirement.
IX. Tentative Course Schedule

*May change to accommodate guest presenters & student needs. **I reserve the right to add a Saturday field trip if schedules require amendments***

Please access online course material via Blackboard (BB) and follow all posted instructions to find readings and supplemental material necessary to complete the posted assignments.

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Thursday Lab Topic</th>
<th>Textbook Chapter Assigned</th>
<th>Wednesday Lecture Topic</th>
<th>Friday Discussion/ Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 14 – Jan 16</td>
<td>#1 Precipitation and Databases</td>
<td>Ch. 1 - 3</td>
<td>Course Overview – Why we care!</td>
<td>Precipitation Lecture</td>
</tr>
<tr>
<td>2</td>
<td>Jan. 21 – Jan. 23</td>
<td>#2 Evaporation</td>
<td>Ch. 4</td>
<td>Evaporation, Interception, Transpiration</td>
<td>Evap, Int., Transp. Discussion</td>
</tr>
<tr>
<td>3</td>
<td>Jan. 28 – Jan. 30</td>
<td>#3 Soil Moisture</td>
<td>Ch. 5</td>
<td>Throughfall, Infiltration, Runoff</td>
<td>Inf., Runoff Discussion</td>
</tr>
<tr>
<td>4</td>
<td>Feb. 4 – Feb. 6</td>
<td>#4 WCU Water Treatment Tour</td>
<td>Ch. 7</td>
<td>Groundwater and Recharge</td>
<td>Groundwater Discussion</td>
</tr>
<tr>
<td>5</td>
<td>Feb. 11 – Feb. 13</td>
<td>#5 Vegetation Type</td>
<td>Reading on BB</td>
<td>Vegetation Type and Water Yield</td>
<td>Veg. Discussion</td>
</tr>
<tr>
<td>6</td>
<td>Feb. 18 – Feb. 20</td>
<td>#6 Forest Density</td>
<td>Reading on BB</td>
<td>Forest Density and Water Yield</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Feb. 25 – Feb. 27</td>
<td>#7 USGS Water Data</td>
<td>Ch. 3</td>
<td>Snow Hydrology and Runoff</td>
<td>Watershed Management Plans</td>
</tr>
<tr>
<td>8</td>
<td>Mar. 4 – Mar. 6</td>
<td>#8 NRCS Watershed Tour</td>
<td>Ch. 14</td>
<td>Steps of a Watershed Management Plan</td>
<td>Steps of a Watershed Management Plan <strong>Student Presentations</strong></td>
</tr>
<tr>
<td>9</td>
<td>Mar. 9 – Mar. 13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Mar. 18 – Mar. 20</td>
<td>#9 Erosion and Sediment measures</td>
<td>Ch. 8 -9</td>
<td>Erosion and Sediment</td>
<td>Erosion and Sediment</td>
</tr>
<tr>
<td>11</td>
<td>Mar. 25 – Mar. 27</td>
<td>#10 Water Quality</td>
<td>Ch. 11</td>
<td>Water Quality</td>
<td></td>
</tr>
<tr>
<td>Week</td>
<td>Dates</td>
<td>Activity/Assignment</td>
<td>Ch.</td>
<td>Topic</td>
<td>Topic</td>
</tr>
<tr>
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<td>--------------------------------------------------</td>
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<td>------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>12</td>
<td>Apr. 1 – Apr. 3</td>
<td>------------------------ Easter Break – no classes ------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Apr. 8 – Apr. 10</td>
<td>#11 RiverLink Watershed Tour</td>
<td>Ch. 10</td>
<td>Stream Classification</td>
<td>Water Usage and Management</td>
</tr>
<tr>
<td>14</td>
<td>Apr. 15 – Apr. 17</td>
<td>#12 Stream Classification</td>
<td>Reading on BB</td>
<td>Watershed Issues and BMPs</td>
<td>Watershed Issues and BMPs</td>
</tr>
<tr>
<td>15</td>
<td>Apr. 22 – Apr. 24</td>
<td>#13 Work on Group Project</td>
<td></td>
<td>Watershed Issues and BMPs</td>
<td>Watershed Issues and BMPs</td>
</tr>
<tr>
<td>16</td>
<td>Apr. 29 – May 1</td>
<td>#14 Peer review of writing</td>
<td></td>
<td><strong>Student Presentations – Evaluating the effectiveness of BMPs</strong></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>May 4 – May 8</td>
<td>------------------------ Final Exam Week ------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fall 2014  Lecture: TR 11:00-12:15 (ST 354)  Lab: W 12:30-2:20 (ST 354)
Professor:  Dr. Diane Styers  
   ST 320, dmstyers@wcu.edu, 828-227-3819
Office Hours:  Wednesday 9:00-10:00am, by appointment, & when door is open

Course Description
Integrative, interdisciplinary investigation into ecosystem habitats. Biophysical interactions and extrapolation of community to landscape level analysis. 3 Lec/2 Lab. PREQ: NRM 344, GEOG 324, or permission of instructor. Credits: (4)

Course Goals and Objectives
- This course presents advanced remote sensing and geospatial analysis techniques to provide students with the skills to link ground data with geospatial data to answer landscape-level questions.
- It is designed to build on the fundamentals of remote sensing and Earth observation introduced in GEOG 324 Intro to Remote Sensing and the geospatial analysis concepts and methods learned in GEOG 221 Intro to Geospatial Analysis and NRM 344 Applied GIS. The course emphasizes a hands-on learning environment, with a primary focus on current information extraction techniques used by remote sensing professionals and researchers to support analyses of ecosystem structure and function. Ultimately, the course will empower students to delve more deeply into advanced topics in remote sensing and instill enthusiasm in this discipline to encourage future specialists.

By the end of this course, students will:
- expand knowledge of the remote sensing approach to environmental monitoring
- advance skills using software to extract information from both active and passive sensor data, and perform digital image processing and analysis for a broad range of applications
- learn remote sensing problem solving approach to complete a major Earth observation project

Course Materials
- Other supplemental readings will be provided by the professor or gathered by students.
- I will post all course materials to Blackboard. Please learn how to access and use this resource.

Faculty Expectations of Students/Course Policies
- Statement of expectations for attendance and participation
  All undergraduates are expected to attend and participate in all meetings of the courses in which they are enrolled; any absence is incurred at the student’s own risk. A student with more unexcused absences than the semester hours given for a course can expect the instructor to lower their final grade. Missing 10% or more of class meeting times (e.g. 3 TR classes or 1 lab class) constitutes a significant amount of materials and experience and is very difficult, if not impossible, to make up.
Statement of classroom behavior
Respect for all individuals and their opinions in the class. Put away cell phones upon entering the class. Please make all efforts to not be distracted by the computer in front of you during lectures.

Statement on late and/or makeup assignments
I expect all assignments to be handed in on time (unless you have a legitimate excuse). Assignments received within 48 hours of the due date/time will incur a 25% grade reduction. Assignments received after 48 hours of the due date/time will not be accepted.

Grading Procedures

<table>
<thead>
<tr>
<th>Assignment</th>
<th>% Grade</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes/Write-ups</td>
<td>20%</td>
<td>Designed to evaluate student’s understanding of project components and to ensure all students remain engaged in all aspects of project</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>25%</td>
<td>Research design, reporting, and statistics</td>
</tr>
<tr>
<td>Project Report 1</td>
<td>10%</td>
<td>Introduction &amp; part of Methodology section (develop objectives, design field data collection and database)</td>
</tr>
<tr>
<td>Project Report 2</td>
<td>15%</td>
<td>Revisions to Report 1 + expanded Methodology section + Results</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(field data collection, descriptive and inferential statistics)</td>
</tr>
<tr>
<td>Project Report 3</td>
<td>20%</td>
<td>Revisions to Report 2 + Discussion, Conclusions &amp; References</td>
</tr>
<tr>
<td>Final/Presentation</td>
<td>10%</td>
<td>Final presentation of project</td>
</tr>
<tr>
<td>Effort &amp; Attitude</td>
<td>Incl. in all</td>
<td>Class participation, effort, and attitude are important!</td>
</tr>
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</table>


*In order to pass the course (i.e., earn a grade of D- or higher), you must have a passing score (>60%) for your exam average and non-exam average (ex. labs & research).

Important Dates
Sep 1       Labor Day - No classes
Sep 16      Project Report 1 due
Oct 2-4     NRM 210 Field Trip - No class
Oct 9       Midterm Exam
Oct 13-17   Fall Break - No classes
Oct 20      Last day for "W"
Oct 28      Advising Day - No classes
Nov 13      Project Report 2 due
Nov 26-28   Thanksgiving - No classes
Dec 2       Project Report 3 due
Dec 9       Final Exam (poster presentations) - 12:00-2:30
Office of Disability Services:
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Academic Calendar includes dates for all breaks, university closures, final exams, etc. The academic calendar can be found at: http://www.wcu.edu/academics/campus-academic-resources/registrars-office/academic-calendar.asp

Weather Policy
If the University closes for inclement weather, class will be canceled. If there is another reason to cancel class, then I will notify everyone by email.

Online course evaluations will be open from November 9 - December 6.

Academic Integrity Policy
Western Carolina University, as a community of scholarship, is also a community of honor. Faculty, staff, administrators, and students work together to achieve the highest standards of honesty and integrity. Academic dishonesty is a serious offense at Western Carolina University because it threatens the quality of scholarship and defrauds those who depend on knowledge and integrity. Violations include:

Cheating – Intentionally using or attempting to use unauthorized materials, information, or study aids in any academic exercise.
Fabrication – Intentional falsification of information or citation in an academic exercise.
Plagiarism - Intentionally or knowingly representing the words or ideas of someone else as one’s own in an academic exercise.
Facilitation - Intentionally or knowingly helping or attempting to help someone else to commit an act of academic dishonesty, such as knowingly allowing another to copy information during an examination or other academic exercise.

WCU’s Full Statement on Academic Integrity (including plagiarism) can be found here: http://catalog.wcu.edu/content.php?catoid=20&navoid=346#honestypolicy
Instructor: Laura E. DeWald
Office: 317 Stillwell Building, (828) 227-2478, ldewald@wcu.edu

Office Hours: 9:30 – 10:30 T/Th, Noon-1:00 W, other times by appointment.

Course Description: Research in NRCM provides an opportunity for students to gain hands-on experience in developing, conducting, interpreting, and communicating directed research.

Course Objectives:
- Construct a testable hypothesis or clear descriptive research objective
- Conduct a search of the peer-reviewed literature pertinent to the topic you wish to research
- Write a research proposal, following standard guidelines
- Collect, analyze, and interpret data
- Write a manuscript following accepted scientific format and style that includes a broad interpretation of the significance of your research in light of the results found in the peer-reviewed literature.

Grading: Grading in this course is based on effort exhibited by the student during the semester which includes meeting deadlines set collaboratively between the student and instructor and on the quality of the end product of each of the goals under Course Objectives. Judging the quality of these products is subjective and for that reason the +/- grading scheme will not be used. “A” will be given for above average performance, “B” for average performance, “C” for acceptable, but below average, and “F” for unacceptable performance.

Expectation of work: As of July 1, 2011, the Code of Federal Regulations, Title 34, Section 600.2 (34 CFR 600.2), defines a credit hour as:
(1) One hour of classroom or direct faculty instruction and a minimum of two hours of out of class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or
(2) At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

Based on this definition, you should expect to invest a minimum of 6 hours of work per week for this 2 credit hour course per week for a total of 90 hours for the semester. No doubt there will be some weeks with near zero effort expended, but others with far more than 6 hours worked. You will be expected to maintain a log of the hours you work.

Policies associated with accommodations for students with disabilities, student support services, and academic integrity are posted on Blackboard.
Fall 2013 Meeting: W 1:30-2:30 (ST 323)  TA for RS Lab: W 2:30-4:20 (ST 354)

Professor: Diane M. Styers, PhD  ST 320, dmstyers@wcu.edu, 828-227-3819
Office Hours: Monday and Wednesday 8:00-8:30am, by appointment, & when door is open

I. Course Description
Interpretation and application of remotely sensed data on the Earth’s physical and cultural environments; major project required. PREQ: Geog 324 and permission of instructor. Credits: (3).

II. Course Aims and Learning Goals
- This course presents advanced remote sensing techniques used in research and applications. It is designed to build on the fundamentals of remote sensing and Earth observation introduced in Geog 324 Introduction to Remote Sensing. The course emphasizes a hands-on learning environment, with a primary focus on current information extraction processes used by professional remote sensing specialists and researchers to support environmental and cultural applications. Ultimately, the course will empower students to delve more deeply into advanced issues in remote sensing and instill enthusiasm in this subject area to encourage future specialists.

By the end of this course, students will:
- expand knowledge of the remote sensing approach to environmental monitoring
- advance skills using software to extract information from both active and passive sensor data, and perform digital image processing and analysis for a broad range of applications
- learn remote sensing problem solving approach to complete a major Earth observation project

III. Course Materials
- Supplementary readings will be provided as the semester continues.
IV. Faculty Expectations of Students/Course Policies

- **Statement of expectations for attendance and participation**
  I expect assistance with lab creation and weekly participation in lab. I also expect diligent work on the major research project so it can be implemented in the intro remote sensing class (GEOG 324) as scheduled. Lastly, I expect completion of other research related tasks that require advanced remote sensing skills. All of these assignments will ultimately enable you to expand your career opportunities by learning new geospatial skills that are in high demand in a variety of disciplines.

- **Online course evaluations for this course will be open from November 10 – December 6.**

V. Grading Procedures

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<tr>
<th>Assignment</th>
<th>% of Grade</th>
<th>Purpose</th>
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<tr>
<td>Lab TA</td>
<td>33%</td>
<td>Assisting with lab creation and implementation</td>
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<tr>
<td>Major RS research project</td>
<td>50%</td>
<td>Advanced knowledge and skills will be applied to develop a project</td>
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<td>Misc RS research tasks</td>
<td>17%</td>
<td>Several smaller remote sensing related research tasks will be completed</td>
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<td>Total</td>
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Letter grades will be assigned according to the following:

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<tr>
<th>Percentage Grade</th>
<th>Letter Assigned</th>
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<th>Quality Points</th>
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<td>99-100</td>
<td>A+</td>
<td>Excellent</td>
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<tr>
<td>92-98</td>
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<td>A-</td>
<td></td>
<td>3.67</td>
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<tr>
<td>88-89</td>
<td>B+</td>
<td></td>
<td>3.33</td>
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<tr>
<td>82-87</td>
<td>B</td>
<td>Good</td>
<td>3.0</td>
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<td>80-81</td>
<td>B-</td>
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<td>78-79</td>
<td>C+</td>
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<td>2.33</td>
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<tr>
<td>72-77</td>
<td>C</td>
<td>Satisfactory</td>
<td>2.0</td>
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<tr>
<td>70-71</td>
<td>C-</td>
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<td>1.67</td>
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<tr>
<td>62-67</td>
<td>D</td>
<td>Poor</td>
<td>1.0</td>
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<tr>
<td>60-61</td>
<td>D-</td>
<td></td>
<td>0.67</td>
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<tr>
<td>Below 60</td>
<td>F</td>
<td>Failure</td>
<td>0</td>
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VI. Tentative Course Schedule

- **Important Dates:**
  - Sep 16: ENVI Tutorials must be converted to labs by this date
  - Oct 2: RS Project must be developed, tested, and written-up by this date
  - Nov 8: Lidar labs must be completed by this date
  - Dec 6: All other tasks must be completed by this date
Class meeting times: The scheduled course meeting time is Friday from 12:30 until 5:00 in ST 322. The full
period will be used for field work, and when doing field work we will depart promptly at 12:30 from in front of
Stillwell. On days when we are inside, we will generally meet from 1:00 until 3:00.

Prescribed burns are only conducted when certain weather conditions occur. In our region, there are only about 12
days each spring when conditions are right. As such, the chances of burns occurring on Fridays are relatively
small, so class burns may occur on other days. You will not be expected to attend if you have other commitments.

Dynamic class schedule: Class scheduling will be fluid. Plans will sometimes change at the last minute due to
weather. Plan to meet every Friday, and be prepared for either a classroom session or the field. However, be ready
for last minute changes. These changes will be posted on Blackboard and emailed to the class.

Course Objectives: During this course students will explore the role and application of prescribed fire as a
management tool in the southern Appalachians. We will review the following concepts:
- Fire ecology and its role in the maintenance and restoration of forest ecosystems
- Prescribed fire design and implementation strategies
- Burn plan preparation
- Fire effects monitoring strategies

A key theme for the course will be to plan and design a prescribed burn on the Wolf Creek Preserve. That burn will
likely occur during the upcoming fall or spring. We will do the preliminary planning and layout and construct
some of the fire lines.

We will also have a number of guest speakers (fire managers and fire ecologists from varying organizations) who
will describe how they use fire in their organizations and present case studies from actual fires.

Finally, it is very much hoped that we can participate in one or more prescribed burns. A number of factors must
fall into place for that to happen, so this is not something we can guarantee. Only students with Type II wildland
firefighter training can actually participate on burns. However, we will do whatever we can to ensure that others
can be present and observe.

Required Text: There is no required text for this course; however some materials will be distributed to the class
using Blackboard.

Evaluation: This is an S/N (satisfactory/non-satisfactory) course. Students will receive an S provided they
participate fully in all class activities. These include:
- Attend all Friday class sessions
- Pay attention during class (no texting or cell phone use)
- Complete outside readings and assignments
- Actively engage in a positive manner
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Academic Calendar includes dates for all breaks, university closures, final exams, etc. The academic calendar can be found at: http://www.wcu.edu/academics/campus-academic-resources/registrars-office/academic-calendar.asp.
Goals and objectives: This NRCM capstone course where students integrate and apply skills and techniques learned throughout the NRCM curriculum. NRCM faculty have identified the following goals and objectives for this class:

- **Produce an integrated natural resource conservation and management plan for a specific land parcel.** Creating a management plan is a complex process that requires conducting a complete resource assessment, articulating clear management objectives, and creating a comprehensive strategy for achieving those objectives.

- **Work effectively as a member of a team.** This is often one of the most challenging aspects of this course, although it is also one of the most important. It is expected that each individual will (i) contribute to the overall effort, (ii) teach and inform their peers, and (iii) learn from their peers. We recognize that different students have different strengths and abilities, but it is each student’s responsibility to be proactive in terms of identifying ways that they can contribute effectively.

- **Integrate information from past coursework with additional information as needed to prepare a plan that is sustainable and fully achieves landowner objectives.** No amount of coursework can provide you with all of the information you need to write a management plan of this nature. You will need to add to your existing knowledge base in order to adequately address the myriad of issues that will arise during the course of this project.

- **Employ critical thinking and problem solving skills.** There is no formula or template for a perfect management plan. You will need to be creative and work through a variety of management options. Your thought process needs to be logical and well-reasoned.

- **Demonstrate effective oral and written communication skills.** Throughout the course of the semester, students will present material both orally and in writing to a variety of audiences. You must be able to present your ideas clearly and concisely.

**Project site:** The entire class will work together to develop an integrated resource management plan for the **Wolf Creek Watershed Natural Area** located on Cullowhee Mountain in Jackson County (see attached map). About 50% of the natural area is on national forest and the remainder is owned by WCU. The Biology Department oversees the property. For the purposes of this exercise the property “owner” will consist of representatives from the Biology and NRCM programs.

As indicated above, it is expected that the process of developing the management plan will be mostly student-driven, however some general guidelines are presented below:

- The class is expected to produce a comprehensive natural resource assessment for the property that considers soil, water, forest, and wildlife resources, in addition to, topography, roads, trails, and any other features. The assessment will be completed through a combination of field work, geospatial analyses, and review of information already available for the property.
- The class is expected to articulate the landowners’ broad management goals for the assigned property. The class will need to articulate a subset of specific management objectives that need to be achieved in order to satisfy the broader goals. A critical component will include
developing a series of metrics (things that can be quantified) that can be used to assess whether management goals are being met.

- The plan should focus on potential management scenarios that are consistent with the NRCM curriculum, and thus should consider typical natural resource management issues related to forest, soil, water, and wildlife resources.
- The plan should be feasible and should make good use of the site’s natural resources.
- It is expected that all team members will contribute to, and become familiar with, all components of the project. While students with different concentrations and backgrounds will likely provide more leadership in some areas, it is not acceptable for the class to divide this project among team members. Each individual must have a working knowledge of all components of the plan.
The NRM-440 class will develop recommendations that will aid in the development of a sustainable campus as discussed in WCU’s 2014 Campus Master Plan. The class will focus on areas where they can make useful contributions based on their disciplinary expertise as described below.

1. Characterize the land-use and land-cover for the WCU campus (main and west campuses), upper Long Branch watershed, and Wolf Creek preserve. The results should be presented using a series of maps and supporting text, tables, and figures that identify and describe different land-cover and land-use areas. You should include cultural features and infrastructure (buildings, roads, trails, etc.), and important educational resources, such as research sites, permanent plots, and potential outdoor classrooms.

2. Develop a riparian buffer plan along Cullowhee Creek that is consistent with USACE requests. This should include a description of the process required to place the Cullowhee Creek riparian zone into a conservation easement.

3. Develop riparian management recommendations for all perennial streams on the main and west campuses.

4. Develop recommendations for the preservation and conservation of existing forests and woodlands. This should include a description of all forest stands, and for each, an assessment of its ability to provide important ecosystem services. You should also identify potential threats (imminent or otherwise), and management strategies designed to reduce or mitigate those threats.

5. Identify areas where soil erosion is occurring, characterize the causes and environmental impacts of that erosion, and develop management recommendations for its reduction or elimination.

6. Identify areas where storm waters may be negatively impacting water quality or soil resources (poor drainage). Describe the causes and negative impacts, and develop management strategies to reduce or eliminate those problems. We do not expect you to consider things outside of your disciplinary expertise, such as civil or hydrologic engineering.

Notes:
- For all proposed management recommendations, we expect an estimate of costs (based on today’s prices), an implementation strategy, and a monitoring strategy to determine whether the treatments were successful, and will continue to be effective in the future.

- This is intended to be a fully integrated project. There is considerable overlap between many of the project components. All project reports should be seamless, as opposed to, separate reports for each of the 6 focus areas.
Appendix 3.5c: Recent Geology Senior Research Capstone Projects

Spring 2015
1:20 – 1:35 Senior Thesis Oral Presentation
RELATIONSHIP BETWEEN FRACTURE PATTERNS AND KM-SCALE STRUCTURES IN LOW- POROSITY ROCKS AS INFERRED FROM GEOMORPHOLOGY: IMPLICATIONS FOR GROUNDWATER PATTERNS IN FOLDED BEDROCK
Garic Williams, Geology, Faculty mentor: Cheryl Waters-Tormey

1:35 - 1:50 Senior Thesis Oral Presentation
MICROSTRUCTURAL EVIDENCE OF CYCLIC HYDRAULIC AND CATACLASTIC BRECCIATION IN A DILATIONAL FAULT ZONE, JERVIOS RANGE REGION, CENTRAL AUSTRALIA
Alicia Fowler, Geology, Faculty mentor: Cheryl Waters-Tormey

1:50 - 2:05 Senior Thesis Oral Presentation
ORGANIC RICH DEPOSITS FROM A SOUTHERN APPALACHIAN WETLAND INDICATE CARBON SEQUESTRATION POTENTIAL AND SITE STABILITY OVER THE LAST MILLENNIUM
Chris Dunlap, Geology, Faculty mentor: Ben Tanner

Fall 2015
3:00 – 3:25 Senior Research Seminar Oral Presentation
HYDROGEOMORPHIC INFLUENCES OF HYPORHEIC EXCHANGE IN A HEADWATER STREAM, CULLOWHEE, NC
Hans Beck, Senior, Geology
Reece Hudspeth, Senior, Geology
Michael Keever, Senior, Geology
Colton McClung, Senior, Secondary Science—Earth Science
Chelsea Stephens, Senior, Secondary Science—Earth Science
Faculty mentors: JP Gannon & Mark Lord

3:30-3:45 Senior Thesis Oral Presentation
PRIMARY SEDIMENTARY STRUCTURES OF CARBONATE EOLIANITES AS INDICATORS OF CLIMATE INSTABILITY DURING THE LAST INTERGLACIAL: ELEUTHERA ISLAND, BAHAMAS
Bailey Donovan, Senior, Geology, Faculty mentor: Blair Tormey

Spring 2014
3:05 – 3:20 Senior Thesis Oral Presentation
GROUND PENETRATING RADAR (GPR) SURVEY OF OTTO MOUND, OTTO, NORTH CAROLINA
Emily Pendergrass, Geology, Faculty mentor: Blair Tormey

3:25 - 3:40 Senior Thesis Oral Presentation
LEGACY LAND USE EFFECTS ON SOIL PHYSICAL PROPERTIES AND SLOPE HYDROLOGY, WESTERN CAROLINA HYDROLOGIC RESEARCH STATION, CULLOWHEE, NC

Kelly Ferri, Senior, Geology
Faculty mentors: Dave Kinner and Mark Lord

Fall 2013
3:00 – 3:30 Senior Research Seminar Oral Presentation

LATE PLEISTOCENE – HOLOCENE PALEOENVIRONMENTAL STUDY OF THREE SOUTHERN APPALACHIAN WETLANDS

Daniel Beall  Brittany Doll  Elizabeth Scholtz
Ashley Brittain  Adam Farris  Michael Williams
Aaron Chopp  Andrew Jensen  (Seniors, Geology)
Cullen Cogburn  David Johnson
Michele Coker  Sydny Merrill  Faculty: Ben Tanner

3:30-3:45 Senior Thesis Oral Presentation

EFFECTS OF HARD STABILIZATION ON A HUNTING ISLAND STATE PARK SALT MARSH, S.C.
Joel Bostic, Senior, Secondary Science—Earth Science, Faculty mentor: Ben Tanner
Geology Long-term course schedule

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* list does not includes regularly taught courses, such as special topics
### Appendix 3.6b: NRCM Tentative long term schedule of course offerings through Spring 2019

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**Required courses not taught by NRCM faculty that are typically not taught every semester (these are subject to error, check with home department for confirmation)**

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### Degrees Conferred

**Appendix 3.7: Time to degree for GNR**

**College of Arts and Sciences**  
Geosciences and Natural Resources

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### University Requirements

Liberal Studies  
Geology Major  
General Electives  

Total 120 hours

### Geology Requirements (64 hours)

#### Geology Core Courses (30)
- Geol 150 Methods in Geology (4)
- Geol 155 Historical Geology (4)
- Geol 250 Introduction to the Rock Forming Minerals (3)
- Geol 302 Geomorphology (4) or Geol 305 Soils and Hydrology (4)
- Geol 355 Petrology (4)
- Geol 371 Structural Geology (4)
- Geol 422 Sedimentation and Stratigraphy (4)
- Geol 495 Senior Research Seminar Capstone (3) or equivalent, approved research capstone (ex. 499 Senior Thesis)

#### Geology Concentrations:

All students must select a concentration, but the concentrations areas mostly serve as advising guides. All concentrations prepare students for employment in geology and entrance into graduate school.

- **Environmental Hydrology (34)**
  - Geol 405 Hydrogeology (4)
  - Chem 139 General Chemistry I (4)
  - Math 146 Precalculus (4)
  - Geol 471 Tectonics (3)
  - Math 146 Precalculus (4)
  - Math 153 Calculus I (4)
  - Math 270 Statistical Methods I (3)
  - Math 170 Applied Statistics (3)
  - Math 170 Applied Statistics (3)
- **Solid Earth (34)**
  - Geol 405 Hydrogeology (4)
  - Chem 139 General Chemistry I (4)
  - Math 146 Precalculus (4)
  - Geol 471 Tectonics (3)
  - Math 146 Precalculus (4)
  - Math 153 Calculus I (4)
  - Math 270 Statistical Methods I (3)
  - Math 170 Applied Statistics (3)
  - Math 170 Applied Statistics (3)
- **Interdisciplinary (34)**
  - Geol 405 Hydrogeology (4)
  - Chem 139 General Chemistry I (4)
  - Math 146 Precalculus (4)
  - Geol 471 Tectonics (3)
  - Math 146 Precalculus (4)
  - Math 153 Calculus I (4)
  - Math 270 Statistical Methods I (3)
  - Math 170 Applied Statistics (3)

#### REQUIRED
- **Chemistry**
  - Chem 139 General Chemistry I (4)
  - Chem 139 General Chemistry I (4)
  - Chem 139 General Chemistry I (4)
- **Physics**
  - Choose One (3-4):
    - 130 Intro Physics I
    - 130 Intro Physics I
    - 130 Intro Physics I
- **Advanced Chemistry or Physics**
  - Choose One (3-4):
    - Geol 405 Hydrogeology (4)
    - Chem 139 General Chemistry I (4)
    - Chem 461 Environmental Chemistry (3)
  - Choose One (3-4):
    - Geol 465 Environmental Geochemistry (3)
    - Chem 461 Environmental Chemistry (3)
    - Geol 450 Wetlands (3)
  - Choose One (3-4):
    - Chem 330 Aquatic Chemistry + Lab (3, 1)
    - Phys 231 General Physics II (4)
    - Phys 131 Introductory Physics II (4)
  - Choose One (3-4):
    - Chem 461 Environmental Chemistry (3)
    - Chem 232 Quantitative Chemistry (3)
    - Chem 232 Quantitative Chemistry (3)

#### Other Science
- Choose One (4):
  - Biol 140 Principles of Biology I
  - Biol 141 Principles of Biology II
  - 130 Intro Physics I
  - 230 General Physics I

#### MAJOR ELECTIVES
- 10-12 hours upper level math or science approved by advisor.
- Some possible electives:
  - Geol 410 Fluvial Geomorphology (3)
  - Geol 420 - ... Contaminated Rivers (3)
  - Geol 450 Wetlands (3)
- 11-13 hours upper level math or science approved by advisor.
- 17-19 hours upper level math or science approved by advisor. Electives must include at least 9 hours outside of geology.

---

*Some requirements may not match the current catalog because of in-progress curricular changes*

**Geology Concentrations:** All students must select a concentration, but the concentrations areas mostly serve as advising guides. All concentrations prepare students for employment in geology and entrance into graduate school.
NRCE eight semester planning guide for program requirements – Soil and Water Resources concentration

Students should develop their schedules based on the guidelines presented below. Highest priority should be given to scheduling the courses in red during the semester indicated to satisfy prerequisites and sequential learning objectives. There is more flexibility for courses in green, though they also should be taken during one of the semesters indicated. **STUDENTS MUST ALSO COMPLETE LIBERAL STUDIES REQUIREMENTS AND ACHIEVE 120 CREDIT HOURS IN ORDER TO GRADUATE.**

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NRCM eight semester planning guide for program requirements – Forest resources concentration

Students should develop their schedules based on the guidelines presented below. Highest priority should be given to scheduling the courses in red during the semester indicated to satisfy prerequisites and sequential learning objectives. There is more flexibility for courses in green, though they also should be taken during one of the semesters indicated. **STUDENTS MUST ALSO COMPLETE LIBERAL STUDIES REQUIREMENTS AND ACHIEVE 120 CREDIT HOURS IN ORDER TO GRADUATE.**

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- **Courses in red** are highest priority for scheduling.
- **Courses in green** offer more flexibility but should be taken during one of the indicated semesters.
Appendix 4: Faculty Resources

4.1: GNR Faculty CVs ....................................................................................................................... 1
4.2: GNR Grant Awards Active or Awarded Since 2008 .............................................................. 141
4.3: GNR Faculty Distributions 2009-2014 (from Institutional Research) ............................... 145
4.4: GNR Course Offerings, Sections, and SCHs ......................................................................... 146
### Appendix 4.1: GNR Faculty CV’s

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<td>Krenz, Robert J.</td>
<td>NRCM</td>
<td>83</td>
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<tr>
<td>Lord, Mark L.</td>
<td>Geology</td>
<td>89</td>
</tr>
<tr>
<td>Miller, Jerry R.</td>
<td>Geology</td>
<td>107</td>
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<tr>
<td>Stafford, Emily S.</td>
<td>Geology</td>
<td>121</td>
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<td>Styers, Diane M.</td>
<td>NRCM</td>
<td>124</td>
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<tr>
<td>Tanner, Benjamin R.</td>
<td>Geology</td>
<td>131</td>
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<tr>
<td>Waters-Tormey, Cheryl</td>
<td>Geology</td>
<td>138</td>
</tr>
</tbody>
</table>
Education
Ph.D. Forestry (minor Soil Science), 1990. University of Minnesota
Dissertation Title: *Quaking aspen regeneration in northern Minnesota: Effects of harvest season and site conditions.*
M.S. Soil Science, 1981. Montana State University
Thesis Title: *Compaction by logging equipment of six soils in northwestern Montana as affected by soil water content, equipment type and number of passes.*
B.S. (with honors) Forestry, 1977. University of Montana

Professional Experience
July 2013 to present: Associate Professor of Natural Resource Conservation & Management and Natural Resources Program Director, Department of Geosciences and Natural Resources, Western Carolina University
July 2011 to June 2013: Interim Department Head and Associate Professor of Natural Resource Conservation & Management, Department of Geosciences and Natural Resources, Western Carolina University
1993 to 2011. Assistant (1993-2000) and Associate Professor (2000-2011) of Natural Resource Conservation and Management, Department of Geosciences and Natural Resources, Western Carolina University, Cullowhee, North Carolina. (Program Director beginning Fall 2006), 2006 to present. Adjunct Associate Professor, Department of Forestry and Natural Resources, Clemson University, Clemson, South Carolina.
1994 (summer). Visiting Professor, Department of Soil Science, University of Minnesota, St. Paul.
September 1990 to August 1993. Post-doctoral Associate, Department of Soil Science, University of Minnesota.
1987 to 1990. Graduate Research Assistant, Department of Forest Resources, University of Minnesota.
1981 to 1987. Soil Scientist, Minnesota Agricultural Experiment Station, Beltrami County Soil Survey, Bemidji.
1978 to 1981. Graduate Research Assistant, Plant and Soil Science Department, Montana State University, Bozeman.
1977 to 1978. Range Technician, USDI Bureau of Land Management, Dillon, MT.

Teaching Philosophy
Natural resource management is an interdisciplinary and highly applied field. Managing natural resources is often challenging due to the complexity of natural systems coupled with the reality that science behind most management decisions is both imperfect and incomplete. I try to provide students with a variety of learning experiences that will enable them to be successful – both as resource managers and in life. This requires students to gain practice and become proficient in a number of areas, including understanding and applying core principles, developing good problem solving skills, thinking critically, effectively working as part of a team, and communicating well.

Courses taught (Courses in bold taught in the past 5 years)
NRM-210 Methods in Natural Resources Management (every fall)
NRM-420 Soil Genesis and Classification (spring 2010, 2012)
NRM-440 Integrated Resource Management (every spring)
NRM-452 Forest Management (spring 2012, 2014)
NRM-483 Applications in Forest Management (spring 2012, 2015)

**Peer-reviewed Publications**

Professional Papers (not peer reviewed)
**Professional Presentations and Abstracts**


Bates, P.C., M. Forbis, and J. Abrams. Prescribed fire effects on oak regeneration in the southern Appalachians: First year results. Poster presentation Society of American Foresters National Convention. September 13-17, 2001. Denver, Colorado. (Note: poster was accepted but the convention was canceled due to the events of September 11)

Student-mentored presentations, papers, and abstracts (student names in bold)
Holland, Amber L., Michael W. McCloy, Brent C. Mills, Ben A. Melton, and Paul E. Pittman.


Abrams, Jamie, Jonathan Creason, and Matt Cave. Response of planted black cherry to natural competition in a western North Carolina clearcut. Poster presentation Society of American Foresters National Convention, Denver, Colorado. September 13-17, 2001. (Note: the convention was canceled due to the events of September 11)

Cave, Matt, Michael Forbis, and Jonathan Creason. Growth and grade response to thinning in a mixed oak stand in western North Carolina. Poster presentation Society of American Foresters National Convention, Denver, Colorado. September 13-17, 2001. (Note: the convention was canceled due to the events of September 11)


Funded Proposals
2009. Bates, P.C. Characterization of preburn stand conditions at Cold Mountain (Haywood County, NC), Bluff Mountain (Ashe County, NC), and Yellow Creek (Graham County, NC). Source: The Nature Conservancy. Amount funded: $6000. Funding awarded to Forest Stewards, Inc.
**Amount Funded:** $10,087.

**Amount funded:** $2500.

**Amount funded:** $5324.

**Amount funded:** $24,000. *Funding awarded to Forest Stewards, Inc.*

**Amount requested:** $35,000  
**Amount Funded:** $35,000.

**Amount requested:** $50,000.  
**Amount Funded:** $50,000.

**Amount requested:** $12,700.  
**Amount Funded:** $12,700.

**Amount requested:** $3000.  
**Amount Funded:** $3000.

**Amount Requested:** $14,500.  
**Amount Funded:** $14,500.

**Amount requested:** $5000.  
**Amount funded:** $5000.

**Amount funded:** $1.5 million.

**Amount Funded:** $3600.

**Amount funded:** $7000.

**Amount funded:** $3000.

**Amount funded:** $10,000.


1991-1992 University of Minnesota
   FR 5140 Silviculture in North American Forest Types
   FR 5126 Silviculture: Soil-Site Relationships.

1997 (summer) NC Teaching Fellows Summer Enrichment Program: Man and the Environment


**Graduate Committee Membership (1Director)**

**Scott Abla,** MS Biology, 2014. Western Carolina University
   dNbr Imagery and xeric pine-oak forest stand characteristics for fires of different severity in Great Smoky Mountains National Park.

**Adam Becker,** MS Candidate, Department of Forestry and Natural Resources, Clemson University.
   (Adam passed away in 2009)

1**D. Shannon Rabby,** MS Biology, 2005. Western Carolina University
   Small mammal community dynamics across a chronosequence of southern Appalachian mesic hardwood forests

**Lisa Mazzarelli,** MS Biology. 2002. Western Carolina University
   Ground-nesting bird response to land use history in mesic forests of the southern Blue Ridge Mountains

**Grace E.W. Bockoven,** MS Biology. 1999. Western Carolina University
   Peregrine falcon (*Falco peregrinus*) restoration in the southern Appalachians

**Diana Ohongo,** MS Chemistry. 1997. Western Carolina University
   Highly oriented pyrolytic graphite as a platform for atomic absorption spectrometry for the determination of lead, copper, and aluminum
**Offices Held**
President, Board of Directors, Forest Stewards, Inc. 2008-present
Board of Trustees, Balsam Mountain Trust. 2009-present
Board of Directors, Southern Forests and Communities. 2011-2013
Board of Directors, Southern Forestry Foundation. 2002-2009
Chair, Nantahala Chapter of the Society of American Foresters. Fall 1996 - Fall 1998.
President, Xi Sigma Pi, University of Minnesota, 1988-1990.
Land management committee, Balsam Mountain Trust. 2005 – present
Natural Resources Program Advisory Committee member. Haywood Community College. 2002 - present.

**Professional and honorary societies**
Xi Sigma Pi
Phi Kappa Phi
Society of American Foresters
North Carolina Registered Forester #1292
Fire Learning Network
North Carolina Prescribed Fire Council

**Honors and awards**
WCU Chancellor’s Meritorious Award for Engaged Teaching for 2008-2009
Special recognition for service to the region by the Governing Board of the Southwestern Commission and the Executive Committee of the Land Trust for the Little Tennessee 2007
Boise Cascade Corporation Graduate Fellowship, 1989-1990.
USDA Forest Service Certificate of Merit (plus cash award), 1978.

**Professional Consulting**
1998 - present. NC Registered Forester providing consulting services to private landowners in western North Carolina.
1995 and 1996 (summer). Forest land classification using digital elevation models in the central Appalachians. Co-investigator: Dr. JC Bell, Department of Soil, Water and Climate, University of Minnesota. Client: WestVaco Corporation
**Professional Service Activities**

**Papers and presentations**


2004. GIS for the sciences: The Little Tennessee sustainable forestry project. Presentation to the WCU community, Western Carolina University. February 26.


Ronald W. Davis  
Department of Geosciences and Natural Resource Management  
Western Carolina University  
Cullowhee, NC 28723

EDUCATION

Ph.D., Natural Resources and Environmental Sciences, University of Illinois, December 2005.  
Dissertation: A GIS-Based Habitat Model Predicting Nutritional Condition of Free-Ranging  
Elk in the Pacific Northwest.

Master of Arts, Physical Geography, Indiana State University, December, 1999.  
Thesis: Black-Tailed Deer Habitat Changes in a Portion of the Mount St. Helens Blast Zone.

Bachelor of Science, Life Sciences and Science Education, Indiana State University, May, 1991.

PROFESSIONAL EXPERIENCE

Western Carolina University August 2006–present. Associate Professor, Department of  
Geosciences and Natural Resource Management. Teaching: Geographic Information Systems,  
and natural resource evaluation, geospatial modeling.

University of Illinois/U.S. Army Civil Engineering Research Laboratory. Research Contractor:  
July 2005–December 2006. Red Cockaded Woodpecker habitat based population modeling. Duties:  
1) Developed and evaluated data sets that will be used in Geographic Information System analysis,  
including an on-site evaluation of data collection; (2) assisted in developing the population model for  
the Red Cockaded Woodpecker demographic analysis; and (3) served as a member of the research  
team responsible for project development and reporting.

SEROS (Science Education and Research Opportunities for Students—a 501c3 organization) April  
2004–June 2006, Acting Director: Coordinator and co-author for research and science education  
initiatives and funding proposals.

National Council for Air and Stream Improvement, La Grande Oregon, Summer 2003, GIS  
Consultant/Contract Employee: Developed a GIS-based habitat evaluation model for elk as part of  
the re-licensing effort for the Baker Lake Reservoir in the Mt. Baker-Snoqualmie National Forest.  
Cooperated directly with U.S. Forest Service personnel and an environmental consulting firm (EDAW)  
to compile GIS layers and design a model to meet habitat mitigation needs.

Technician: Radio telemetry data collection assessing urban deer habitat use near Vancouver,  
Washington.

Ivy Tech State College, Indianapolis, Indiana Spring 2005, Science Department Adjunct Faculty  
Instructor: Undergraduate World Regional Geography.
University of Illinois, Urbana, IL Spring 2004. Natural Resources and Environmental Sciences Graduate Instructor: Developed and taught and undergraduate course entitled “Wildlife Habitat Ecology and Management”


SCHOLARSHIP

Peer Reviewed Research Papers


Proceedings, Abstracts and Other Scientific Works


International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences.


PROFESSIONAL PRESENTATIONS
(Student presenters underlined)


Donaldson, W. and R. Davis. 2010a The effects of roads and traffic intensity on movement patterns of the eastern box turtle. State of North Carolina Undergraduate Research and Creativity Symposium, Wilmington, NC.

Donaldson, W. and R. Davis. 2010b. The effects of roads and traffic intensity on movement patterns of the eastern box turtle in Western NC. Association of Southeastern Biologists, Asheville, NC.


**EXTERNAL FUNDING**


Davis, R. W., P. Foley, and B. Byrd. 2012. Faculty Research and Creative Activities Award: Biodiversity Inventories and Forest Fragmentation: Can Mosquitoes Suck Out The Data for Us? Western Carolina University Graduate School. 5000.00 Funded 2012.


**PROFESSIONAL ASSOCIATIONS**

International Spatial Accuracy Research Association

National Chapter of The Wildlife Society (past chair of the Environmental Education Award Committee).

NC Chapter of The Wildlife Society (Current Member of NCTWS Education and Outreach Committee)

Society for the Study of Amphibians and Reptiles
LAURA E. DeWALD
317 Stillwell  828-227-2478  ldewald@wcu.edu

EDUCATION

Ph.D., 1986, Forestry (genetics/tree physiology), Virginia Tech., Blacksburg, VA
  Dissertation: Changes in Loblolly Pine Seedling Root Growth Potential: Over Time, During Cold Storage, and Among Half-Sib Families
M.S., 1982, Forest Resources (genetics), Pennsylvania State University, University Park, PA
B.S., 1980, Forestry, Michigan Technological University, Houghton, MI

PROFESSIONAL EXPERIENCE

August 2004 – Present: Western Carolina University, Cullowhee, NC
  Current position: Graduate Faculty, Professor and Director, Environmental Science Program
  Interdisciplinary appointment (Environmental Science Program, Natural Resources Management Program [Geoscience & Natural Resources Dept.], and Biology Department)
August 1994 – July 2004: School of Forestry, Northern Arizona University, Flagstaff, AZ
  July 2003 – July 2004: Associate Dean, Associate Professor, and Program Director, AZ Bureau Forestry and USDA McIntire-Stennis Funds
  July 1989 – August 1992: Forest Biology Faculty and Forest Supervisor
  Post-Doctoral Research Associate: Nitrogen and seedling carbon allocation in fast- and slow-growing half-sib families of slash pine
  Post-Doctoral Research Associate: Effects of soil aluminum on nutrition, water relations and growth on red and white spruce, and northern red oak seedlings
  Research Assistant: Loblolly pine root growth potential, Appomattox Court House National Historical Park Forest Management Plan, Fraser fir genetics and physiology studies
September 1980 - May 1982: School Forest Resources, Penn State Univ., University Park, PA
  Research Assistant: graduate research and teaching

TEACHING PHILOSOPHY

The courses I teach have an applied focus, are interdisciplinary, they range across academic levels (course levels 100 through 600) and across class types (seminars, lectures, laboratories, liberal studies, independent studies, and undergraduate and graduate research) including web-based on-line courses and non-majors courses. Regardless of course type or level, my teaching philosophy is strongly student-centered; I strive to actively engage students in their own learning to solve problems and to develop critical thinking, reading and writing skills in different content areas. My exams require students to use these skills to address real-world scenarios. My writing assignments (essays, laboratory reports, research
papers) also require students to address real-world environmental problems using the content and concepts they have been learning in class. Finally, I use learning outcomes-based assessment in my courses to provide feedback regarding student understanding of content and concepts which allows me to modify content, methods and assignments to improve the learning experience for both myself and my students. My philosophy regarding graduate and undergraduate collaborative research projects is to mentor and facilitate development of students from being “participants” to “co-pilots” to being able to “pilot” their own research. I reward students who achieve “pilot” status with senior authorship on publications and presentations.

COURSES TAUGHT (last 5 years, * = new course developed at WCU)

**Undergraduate:**
*Ecological Restoration (BIOL438), *Conservation Biology (BIOL441), Introduction to Natural Resource Conservation (NRM140, face-to-face and online sections), *Introduction and Approaches to Environmental Science (ES150), Forest Ecology (NRM351), Dendrology (BIOL254)

**Graduate:**
*Ecological Restoration (BIOL538), *Conservation Biology (BIOL541), *Ecological Genetics (BIOL639)

RESEARCH EXPERIENCE – PUBLICATIONS

a) Peer-Reviewed Journals

(publications in italic are teaching related, underlined author = student)


DeWald, LE and MF Mahalovich. 1997. The role of forest genetics in managing ecosystems. Journal of Forestry 95:12-16


DeWald, LE and KC Steiner. 1986. Phenology, height increment and cold tolerance of Alnus glutinosa populations in a common environment. Silvae Genetica 35:205-211
b) Books and Book Chapters


c) Other Publications (not peer-reviewed)


DeWald, LE and J F Falcone. 2007. Effects of hemlock woolly adelgid (Adelges tsugae) and an insecticide treatment on food availability for the black-throated green warbler (Dendroica virens) in GSM National Park. Final Report


DeWald, LE 2004. Strategic Plan for the School of Forestry, Northern Arizona University


DeWald, LE and AE Springer. 2000. Incorporating ecological and non-ecological concerns in the restoration of a high-elevation Bebb willow riparian community. USFS RMR-GTR


RESEARCH EXPERIENCE - Research Grant History (teaching grants in italics)


2) Habitat use by elk in Great Smoky Mountains National Park. Rocky Mountain Elk Foundation. 2012-2013 $11,378

3) Landscape-scale thresholds of early successional habitat: Reconciling biodiversity, public perception and timber yield in managed forests. Co-PI with S. Loeb (USFS Research), B. Collins and J. Hyman (WCU Biology), E. Baldwin and T. Cushing (Clemson), and D. Rankin (USFS Nantahala NF). USDA-AFRI 2012-2017. $449,148
6) Sciences: Seeking clear indicators for effective new changes in educating students. Co-PI Kim Elliott (College of Education and Allied Professions, WCU), North Carolina State NC QUEST – continuation project. 2007-2008, $125,000
7) LI-COR Purchase. Collaborator with Beverly Collins (Dept. Biology, WCU). LI-COR Environmental Education Fund (LEEF), LI-COR Biosciences, Lincoln NE. 2007 $25,000
9) Production and distribution of native medicinal plants in western North Carolina. Institute for the Economy and Future, Western Carolina University. 2006. $3000
14) Genetic structure within and among four grasses native to ponderosa pine ecosystems. USDA McIntire-Stennis/AZ Bureau Forestry. NAU 2002-2006, $76,900
15) Genetic structure within and among four grasses native to ponderosa pine ecosystems. Northern Arizona University Intramural Grants Program. NAU 2002-2003, $11,700
21) Trees from the world’s continents at Northern Arizona University. AZ Urban and Community Forestry, Community Challenge Grant. AZ State Land Dept., Forestry Division. NAU 1999-2000, $10,000.

26) Response of a Bebb willow-mixed gramminoid community to riparian habitat restoration. USDA McIntire-Stennis/AZ Bureau Forestry. NAU 1996-1998, $28,000


31) Genetic variation among populations of Douglas-fir on the Navajo Reservation and implications for regeneration management. USDA McIntire-Stennis/AZ Bureau Forestry. NAU 1995-1999, $56,000


33) Morphological and genetic variation among and within Arizona bugbane populations. Northern Arizona University, Intramural Grants Program. NAU 1994-1995, $83,000

**RESEARCH EXPERIENCE - Professional Presentations – Past 10 years only**

*(presentations in italic are related to education and/or teaching)(underlined author = student)*

Montgomery, Ashley and Laura E. DeWald. 2014. *(Invited)* Predicting suitable habitat for *Isotria medeoloides* (Pursh) in the southern Appalachian region. US Forest Service, Seminar Series, Southeastern Regional Office, Atlanta, GA November 13


Montgomery, Ashley and Laura E. DeWald. 2014. Predicting suitable habitat of the Federally threatened species *Isotria medeoloides* (Pursh) in the southern Appalachian region using the Maxent Model approach. 75th Annual Meeting of the Association of Southeastern Biologists, Spartanburg, SC April 2-5

Abla, Scott and Laura E. DeWald. 2014. Multi-severity fire effects in xeric oak-pine communities following small fires in the Great Smoky Mountains National Park. 75th Annual Meeting of the Association of Southeastern Biologists, Spartanburg, SC April 2-5


Hillard, EM and LE DeWald. 2013. (Poster) Habitat use by elk (*Cervus elaphus*) in Great Smoky Mountains National Park. College of Agricultural Sciences Fall Festival, Southern Illinois University, Carbondale, IL Oct. 18


Collins, B and LE DeWald. 2012. Investigating near-ground climate in contrasting sites. Poster Presentation. 4th Annual Faculty Scholarship Celebration, Western Carolina University. Feb. 16

Torgerson, J and LE DeWald. 2012. Genetic variation in Hydrastis canadensis populations in western North Carolina. 73rd Annual meeting of the Association of Southeastern Biologists Univ. Georgia, Athens GA April 4-7

Dixon, G and LE DeWald. 2012. Clonal dynamics and decline of trembling aspen (Populus tremuloides Michx.) in the Kaibab National Forest, Arizona. 73rd Annual meeting of the Association of Southeastern Biologists Univ. Georgia, Athens GA April 4-7

DeWald, LE. 2012. Getting students to read and think: Using popular literature in an introductory Natural Resources course. 9th Biennial Conference on University Education in Natural Resources. March 22-24, Colorado State Univ. Fort Collins, CO


DeWald, LE. 2011. (Invited) Augmenting natural medicinal plant populations with local or non-local plants: The good, bad and ugly. Southern Appalachian Man and the Biosphere Conference, Nov. 15-17, Asheville, NC

Hoffman, Keith and LE DeWald. 2010. Patterns of recruitment and culm morphology in Arundinaria gigantea. Assoc. SE Biologists Annual Meeting, April 7-10, Asheville, NC

DeWald, LE, T Clark and Keith Blatner. 2010. Standing our ground: The meaning of SAF accreditation. 8th Biennial Conf. on University Education in Natural Resources. March 25-27, Blacksburg, VA


Falcone, J, and LE DeWald. 2009. Comparisons of arthropod and avian communities in insecticide...
treated and untreated hemlock stands. GSM National Park Science Colloquium, Gatlinburg, TN March 20, 2009

Extine, J, LE DeWald and R Davis. 2008. Ability of golf courses to provide landscape connectivity in Western North Carolina. 6th Southern Forestry and Natural Resources GIS Conference, Orlando FL March 24-26


DeWald, LE and P Bates. 2008. Field experience for students also provides critical assistance for family landowners in the southern Appalachians. Presentation at the 7th Biennial Conference, University Education in Natural Resources, March 13-15, Corvallis, OR


Extine, J and LE DeWald. 2007. Golf courses and their ability to provide landscape connectivity in Western North Carolina. Assoc. SE Biologists Annual Meeting, Columbia, SC, April 18-21


DeWald, LE. 2006 (Invited). Using genetics to compare population structure and movement of puma. Paul Burton Seminar Series, Western Carolina University, Cullowhee, NC 11/10/06


DeWald, LE, D McGinty, C Carter and A Dewanti. 2006. Rubrics: are they worth the time it takes to develop them? 2nd Annual Scholarship of Teaching and Learning Faire. Western Carolina University, Cullowhee, NC, February 23, 2006


**46 addition professional presentations during years 1999-2004 of which 12 were invited and 3 were teaching related. Titles available on request

TEACHING EXPERIENCE

**a) Teaching Employment**

August 2004 – Present: Western Carolina University, Cullowhee, NC

August 1994 – July 2004: School of Forestry, Northern Arizona University, Flagstaff, AZ


September 1982 - June 1986: Dept. Forestry, Virginia Tech, Blacksburg, VA. (part time)

September 1980-June 1982: Dept. Forest Resources, Penn State Univ. (part time)

**b) Courses Taught Prior to Western Carolina University**

**Northern Arizona University**


**Green River Community College**

Appendix 4: Page 26 of 151
DeWald – vitae page 10

Warren Wilson College

**Undergraduate:** *Forest Biology, Genetics, Biochemistry, General Biology (Botany), General Biology (Ecology), Natural Resource Conservation, Environmental Policy, Soil Science, Geology, *Summer Forestry: Silviculture, Measurement and Surveying, Forest Management

Virginia Polytechnic Institute and State University

**Undergraduate:** Dendrology laboratory, Silviculture laboratory, Forest Ecology laboratory

### Graduate Students Mentored

<table>
<thead>
<tr>
<th>Name</th>
<th>Degree</th>
<th>Thesis/Dissertation Project</th>
<th>Graduation</th>
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<tr>
<td><strong>Western Carolina University – Biology Department</strong></td>
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<tr>
<td>A. Hawk</td>
<td>MS</td>
<td>Comparing Maxent and DOMAIN habitat modeling of the rare <em>Trillium simile</em></td>
<td>Ongoing</td>
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<tr>
<td>T. Green</td>
<td>MS</td>
<td>Early succession habitat and canopy opening size in the Nantahala NF</td>
<td>Ongoing</td>
</tr>
<tr>
<td>S. Binninger</td>
<td>MS</td>
<td>Fire Severity and herbaceous plant Community Responses GSMNP</td>
<td>Ongoing</td>
</tr>
<tr>
<td>K. Bennett</td>
<td>MS</td>
<td>Phenotypic and genetic variation in eastern NC fox squirrel populations</td>
<td>Ongoing</td>
</tr>
<tr>
<td>A. Montgomery</td>
<td>MS</td>
<td>Using Maxent to predict <em>Isotria medeoloides</em> habitat in the S. Apps.</td>
<td>Dec. 2014</td>
</tr>
<tr>
<td>S. Abla</td>
<td>MS</td>
<td>Fire Severity and Woody Plant Community Responses GSMNP</td>
<td>Dec. 2014</td>
</tr>
<tr>
<td>L. Hillard</td>
<td>MS</td>
<td>Elk habitat use in Great Smoky Mountains National Park</td>
<td>Aug. 2013</td>
</tr>
<tr>
<td>A. Pallette</td>
<td>MS</td>
<td>Germination ecology of <em>Helonias bullata</em> (co-advised with B. Collins)</td>
<td>May 2013</td>
</tr>
<tr>
<td>G. Dixon</td>
<td>MS</td>
<td>Genetic diversity and decline in <em>Populus tremuloides</em> stands in Arizona</td>
<td>Aug. 2012</td>
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<tr>
<td>N. Shipman</td>
<td>MS</td>
<td>Sensory cues for pollination visitors of <em>Trillium cuneatum</em></td>
<td>Aug. 2011</td>
</tr>
<tr>
<td>K. Hoffman</td>
<td>MS</td>
<td>Patterns of recruitment and culm morphology in river cane canebrakes</td>
<td>Dec. 2010</td>
</tr>
<tr>
<td>S. Grant</td>
<td>MS</td>
<td>Genetic diversity of northern red oak in western NC</td>
<td>Dec. 2010</td>
</tr>
<tr>
<td>J. Falcone</td>
<td>MS</td>
<td>Arthropod-avian assemblages in insecticide-treated and untreated eastern hemlock stands in GSMNP</td>
<td>May 2009</td>
</tr>
<tr>
<td>J. Extine</td>
<td>MS</td>
<td>Evaluation of potential habitat in golf courses in western NC</td>
<td>Dec. 2008</td>
</tr>
<tr>
<td>C. Lett</td>
<td>MS</td>
<td>Phosphorus and mycorrhizae effects on growth of <em>Celastrus orbiculatus</em></td>
<td>May 2008</td>
</tr>
<tr>
<td><strong>Northern Arizona University – School of Forestry</strong></td>
<td></td>
<td></td>
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<tr>
<td>J. Busco</td>
<td>MS</td>
<td>Establishing Junegrass and muttongrass in SW ponderosa pine forests</td>
<td>Dec. 2005</td>
</tr>
<tr>
<td>D. Crisp</td>
<td>MS</td>
<td>Survival and recruitment of bull thistle after pile burning and litter removal</td>
<td>May 2004</td>
</tr>
<tr>
<td>B. McRae</td>
<td>PhD</td>
<td>Integrating landscape ecology and population genetics</td>
<td>May 2004</td>
</tr>
<tr>
<td>B. Nowicki</td>
<td>MS</td>
<td>Genetic diversity and dwarf mistletoe resistance in SW Douglas-fir</td>
<td>Dec. 2003</td>
</tr>
<tr>
<td>E. Bressler</td>
<td>MS</td>
<td>Genetic variation of isolated Douglas-fir in SW N. America and N. Mexico</td>
<td>May 2003</td>
</tr>
<tr>
<td>S. Swope</td>
<td>MS</td>
<td>Exotic plant invasions in relation to diversity, limiting resources and livestock grazing in Arizona grasslands</td>
<td>May 2003</td>
</tr>
<tr>
<td>K. Kolanoski</td>
<td>MS</td>
<td>Genetic variation of ponderosa pine in N. AZ: Implications for restoration</td>
<td>May 2002</td>
</tr>
<tr>
<td>M. White</td>
<td>PhD</td>
<td>Changes in subalpine and montane grasslands, Apache-Sitgreaves NF, AZ</td>
<td>Dec. 2002</td>
</tr>
<tr>
<td>D. Fischer</td>
<td>MS</td>
<td>Transpiration and canopy conductance of ponderosa pine and limber pine in a high-elevation prairie</td>
<td>May 2001</td>
</tr>
<tr>
<td>S. Church</td>
<td>MS</td>
<td>Response of Bebb willow to riparian restoration, Hart Prairie, Arizona</td>
<td>Aug. 2000</td>
</tr>
<tr>
<td>L. Moser</td>
<td>MS</td>
<td>Genetic structure and variation in a southwestern Douglas-fir population</td>
<td>May 1999</td>
</tr>
<tr>
<td>J. Zimmerman</td>
<td>MS</td>
<td>Plant diversity in the Pumphouse Wash canyon system, Coconino Co., AZ</td>
<td>May 1997</td>
</tr>
<tr>
<td>E. Naumburg</td>
<td>MS</td>
<td>Shade response of five grass species of southwestern ponderosa pine forests</td>
<td>Aug. 1996</td>
</tr>
<tr>
<td><strong>Northern Arizona University – Environmental Science and Policy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Soller</td>
<td>MS</td>
<td>Using native seed for re-vegetation: science and policy</td>
<td>Dec. 2003</td>
</tr>
<tr>
<td>A. Richey</td>
<td>MS</td>
<td>Development of a rapid riparian assessment tool</td>
<td>Dec. 2005</td>
</tr>
</tbody>
</table>
SERVICE TO PROFESSION AND UNIVERSITY

Service to Western Carolina University: Departmental Service

Geoscience and Natural Resources Department


Natural Resources Conservation and Management Program (within the Department)

- Landscape Ecologist /GIS Faculty Search Committee – 2006, assisted with self study document and site visit for program review 2007-2008

Environmental Science Program (Interdisciplinary Program)

- Director and member, Executive Committee (2005 – present), revised tenure/promotion document (2007-2010), wrote self study for program review, wrote Quality Enhancement Plan, wrote program prioritization document, oversee budget, curriculum, advising, recruitment and retention and administration of the program

Biology Department


Service to Western Carolina University: College of Arts and Science

- Dean’s Advisory Committee: 2011 – 2012, Ad Hoc Helen Patton Center Committee: 2008 - present

Service to Western Carolina University: Institution Service


Previous Service to Northern Arizona University: School of Forestry

- Writing Across the Curriculum Committee (1 year), Dept. Chair’s Advisory Committee (1 year), Academic coordinator, Environmental Management Emphasis for the Environmental Science, Department (5 years), Curriculum Review Committee (3 years), Scholarship Committee (2 years, Chair), Manager, School of Forestry’s Arboretum (2 years), Professional Forestry Program/Curriculum Review Committee (2 years), Silviculture Faculty Search Committee (1 year), Research Specialist Search Committee (1 year), Recruitment, Retention and Placement Specialist Search Committee (1 year), Forest Measurements Curriculum Revision Committee (1 year), Organized Forestry Seminar Series in 1995-1997, MacIntire-Stennis/AZ Bureau of Forestry Grant Proposal Evaluation Committee (3 years, Chair), Faculty Status (promotion/tenure) Committee (2 years, Chair), Representative to Long-
Distance Education Consortium (Virginia Tech., NAU, Univ. Montana, Univ. Idaho, US Forest Service, Bureau Land Management, National Park Service) (2003-2004), Dean Search Committee (2003) Strategic Planning Committee (1 year, Chair), Forest Management Faculty Search Committee (1 year, Chair), Assisted School of Forestry’s Graduate Program Review by USDA/CSREES April 4-8, 2004, Adjunct Faculty Review Committee (3 years)

**Previous Service to Northern Arizona University College of Ecosystem Science and Management**
Environmental Management Curriculum Development committee (2 years), Promotion and Tenure Committee (1 year, Chair)

**Previous Service to Northern Arizona University: Institution Service**
NASA Steering Committee (3 years, Chair in 2003-2004), University Curriculum Committee (1 year) Commission on the Status of Women (4 years, Presidential appointments], Faculty co-chair), Intramural Grant Program Review Committee (4 years), University Program Review Committee (3 years, Chair, Geology Review, Geography Review), Steering Committee for the Graduate Certificate in Conservation Ecology (3 years), Women in Science, Engineering, and Technology Committee (1 year) Research Greenhouse Coordinating Committee (3 years), “UPTEAM” Mentor for Multicultural Student Center (2 years), Incoming Freshman/Transfer Student “Previews” Advisor (3 years), Summer Sessions Advisory Committee (1 year), Distance Education Assessment Specialist Search Committee (1 year), Committee on Faculty Effort and Expectations (1 year), Centennial Campus Arboretum Committee (3 years)

**Service to External Constituencies**

**Michigan Technological University**
Member of the Presidential Council of Alumnae – advisor to the President, 2005 - present

**Professional Organizations: Committees and Leadership**

**Society of American Foresters (SAF)**
- Education Policy and Review National Committee (2013 – present)
- Fellows Nomination Selection Committee, Appalachian Society SAF (2009-2014)
- Task Force on Special Accreditation for Terrestrial Ecosystem Curriculum (2009-2012)
- Awarded Fellow in the Society of American Foresters 2007 outstanding scholarship, teaching, and service to the profession of forestry (award recognizes only 5% of SAF Members)
- Chair, Nantahala Chapter, North Carolina Division (2007-2011)
- North Carolina SAF Executive Committee (2007- 2011)
- Chair, Science and Technology Committee, NC Division, SAF (2007)
- Co-Chair & Co-Host: Annual NC Division Meeting, Waynesville, NC June 6-8, 2007
- National Committee on Accreditation 2003-2006 and 2008-2012 (Chair 2009 – 2012)
- Southwest Section: Chair (2002), Chair-Elect (2001) and Past-Chair (2003)
- D1 working group: (Tree Improvement/Forest Genetics): Secretary (2001 & 2002), Chair-elect (2003), Chair (2004 and 2005), Past-Chair (2006)
- Northern Arizona University’s representative to National Office (1996-2004)
- Organized several technical sessions for the National Conventions (see below)
Western Forest Genetics Association
- Treasurer (2004-2005)

Association of Southeastern Biologists
- 71st Annual Meeting Planning Committee and **Program Co-Chair** (2008-2010)

**Peer-Reviewer**

**Book Reviews:**
- Scritable.com website review for WH Freeman Publishers 2009
- “Schoolyard Habitat Handbook”, AZ Game and Fish Heritage Fund
- “Beyond Ponderosa”, Flagstaff Community Tree Board

**Program Reviews:** Society of American Foresters Accreditation Site Visits

**Research Proposals and Programs:**
- Proposal review, National Graduate Women in Science Organization Fellowships, 2009
- US Civilian Research and Development Foundation (CRDF)
- National Science Foundation (4 proposals)
- Research Programs: USFS Rocky Mountain Research Station (2 programs)

**Journal Articles:**

*On average I review 6 manuscripts per year.* I have reviewed manuscripts for the following Journals:

**Technical Reports:** US Forest Service General Technical Reports (2 reports)

**Moderator or Facilitator for Teaching or Research Workshops and Conferences:**
- **Moderator** for 15th, 16th, and 18th Annual Graduate Research Symposium. March 22, 2007, March 27, 2008, March 11, 2010, Western Carolina University, Cullowhee, NC
- **Invited Facilitator:** Assessing Student Learning Focus Group. 5th Annual Summer Institute on Teaching and Learning. May 2007 and May 2011: Coulter Faculty Center for Excellence in Teaching and Learning. WCU
- **Instructor and Workshop Developer** (with Dr. Patricia Bricker, WCU BK Elem & Middle Grades Ed): Inquiry-based science instruction: A professional development workshop for Alleghany County elementary and middle-school teachers. July 10-14, Sept. 1 2006 and March 4-6 and June 3-5, 2007 Sparta, NC
- **Facilitator**, Assessing Student Learning Focus Group, 3rd and 4th Annual Summer Institutes on Teaching and Learning. Coulter Faculty Center for Excellence in Teaching and Learning, Western Carolina University. May 2005 and 2006

- **Member** of the Faculty Learning Community on Assessment. Coulter Faculty Center for Excellence in Teaching and Learning, Western Carolina University, 2004-2006.

- Learner-Centered Education – Arizona Tri-University Project on Learner Centered Education Techniques and course development. **Facilitator**, June and August 2003.


- Slice of Life Project Forum II. **Facilitator**, National Science Foundation Forum, Northern Arizona University, Dec. 1997


- Re-examining University Science Teaching. **Facilitator**, National Science Foundation Forum, Northern Arizona University, Dec. 1995

**Conference Planning and Organization:**

- Program Chair and Planning Committee, Association of Southeastern Biologists Annual Meeting, Asheville, NC April 7-10, 2010

- **Co-Chair**: Natural Resource Education for a Culturally Diverse Audience. 5th Biennial Conference on University Education in Natural Resources, Flagstaff, AZ, March 14-17, 2004.


- Organized July 1999 Western Forest Genetics Association Annual Meeting in Flagstaff, AZ

- Conducted fieldtrip for Arizona Riparian Council Annual meeting: April 30-May 1, 1999.

- Planning and technical assistance for the 2nd Southwestern Rare and Endangered Plant Conference, Flagstaff, AZ February 1996.

**Other Professional Service to External Constituencies**

- Participant in the Western Carolina University “Public School Projects for Math and Science” Collaborative work with a public school teacher to enhance science education (2006-2007)

- NC Quest Middle School Science Teachers –  **Inquiry Resources CD development** with Dr. Patricia Bricker (WCU, BK Elem & Middle Grades Ed) 2008

- Served as Advisor for High School AP Biology Class through the Mathematics and Sciences Grants for School Involvement 2006 and 2007

- “Magnolia Detectives Project” advisor for Jennifer Allsbrook, Polk County High School (DNA biotechnology project) 2009-2010

- Watershed prioritization development team, USDA Forest Service and Society of Ecological Restoration in collaboration with the Sonoran Institute and USGS Biological Resources Division, University of Arizona, 1997

- Experts Conservation Panel for The Nature Conservancy’s Bioregional planning for the Arizona – New Mexico Mountains ecoregion, 1997 and 1999

- Technical advisor/editor for National Geographic article (190[3]:80-97) 1996

- Member of the USDA Forest Service East Clear Creek Ecosystem Collaborative Assessment and Planning Team, Coconino National Forest, 1995-1999

- Forest regeneration/restoration advisor for the Hopi Tribe, Arizona, 1995-2004

- Advisor, Navajo Forestry – Reforestation Department Seed Orchard Project, 1995-2004
- Member of the USDA Forest Service East Clear Creek Ecosystem Collaborative Assessment and Planning Team, Coconino National Forest 1995-1999
- Forest regeneration/restoration advisor for the Hopi Tribe, Arizona
- Instructor for NSF-funded Summer Science Program for youth at NAU 1996 and 1997
- Watershed prioritization development team, USDA Forest Service and Society of Ecological Restoration, Sonoran Institute and USGS Biological Resources Division, AZ, 1997
- Experts Conservation Panel for The Nature Conservancy’s Bioregional planning for the Arizona – New Mexico Mountains ecoregion 1997 and 1999

PROFESSIONAL ACTIVITIES, SPECIAL HONORS, RECOGNITION:

MAJOR PROFESSIONAL/SELF-IMPROVEMENT ACTIVITIES:
Society of American Foresters Leadership Academy, Nebraska City, NE, May 19-23, 2001

Instructional Improvement Training - Invited Participant/Facilitator:
Techniques in the Multi-Cultural Classroom. Participant. NAU, February 1995
1996 Roundtable discussion regarding the role of research in undergraduate education (published in 1996 NAU “Horizons” magazine: “Beyond books: where research fits in”).
Toward a sustainable future: Re-envisioning the curriculum at NAU. May 17-18, Aug.18, 1998
Re-examining University Science Teaching. NAU/National Science Foundation Forum,
Facilitator, Dec.1995
Southern Utah Great Teachers Summit, Kanab UT, Participant, Feb. 24-26, 2000
Learner-Centered Education – Arizona Tri-University Project on LCE Techniques and course development. Facilitator, June and August 2003.
Member of the Faculty Learning Community on Assessment. Coulter Faculty Center for Excellence in Teaching and Learning, Western Carolina University, 2004-2006.

Assessment of Student Learning Focus Group at the Scholarship of Teaching and Learning, Facilitator, May 2005 Summer Institute, Western Carolina University, May 2005

Teaching and Learning Workshop, participant. Coulter Faculty Center for Excellence in Teaching and Learning, Western Carolina University Sept. 13, 2005.

Summer Institute for Teaching and Learning, Coulter Faculty Commons, Western Carolina University, May 2011

Leadership Retreat: Coulter Faculty Commons, Western Carolina University May 31, 2011
Curriculum Vitae
AMY L. FAGAN
Western Carolina University
Geosciences and Natural Resources
331 Stillwell Building
Cullowhee, NC 28723
828-227-3820
alfagan@wcu.edu

EDUCATION AND WORK EXPERIENCE
Ph.D.  Lunar Petrology, University of Notre Dame 2013
Dissertation: “Volcanic and Impact Processes on Mars and the Moon”

B.S.  Geology, with Honors, Cum Laude, Washington and Lee University 2006

PROFESSIONAL EXPERIENCE
Assistant Professor
Western Carolina University, Geosciences and Natural Resources Department,
Cullowhee, NC
August 2014-present

Postdoctoral Fellow
Center for Lunar Science and Exploration, Universities Space Research Association-
Lunar and Planetary Institute, Houston, TX
August 2012- July 2014

Teaching Assistant, Civil Eng. and Geol. Sci. Dept., University of Notre Dame
Fall 2008: Geodynamics
Spring 2008: Volcanology
Fall 2007: Volcanology
Spring 2007: Planetary Geology
Fall 2006: Physical Geology

TEACHING PHILOSOPHY
My interest in planetary geology and my experiences both in and out of the geology classroom directly impact my teaching philosophy and interests. I believe the best teaching involves time in the field, examples of processes pervasive throughout our solar system, personal interaction between the professor and student, and using a range of methods inside the classroom.

COURSES TAUGHT
Introduction to Rock Forming Minerals (GEOL 250)  Fall, 2014
Petrology (GEOL 355)  Spring, 2015
The Solar System (AST103)  Spring 2015
**Research Experience**

NASA Lunar Science Institute- Center for Lunar Science Exploration
Team Member,

Postdoctoral Fellow (2012-2014)
Graduate Student Researcher (2009-2012)
Lunar Exploration Student Intern (Summer 2009)

LPI Summer Intern Program
Assistant Mentor 2013, aided undergraduate intern (Caitlin Altomare, Lafayette College) in collecting, analyzing, and presenting data regarding aeolian basaltic clasts in Meteor Crater; work was presented at LPSC 2014

Co-Mentor 2014, aided undergraduate intern (Stefan Farsang, St. Andrew’s University) in collecting, analyzing, and presenting data regarding LL Chondrite LAR 12325; work will be presented at LPSC 2015

Off-campus Summer Research, Lunar Exploration Summer Intern Program, Lunar and Planetary Institute. Supervised by Dr. David Kring. (Summer 2009)

Fellowships/Awards, LPI Career Development Award (2012)
Lilly Fellowship (August 2006-July 2010)
Lena T Stevens Scholarship (2006)
Frank Young Scholarship (2002-2006)

**Professional Activities and Service**

Lunar and Planetary Institute Career Development Award Committee
Panel Member 2014, selected individuals to receive award

Lunar and Planetary Science Conference Program Committee
Panel Member 2014, reviewed submitted abstracts and created appropriate oral and poster sessions for the 45th LPSC, to be held in March 2014.

Lunar and Planetary Science Conference
Co-Chair, Lunar Igneous Processes (2014)
Co-Chair, Lunar Samples: Our evolving view of the lunar crust (2013)
Judge, GSA Stephen E. Dwornik Student Awards; Undergraduate division (2010, 2012); Graduate division (2014)

Next Generation of Lunar Scientists and Engineers (NGLSE)
Annual Workshop co-organizer, 2013 NGLSE Proposal Writing Workshop (virtual meeting), with Lora Bleacher, Noah Petro

NASA Science Mission Directorate Review Panel
Executive Secretary, 2012
Professional Activities and Service Continued

Planetary and Space Science Journal
Reviewer, 2015

K. E. Little Elementary School Annual Space Day 2013
Presenter, presented information about lunar impact craters and the Apollo program

NASA Lunar Science Institute High School Lunar Research Projects (HiSLuRP)
Mentor, 2012-2013 school year
Judge, Spring 2012

NASA Lunar Science Forum
Co-Chair, Parallel Session #10- Geology: Petrology/Mineralogy (2012)
Co-Chair, Parallel Session #6- Samples and Instrument Data (2010)

Lunar Graduate Conference (“LunGradCon”)
Co-organizer, first annual Lunar graduate student conference at NASA Ames (2010)

Notre Dame Graduate Student Union (GSU; 2009-2010)
Chair, GSU Health Care Committee

Publications


**Publications Continued**


**Submitted Manuscripts/Awaiting Publication**


**Manuscripts in Preparation**


**Conference Abstracts/Presentations (Past 5 Years: 2010 to 2015)**

2015


2014

CONFERENCES ABSTRACTS/PRESENTATIONS CONTINUED (PAST 5 YEARS: 2010 TO 2015)


2013


2012


2011


CONFERENCE ABSTRACTS/PRESENTATIONS CONTINUED (PAST 5 YEARS: 2010 TO 2015)


Fagan A.L. and Neal C.R. (2010), Apollo 16 Impact Melt vs Basalt: Textural and Chemical Analyses, Goldschmidt, Knoxville, TN.


FRANK L. FORCINO  
15 Wineberry Lane, Cullowhee, NC 28723  
(484) 467-7887  
Ffforcino@email.wcu.edu

EDUCATION
Ph.D. Earth and Atmospheric Sciences, University of Alberta 2013
M.S. Geological Sciences, San Diego State University 2009
B.S.Ed. Earth and Space Science 2007

PROFESSIONAL EXPERIENCE
Assistant Professor, Geosciences and Natural Resources, Western Carolina University 2014 –

TEACHING PHILOSOPHY
My goal as an educator is to ensure all of my students gain a deeper understanding and appreciation for science. Specifically for students in STEM disciplines, the best education is derived when those students are treated as young scientists. Ways to provide such experiences to the students include inquiry and guided inquiry exercises in the classroom as well as opportunities outside the classroom the conduct independent, original research projects. This philosophy is reflected in not only my educational practices, but also in my research.

COURSES TAUGHT
Sedimentology and Stratigraphy 2015
Geology Field Trip: Kentucky 2015
Investigation of Environmental Geology 2014 – 2015
Historical Geology 2014 – 2015

INVITED TALKS
2014 University of Tennessee, Chattanooga, Sample Size Requirements for Paleoecological Research

CHAIR ED SESSIONS
PEER-REVIEWED PUBLICATIONS

Forcino, F.L., Leighton, L.R., Twerdy, P., and Cahill, J.F. (2015) Reexamining sample size requirements for multivariate, abundance-based community research: when resources are limited, the research does not have to be. PLOS ONE, DOI:10.1371/journal.pone.0128379.


PEER-REVIEWED ABSTRACTS (* = WCU undergraduate student author)


Forcino, F.L. and Libarkin, J., 2013, Not saying “evolution” may be the key to teaching evolution: Geological Society of America Abstracts with Programs: v. 45, p. 284.


ADDITIONAL PUBLICATIONS

http://www.ags.gov.ab.ca/publications/abstracts/OFR_2014_08.html
Forcino, F.L. and Leighton, L.R., 2012, The lazy paleontologist: Evidence for doing less and getting the same meaningful result: University of Alberta Earth & Atmospheric Sciences Graduate Student Association ATLAS Symposium.


Forcino, F.L., 2011, Getting more from less: evidence that multivariate analyses require smaller sample sizes: University of Alberta Earth & Atmospheric Sciences Graduate Student Association ATLAS Symposium.


PROFESSIONAL ACTIVITIES AND SERVICE

2015  Evaluator – Western Regional Science and Engineering Fair, Cullowhee, NC
       Public Outreach – School District Science Olympiad guest instructor, Fairview School, Sylva, NC
2013  Evaluator – Mid-Michigan Symposium for Undergraduate Research, East Lansing, MI
2010  Public Outreach – Fossil Presentation for Daly Grove Elementary School, Edmonton, AB, Canada
2009  Public Outreach – University of Alberta Paleontology Museum Invertebrate Fossil Collection, Museum Friends and Volunteers
       Public Outreach – Fossil Presentation for Daly Grove Elementary School, Edmonton, AB, Canada
2006  Tutor – West Chester Area School District Science Olympiad students
2005  Tutor – West Chester Area School District Science Olympiad students

GRANTS

2011  Centre for Teaching and Learning Research Fellowship, University of Alberta ($20,000)
       Geological Society of America Student Research Grant ($1,000)
       Circumpolar/Boreal Alberta Research Grant Award ($2,000)
2010  Paleontological Society Student Research Grant, G. Arthur Cooper Award ($800)
2008  Sigma Xi Grants in Aid, ($1,000)
John P. Gannon  
Assistant Professor, Dept. of Geosciences and Natural Resources, WCU  
828-227-3813 • jpgannon@wcu.edu

**Education**

2014  Ph.D., Forest Resources and Environmental Conservation (Hydrology), Virginia Tech, Blacksburg, VA

2010  M.S., Geosciences (Hydrogeology), Virginia Tech, Blacksburg, VA

2007  B.S., Physics, The College of New Jersey, Ewing, NJ

**Awards and Honors**

2007-2008 Virginia Tech Department of Geosciences Tillman Teaching Excellence Award, Resources Geology.

**Publications**


**Select Presentations**


**Professional Appointments**
*Virginia Rural Water Association*, Buena Vista, VA
Source Water Protection Technician, October 2010-January 2011
Worked with rural communities to develop plans to protect their public water supplies.

**Professional Organizations and Service Activities**
Member, American Geophysical Union, 2008 - present.

WHEE Firsts first generation student mentor, Western Carolina University, Fall 2014 – Present.

**Research Grants and Fellowships**

Gannon, J.P., McGuire, K.J., Rebel, K.T., May 2012, Ecosystem scale implications of hydropedology: Incorporating high resolution field measurements of soil and hydrology into the WALNUTS distributed ecohydrological model to evaluate carbon redistribution and accumulation in steep headwater catchments, INTERFACE Collaborative Exchange, Purdue University, $1,000.

CHARLENE N. KELLY

January 2015
Western Carolina University
336 Stillwell Hall
Cullowhee, NC 28723
cnkelly@email.wcu.edu
(828) 227-3817

EDUCATION

May 2010
Doctor of Philosophy
Virginia Tech University
Forest Resources and Environmental Conservation
Focus: Watershed Biogeochemistry
Blacksburg, VA

May 2004
Master of Science
West Virginia University
Environmental Biology
Focus: Soil Ecology/Soil Chemistry/Soil Remediation
Morgantown, WV

May 2001
Bachelor of Science
University of Dayton
Environmental Biology
Focus: Ecology and Plant Physiology
Dayton, OH

PROFESSIONAL APPOINTMENTS

Aug 2013-present
Assistant Professor; Cullowhee, NC
Western Carolina University, Department of Geosciences and Natural Resources

Oct 2011-Aug 2013
Physical Research Scientist (GS-12); Denver, CO
USGS Water Resources Division, Mendenhall Post-doctoral Fellow

Jun 2010-Sep 2011
Post-doctoral Research Associate; Blacksburg, VA
Virginia Water Resources Research Center at Virginia Tech and USDA Forest Service Coweeta Hydrologic Lab

Aug 2006-May 2010
Graduate Research and Teaching Assistant; Blacksburg, VA
Virginia Tech University, Department of Forest Resources and Environmental Conservation

Oct 2005-Aug 2006
Laboratory Technician; Asheville, NC
Pace Analytical Labs

Oct 2004-Oct 2005
Land Stewardship Assistant; Asheville, NC
Southern Appalachian Highlands Conservancy/AmeriCorps

May 2004-Sep 2004
Research Technician; Morgantown, WV
West Virginia University, Department of Biology

Aug 2001-May 2004
Graduate Research and Teaching Assistant; Morgantown, WV
West Virginia University, Department of Biology
TEACHING EXPERIENCE

Western Carolina University, Department of Geosciences and Natural Resources (Assistant Professor):

Spring 2015  
NRM 140 - Introduction to Natural Resources and Conservation Management  
NRM 140 Honors – Intro. to Natural Resources and Conservation Management  
NRM 460 – Watershed Management (with lab)

Fall 2014  
NRM 140 - Introduction to Natural Resources and Conservation Management  
NRM 210 – Methods in Natural Resource Management Lab  
NRM 420 – Soil Genesis and Classification (with lab)

Spring 2014  
NRM 140 - Introduction to Natural Resources and Conservation Management  
NRM 320 - Soil Conservation (with lab)

Fall 2013  
NRM 140 - Introduction to Natural Resources and Conservation Management (2 sections)

Virginia Tech University, Department of Forest Resources (Teaching Assistant):

Fall 2009  
Forest Biology and Dendrology Lab

Fall 2008  
Forest Ecology and Management Lab

Spring 2008  
Advanced Forest Soils Lab (graduate-level)

West Virginia University, Department of Biology (Teaching Assistant):

Fall 2003  
Environmental Biology Lab

Fall 2002  
Environmental Biology Lab

Spring 2004  
Capstone Ecology and Evolution Lab: The Total Science Experience  
(National Science Foundation funded research course)

Spring 2003  

Spring 2002  

Fall 2001  
Principles of Biology Lab

GRANT ACTIVITY

Jan 2015  

Jun 2014  
Provost’s Research Grant, Western Carolina University. Response of the Soil Microbiome to Invasive Species Management. Co-Principal Investigator with Timothy Driscoll and Diane Styers. Awarded $15,000.

Aug 2014  
Water Resources and Research Institute of North Carolina (WRRI). Identification of the Predominant Sediment and Sediment-Associated Trace Metal Sources within the Upper Little Tennessee River. Principal Investigator with Jerry Miller and Diane Styers. Not funded. Amount requested $59,948.
MANUSCRIPTS in REVIEW


PEER-REVIEWED PUBLICATIONS


CONFERENCE PROCEEDINGS ARTICLES

- Gurwicz NP, **Kelly CN**, and PE Elias. 2012. The scientific basis for biochar as a climate change mitigation strategy: Does it measure up? *The Union of Concerned Scientists Report*.


### INVITED SEMINARS

<table>
<thead>
<tr>
<th>Month</th>
<th>Event</th>
<th>Location</th>
<th>Details</th>
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<tbody>
<tr>
<td>Apr 2010</td>
<td>EPA Land Remediation and Pollution Control Division. Cincinnati, OH.</td>
<td>Carbon and nitrogen cycling in watersheds of contrasting vegetation types in the Fernow Experimental Forest, WV.</td>
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### INVITED LECTURES

<table>
<thead>
<tr>
<th>Month</th>
<th>Title</th>
<th>Location</th>
<th>Details</th>
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### OTHER PROFESSIONAL DEVELOPMENT

<table>
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<tr>
<th>Month</th>
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<th>Location</th>
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<tr>
<td>Mar 2011</td>
<td>Future Faculty Development Program</td>
<td>Virginia Tech University.</td>
</tr>
<tr>
<td>Dec 2004</td>
<td>Geographical Information System Software Training Program</td>
<td>NC State University.</td>
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### PRESENTATIONS and PUBLISHED ABSTRACTS

<table>
<thead>
<tr>
<th>Month</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>Apr 2012</td>
<td>San Juan Hardrock Mining and Water Quality Conference (poster).</td>
<td>Silverton, CO. Biochar and the remediation of abandoned mine tailings.</td>
<td></td>
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<tr>
<td>Dec 2010</td>
<td>American Geophysical Union Conference (poster; co-author with Noel Gurwick et al.).</td>
<td>San Francisco, CA. Biochar stability in field conditions: What do we know?</td>
<td></td>
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<tr>
<td>Jan 2010</td>
<td>Fernow Experimental Forest Cooperators Meeting (oral).</td>
<td>Elkins, WV. Vegetation controls on carbon and nitrogen cycling and retention: Contrasts in spruce and hardwood watershed budgets.</td>
<td></td>
</tr>
<tr>
<td>Oct 2008</td>
<td>Soil Science Society of America Conference (oral).</td>
<td>Houston, TX. Vegetation controls on nitrogen cycling and retention: Soil and water characteristics of “tight” and “leaky”</td>
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</tbody>
</table>
watersheds.

Jul 2008  1st International Hydropedology Conference (poster). State College, PA. Vegetation controls on nitrogen cycling and retention: Soil and water characteristics of “tight” and “leaky” watersheds.


AWARDS and HONORS

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<tr>
<th>Date</th>
<th>Award Description</th>
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<tr>
<td>Apr 2010</td>
<td>National Research Council Research Associate Fellowship offer (US Environmental Protection Agency)</td>
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<tr>
<td>Mar 2010</td>
<td>Post-doctoral Mendenhall Fellowship (US Geological Survey)</td>
</tr>
<tr>
<td>May 2009</td>
<td>Graduate Research and Development Grant (Virginia Tech)</td>
</tr>
<tr>
<td>Jun 2008</td>
<td>John F. Hosner Scholarship (Virginia Forestry Educational Foundation)</td>
</tr>
<tr>
<td>Dec 2007</td>
<td>Best Student Paper Award (VA/WV Water Resources Research Symposium)</td>
</tr>
<tr>
<td>Jun 2007</td>
<td>Edna Bailey Sussman Environmental Fellowship</td>
</tr>
<tr>
<td>Apr 2007</td>
<td>Graduate Research and Development Grant (Virginia Tech)</td>
</tr>
<tr>
<td>Aug 2006</td>
<td>Vision 2010 Scholar Fellowship (Virginia Tech)</td>
</tr>
<tr>
<td>Oct 2005</td>
<td>AmeriCorps Education Award (Project Conserve)</td>
</tr>
<tr>
<td>Apr 2003</td>
<td>Biodiversity Conservation Research Fund Grant (The Nature Conservancy, Maryland/DC Chapter)</td>
</tr>
<tr>
<td>May 2001</td>
<td>Distinguished Internship Award (UD Department of Biology)</td>
</tr>
<tr>
<td>Aug 1997-May 2001</td>
<td>Presidential Scholarship (University of Dayton)</td>
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SERVICE to DEPARTMENT

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity Description</th>
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<tbody>
<tr>
<td>Jan 2015</td>
<td>Faculty Affairs committee</td>
</tr>
<tr>
<td>Jan 2014</td>
<td>Member, Search committee for GNR Administrative Support Assistant</td>
</tr>
<tr>
<td>Apr 2014</td>
<td>Member, Search committee for GNR Hydrology faculty position</td>
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SERVICE to UNIVERSITY

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity Description</th>
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<tbody>
<tr>
<td>Mar 2014</td>
<td>University Open House participant</td>
</tr>
<tr>
<td>May 2014</td>
<td>WCU Leadership Tour (assisted)</td>
</tr>
<tr>
<td>Aug 2014</td>
<td>New Faculty Orientation (New Faculty Mentor)</td>
</tr>
<tr>
<td>Nov 2014</td>
<td>University Open House participant</td>
</tr>
<tr>
<td>Ongoing</td>
<td>Member, Provost’s Steering Committee for New Natural Science Building</td>
</tr>
</tbody>
</table>
PROFESSIONAL SERVICE and AFFILIATIONS

Peer reviewer - Plant and Soil Science journal
   Journal of Environmental Quality
   Soil Science Society of America Journal
Ecological Society of America-member since 2003
Soil Science Society of America-member since 2008
American Water Resources Association-member since 2007
Western Regional Science and Engineering Fair Judge - 2015
Forestry Graduate Student Association, Virginia Tech - Vice President 2007-08, 2008-09, 2009-10
Graduate Honor System, Virginia Tech - panelist 2007-2010
American Chestnut Foundation - volunteer for field propagation in Virginia mineland soils 2008
Undergraduate Research Experience Mentor, Virginia Tech 2007-2008
Transdisciplinary Water Resources Undergraduate Degree Program Development Committee, Virginia Tech 2011
Wildland Restoration Volunteers-volunteer for Colorado natural area and trail restoration projects 2012
AmeriCorps Project Conserve service member 2004-05
DAVID KINNER
Department of Geosciences and Natural Resources
Western Carolina University
Cullowhee, NC 28723
828-227-3821
dkinner@email.wcu.edu

EDUCATION
Ph.D., Geology, University of Colorado Boulder, CO 1998-2003
Thesis title: “Multi-scale Estimation of Erosion and Deposition in the Mississippi River Basin”

M.S., Geology, University of Colorado, Boulder, CO 1996-1999

B.A., Geology Amherst College, Amherst, MA 1992-1996
Thesis title: “A $^{40}$Ar/$^{39}$Ar and Petrologic Study of a Polymetamorphic Terrane, Puzzle Mt., NW Maine”

PROFESSIONAL EXPERIENCE
Assoc. Dean, College of Arts and Sciences, Western Carolina University 2014-present
Associate Professor, Western Carolina University 2012-present
Geology Program Coordinator 2011-2013
Assistant Professor, Western Carolina University 2006-2012
Instructor, N.C. Summer Ventures Program (high school students) 2008
Mendenhall Post-Doctoral Fellow --USGS Geologic Division 2003-2006
Research Asst. Smithsonian Tropical Research Institute (Balboa, Panama) 1996-1998
Teaching Assistant, University of Colorado 1996-1998

TEACHING PHILOSOPHY
A few lines (one paragraph that we could add on)

COURSES TAUGHT
Geology 140: Investigations in Environmental Geology
Geology 150: Methods in Geology
Geology 191: Geology, Landscapes and the Humans Psyche (Fresh. Seminar)
Geology 302: Geomorphology (team taught)
Geology 305: Soils and Hydrology
Geology 310: Principles of Soils and Hydrology for Construction Managers
Geology 393: Special Problems in Geology (1 student)
Geology 491: N.C. Geology Field Trip (1 credit field trip)
Geology 491: Topics Geologic Data Analysis
Geology 495: Senior Research Seminar
Geology 499: Senior Thesis  
Science 301: Nature of Science (inquiry course for secondary science education students; shared)

**PUBLICATIONS (all peer reviewed; undergraduate student authors underlined)**


**PRESENTATIONS (undergraduate co-authors underlined):**


Kinner, D., Lord, M., and Crow, R., 2013, Student perceived benefits of group geology undergraduate research experience, GSA Fall National Meeting.


Tanner, B. R., Kinner, D.A., Barbour, S., and Young, R., 2010, Radiocarbon dates reveal a high elevation, early Holocene wetland deposit in the southern Appalachian Mountains: GSA Abstracts with Programs, v. 42, no. 1, p. 188


Kinner, D. A., Cheney, J. T., and Hames, W. E., 1996, \(^{40}\text{Ar}/^{39}\text{Ar}\) and Petrologic Study Puzzle Mt., Western Maine: GSA Abstracts with Programs, v. 28, no. 3, p. 72.


**UNDERGRADUATE THESES AND PROJECTS (titles are approximate; not published or peer reviewed)**

Senior Thesis, Geology, 2013 Fall, “Comparison of hillslope hydrology in watersheds with different histories of disturbance”

Capstone (group research projects), 2012 Fall, “Groundwater flowpaths in a disturbed Southern Appalachian watershed”, instructor.


Capstone (group research) seminar, 2008, “History of a sediment core from the Panthertown fen”, co-instructor.

I have also done five within semester undergraduate research projects with my students in Geomorphology (co-taught twice), Soils and Hydrology, Methods in Geology (Intro to Majors), and Honors Environmental Geology classes.

**FUNDED GRANTS**

Western Carolina University (WCU), 2014
Provost’s External Funding Support Grant
“A “Significant Nexus”: How Does a Drainage Gully in a Headwater Watershed Affect Downstream Water Quality?,” $9996
PI: J.P. Gannon (WCU), Co-PIs: Mark Lord (WCU), David Kinner

National Science Foundation, 2011
“Testing the Benefits of Undergraduate Research-Based Learning at Various Curricular Levels Using Authentic Research Questions in Hydrogeomorphology”, $199,099
PI: David Kinner, Co-PI: Mark Lord (WCU)

Western Carolina, (WCU), 2011
“Groundwater Recharge in Different Landscape Elements, Western North Carolina”, $43,800
PI: David Kinner, CO-PI: Mark Lord, Collaborators: Jerry Miller, Ben Tanner

Western Carolina Faculty Research Grant, 2010
“Examining shallow flowpaths in a landslide initiation zone”, $4,000

National Science Foundation, Travel Grant, 2007
“Determination of Sediment Sources and Transport Pathways Using Multivariate Geochemical Fingerprinting, in Mgeni and Berg Catchments, South Africa”, $13,559
Co-PIs: Jerry R. Miller (WCU) Kumud Acharya (Desert Research Institute)

Western Carolina University, Travel Fund, 2007, 2009, 2010

FUNDING (CONTRACTS)
Cherokee Central Schools
“Cherokee Central Schools Rivercane Restoration Project”, $3,200
PI: Benjamin Tanner (WCU), CO-PI: David Kinner

U.S. Geological Survey, Central Region Hazards Team, 2007
“Debris flow research”, $15,434.16
PI: David Kinner

OTHER GRANT ACTIVITY
Petroleum Research Fund, 2009, not funded
“Controls on fracture flow in highly metamorphosed crystalline rocks”
Co-PIs: David Kinner, Cheryl Waters-Tormey

ACADEMIC HONORS
Finalist, Board of Governor’s Teaching Award 2014
College of Arts and Sciences Teaching Award (one per year) 2011
Chancellor’s Engaged Teaching Award, Western Carolina University 2009
Best Paper Award, M. Sc. Student, AGU Hydrology Days, Fort Collins, CO 1999
Jeffrey Deen Memorial Fellowship, University of Colorado 1998
David F. Quinn Prize in Geology, Lincoln Lowell Russell Prize in Music, 1996
Richard M. Foose Prize in Geology, Amherst College
PROFESSIONAL SOCIETIES
American Geophysical Union
Geological Society of America

PROFESSIONAL SERVICE
I have served as a reviewer for NSF, served on an NSF proposal review panel, and been a
reviewer for several journals including: Vadose Zone Journal, Computers and Geosciences, and
Water Resources Research.

Co-Convener, GSA Session on Hydrological Processes and Problems S.12
In the Southern Appalachians
Reviewer of NCGS Landslide Hazard Map for Buncombe County, NC S.09

UNIVERSITY SERVICE (Does not include committees attended because of role as
Associate Dean)
SACS-COC Reaffirmation Compliance Committee F.14-present
WCU Faculty Activity Database Steering Committee F.14-S.15
WCU Academic Space Advisory Board F.14-present
WCU Space Management Committee F.14-present
Faculty Fellow Flipped Pedagogy (C. Faculty Commons) S.14
WCU College of Arts and Sciences (A&S) Secondary Science Education
Advisory Committee S.14
Search Committee Tenure Track Geology Professor F.13
Chair, Search Committee Visiting Geology Professor S.13
WCU, GNR AFE-TPR Committee Member F.12-S.14
University Program Prioritization Task Force Member F.12-S.13
University Curriculum Committee F.12-S.13
WCU GNR Search Committee for Department Technician F.10
WCU A&S Curriculum Committee F.10-S.13
WCU Provost’s Instructional Improvement Grant Committee S.10-11
WCU GNR AFE Committee Untenured Member S.10
WCU Geology Program Search Committee for Asst./Assoc. Prof F. 09
WCU Math Department Search Committee for Asst. Prof. F. 09
WCU Committee on Student Learning 2008-2009
Task Force on the Student Assessment of Instruction at WCU S. 2008
WCU, GNR Resource Committee 2007-2008
WCU, Geology Club Advisor 2006-2007
Faculty Advisor, Mathematical Contest in Modeling 2007
Served as student representative to the Institute of Arctic and Alpine
Research (INSTAAR) directorate 2002-2003
Served as INSTAAR graduate student seminar coordinator 2001-2002
Worked with an undergraduate student as part of the CU 1999
Summer Multicultural Access to Research Training (SMART) program
**Curriculum Vitae**

**BRIAN DONALD KLOEPPEL**

Graduate School, Western Carolina University,  
110 Camp Building, Cullowhee, North Carolina 28723 USA  
Telephone: 828-227-3174  
Email: bkloeppe1@wcu.edu  
Internet: paws.wcu.edu/bkloeppe1

**EDUCATION**

- Ph.D., Forest Ecology, University of Wisconsin - Madison 1998  
  Ph.D. Minor in Botany 1993  

- M.S., Tree Physiology, Pennsylvania State University 1992  
  M.S. Thesis: Seasonal Plant Ecophysiology and Morphology of Four Successional Pennsylvania Barrens Species in Open Versus Understory Environments. 64 pp.

- B.S., Forest Science with distinction, University of Wisconsin - Madison 1989

**PROFESSIONAL EXPERIENCE**

- July 2015 to Interim Dean, Graduate School and Sponsored Research, Western Carolina University  
  Present

- January 2013 to Associate Dean, Graduate School, Western Carolina University  
  Present

- May 2008 to Associate Professor, Department of Geosciences and Natural Resources  
  Present Western Carolina University

- March 2000 to Coweeta LTER Site Director / Assistant Research Scientist  
  May 2008 Odum School of Ecology, University of Georgia

- February 1995 to Coweeta LTER Site Director / Program Coordinator  
  March 2000 Odum School of Ecology, University of Georgia

- January 1992 to Graduate Research Assistant, Department of Forest Ecology  
  February 1995 and Management, University of Wisconsin - Madison

- Fall 1992, Graduate Teaching Assistant and Guest Lecturer, Department of Forest Ecology and Management, University of Wisconsin - Madison

- Fall 1993, Fall 1994 Forest Ecology course (Forestry 550) taught by Dr. Stith T. Gower  
  Intro. to Forest Sci. (Forestry 100) coor. by Dr. George L. Martin

- June 1990 to Graduate Research Assistant, School of Forest Resources,  
  December 1991 Pennsylvania State University
Experience
Fall 1990, Graduate Teaching Assistant and Discussion Leader, School of Forest Resources, Pennsylvania State University
Dendrology (Forestry 203) coordinated by Dr. L.H. McCormick

Fall 1991

May 1989 to May 1990
Associate Research Specialist, Forest Ecophysiology, Department of Forest Ecology and Management, University of Wisconsin - Madison
Study Director: Dr. Peter B. Reich

TEACHING PHILOSOPHY
My philosophy of teaching is to present current, relevant, and challenging material using a variety of tools and techniques to reach students who learn in a variety of ways. I have taught a high diversity of courses (natural resource conservation, policy and administration, forest resource measurements, soil conservation, watershed management, and integrated resource management) that call on the knowledge that I acquired as a student and scientist, and also on the knowledge and extensive experience from my 14 years as Site Director of the NSF-funded Long-Term Ecological Research Program at Coweeta Hydrologic Laboratory in nearby Otto, NC. This combination of knowledge and experience helps me to convince students that the approaches and material that I utilize in my teaching will increase their knowledge of natural resource conservation and management, and in the case of students in our major, prepare them for a successful career.

COURSES TAUGHT
Western Carolina University (*Fa = fall semester, Sp = spring semester, Su = summer semester)
NRM 352 - Forest Resource Measurements, Fa2009, Fa2011, Fa2013, Fall 2015
ES 150 - Introduction to Environmental Science, Sp2010, Sp2011

Professional Activities
Western Carolina University Graduate Faculty (Adjunct 2004 to 2008, Full 2008 to present)
University of Georgia Graduate Faculty (Provisional 2000 to 2004, Regular 2004 to 2008)
Editorial Board Member, Dendrobiology (July 2010 to present)
Highlands Biological Station, Board of Scientific Advisors (January 2004 to present)
NEON, DSECC Domain 7, Representative for Western Carolina University (2009 to present)
Organization of Biological Field Stations
President (2008 to 2010), Past President (2010 to 2012)
Development Committee Chair (2012 to present)
OBFS-LTER Liaison (2007 to present)
Human Diversity Committee Chair (2006 to 2008), Human Div. Award Coor. (2007)
Program Committee Member (2005 to 2006)
Congressional Visits Team Member 14-15 March 2006, Team Leader 18-19 April 2007
Strategic Review Team 23-25 January 2004

Professional Activities (continued)

Pine Lake Environmental Campus Field Station; Hartwick College; Oneonta, NY; 14-19 December 2011; Strategic Plan Reviewer and Writer
Sanata Rosa Island Research Station; California State University - Channel Islands; Camarillo, CA; 02-05 April 2014; Strategic Review Team Leader
Nantucket Field Station; University of Massachusetts-Boston; Nantucket, MA; 14-18 October 2012; Strategic Review Team Leader
Cincinnati Center for Field Studies; University of Cincinnati; Cincinnati, OH; 08-11 Sep 2010; Strategic Review Team Leader
Taylor Wilderness Field Station; Cascade, Idaho; 06-08 October 2008; Strategic Review Team Leader
Cynthia de Grandpre, Katherine Ordway Natural History Study Area, St. Paul, MN; 13-15 June 2012; Strategic Review Team Member
Llano River Field Station; Texas Tech University; 22-25 March 2012; Strategic Review Team Member
Tyson Research Center; Washington University in St. Louis, Missouri; 15-18 December 2008; Strategic Review Team Member
North Dakota State University Field Station Strategic Plan Review Team 15-18 October 2006
Trinity College Field Station Workshop Review Team 18-21 October 2002
Pymatuning Laboratory of Ecology - University of Pittsburgh Strategic Planning Workshop Review Team 03-06 December 2001
Hubbard Brook Facility Planning Workshop Review Team 16-18 July 2001
Baltimore Ecosystem Study Information Management Review Team 01-03 May 1999
Western Carolina University, Board of Governor’s Teaching Award Committee, Chair (2010-2011), Member (2009-2010)
Western Carolina University, Graduate Council Member (2010 to present)
Western Carolina University, Faculty Representative for Chancellor Review 27 October 2008
Rocky Mountain Biological Laboratory, Research Fellowship Committee January 2009
Western North Carolina Science Fair Judge WCU Ramsey Center 19 Feb 2009, 09 Feb 2010
NEON Network Site Visit Review Team Member 19-23 March 2007
Coweeata LTER Co-Lead Principal Investigator (2002 to 2008)
Coweeata LTER Science Advisory Committee Member (1995 to 2008)
University of Georgia, Academy of the Environment Member (2006 to 2008)
LTER Network International Committee Member (2003 to 2008)
LTER Network Technology Committee Member (1998 to 2007)
LTER Network All Scientists Meeting Program Committee (2006)
Invited Participant in the LTER Network Ecophylogenetics Workshop University of Minnesota 31 May to 03 June 2007
Invited Participant in the Collaborative Wireless Infrastructure Workshop University of California - Los Angeles 28 February to 01 March 2006
Invited Research Seminar and Facilities Development Plan Reviewer - Jornada LTER Site New Mexico State University October 2005
Coweeata Hydrologic Laboratory - Hydrologist GS-9 Review Committee Member June 2005
LTER Climate Effects Workshop - Portland State University 24-27 June 2004
Awards and Honor Societies

Western Carolina University: Finalist for College of Arts and Sciences Outstanding Teaching Award (April 2012)
Western Carolina University: Nominee for Service Learning Teaching Award (April 2011)
Macon County Schools: Certificate of Appreciation for Leadership of Coweeta LTER Schoolyard Program (February 2008)
Coweeta Schoolyard LTER Teachers: Certificate for Outstanding Leadership, Support, and Enthusiasm for the Coweeta Schoolyard Program at Macon Middle School (May 2008)
Ecological Society of America: Certificate of Appreciation for Leadership in hosting the Strategies for Ecology Education, Diversity, and Sustainability (SEEDS) Program at Coweeta Hydrologic Laboratory (November 2006)
USDA Forest Service: Certificate of Appreciation for Contributions towards Coweeta Hydrologic Laboratory Receiving the Southern Research Station Director's Award for Outstanding Customer Service (June 2001)
USDA Forest Service: Certificate of Appreciation for Contributions towards Coweeta Hydrologic Laboratory Receiving the Chief's Stewardship Award (July 2000)
Coweeta LTER Program: Certificate for Leadership and Support of the Coweeta Schoolyard LTER Education Program (May 1999)
Coweeta LTER Program: Certificate for Outstanding Performance in Managing the Coweeta LTER Program (June 1997)
USDA Forest Service: Certificate of Excellence for Recovery Efforts after Hurricane Opal at Coweeta Hydrologic Laboratory (October 1995)
Sigma Xi Membership (Scientific Honor Society)
Xi Sigma Pi Membership and National Scholarship (Forestry Honor Society)
Alpha Zeta Membership (Agricultural Honor Society)

Peer Reviewer

American Journal of Botany
BioScience
Bulletin of the Torrey Botanical Club
Canadian Journal of Forest Research
Department of Defense, Strategic Env. Research and Development Prog. (Proposals) 2010
Ecological Applications
European Commission Research Directorate Panelist (Proposals)
   Global Change and Ecosystems - Integrated Projects and Networks of Excellence 2004
Forest Ecology and Management
Functional Ecology
Functional Ecosystems and Communities
Journal of Environmental Management
Journal of Forest Research
Journal of Hydrology
Journal of Vegetation Science
Looking at the Environment (Text Book)
Methods in Ecology and Evolution
National Institute for Global Environmental Change (Proposals)
Peer Reviewer (continued)
National Science Foundation Panelist (Proposals)
  Academic Research Infrastructure (ARI) Competition 2009
  Population and Community Ecology Competition 2011
  Dynamics of Coupled Natural and Human Systems 2012
  Population and Community Ecology Doctoral Dissertation Improvement 2013
National Science Foundation Ecosystem Studies Competition 2006, 2007, 2008 (Proposals)
National Science Foundation FSML Competition 2006, 2007 (Proposals)
National Science Foundation LTREB Competition 2008, 2009, 2010 (Proposals)
Natural Areas Journal
Oikos
Plant Ecology
Plant and Soil
Polish Journal of Ecology
Tahoe Science Consortium 2007, 2008 (Proposals)
Tree Physiology
University of Vermont Agricultural Experiment Station 2004 (Proposal)
USDA Cooperative Research Innovation Grants (Proposals)
USDA Small Business Innovation Research Program (Proposals)
USDA National Institute of Food and Agriculture (Proposals)
USDA National Research Initiative Competitive Grants Program (NRICGP) (Proposals)

Refereed Scientific Publications


Refereed Scientific Publications (continued)


Refereed Scientific Publications (continued)


Manuscripts Submitted
Grants Received

National Science Foundation. 2011-2013. Positioning field stations and marine laboratories for emerging initiatives in scientific research and training. $188,550. I.C. Billick (PI), I.G. Babb (co-PI), B.D. Kloeppel (Co-PI), J.C. Leong (Co-PI), and J.G. Sanders (Co-PI).


USDA Forest Service. 2009-2013. Coweeta permanent plot vegetation changes: succession and exotic insect and disease impacts from the 1930s to 2000s. $65,697 B.D. Kloeppel (PI).


National Science Foundation. 2003-2004. Educational activities and equipment for the Coweeta LTER program grant number (DEB-02-18001). $52,000. T.L. Gragson (PI) and B.D. Kloeppel.


USDA Forest Service. 2002-2005. Regulation of sapflow and streamflow dynamics in deciduous and evergreen watersheds at Coweeta Hydrologic Laboratory. $45,772. B.D. Kloeppel (PI) and T.L. Gragson.
National Science Foundation. 2002-2003. Education and equipment supplement to the Coweeta LTER program grant number (DEB-96-32854). $58,000. B.D. Kloeppel and D.C. Coleman.

Grants Received (continued)


National Science Foundation. 2001-2003. Education and equipment supplement proposal to the Coweeta LTER program grant number (DEB-96-32854). $55,000. B.D. Kloeppel and D.C. Coleman.


National Science Foundation. 1999-2000. Communication Improvements to the Coweeta LTER program at Coweeta Hydrologic Laboratory. $290,000. B.D. Kloeppel (PI) and D.C. Coleman.


Grants Received (continued)
National Science Foundation. 1999-2000. Schoolyard LTER supplement to the LTER program at Coweeta Hydrologic Laboratory (DEB-96-32854). $15,000. B.D. Kloeppel and D.C. Coleman.


Proposals Submitted

Non-Refereed Scientific Publications

Non-Refereed Scientific Publications (continued)


Non-Refereed Scientific Publications (continued)


Non-Refereed Scientific Publications (continued)


Non-Refereed Scientific Publications (continued)


Non-Refereed Scientific Publications (continued)


Research Presentations

2014 Conference of Southern Graduate Schools - Annual Meeting. San Antonio, TX. “Graduation and Career Success Student Workshop”


Research Presentations (continued)


2009 Biology 636 - Physiological and Ecosystem Ecology - Western Carolina University. Cullowhee, NC. “Measuring, modelling, and interpreting soil respiration in forested ecosystems” with Beverly Collins.


2008 Ecological Society of America - 93rd Annual Meeting. Milwaukee, WI. “Integrated research and education projects of the Coweeta Hydrologic Laboratory” with S. Farinas.


2007 Southwestern Community College - Invited Seminar. Sylva, NC. “Plants, Water Availability, and Local to Global Warming”. 

**Research Presentations (continued)**


2007  USDA Forest Service Southern Research Station All Scientists Meeting. Lake Lanier, GA. “Current riparian zone structure and function research at the Coweeta Hydrologic Laboratory” with B.D. Clinton, K.J. Elliott, C.R. Ford, J.D. Knoepp, and J.M. Vose.


2006  University of Georgia Warnell School of Forestry and Natural Resources Seminar. Athens, GA. “Carbon and water dynamics along forest ecosystem gradients”.


2006  Conference on Forest and Water in a Changing Environment. Beijing, China. “Multi-scale comparison of hydrologic and biogeochemical impacts of insect and disease...
outbreaks with forest harvesting” with J.M. Vose, W.T. Swank, C.C. Rhoades, and A.S. Fernald.

2006  ILTER Regional Meeting. Východná, Slovakia. “Collaborative research in the Central and Eastern European / Baltic regions” with Julius Oszlanyi and Saulius Svazas.

Research Presentations (continued)


2003  Ecological Society of America - 88th Annual Meeting. Savannah, GA.” Hillslope and streamwater nutrient dynamics following upland riparian canopy tree windthrow in the

2002 University of Georgia, Institute of Ecology - Ecology 8000 Seminar. Athens, GA. “Ecological Research at Coweeta Hydrologic Laboratory”

Research Presentations (continued)


2001 University of Georgia, Institute of Ecology - Ecology 8000 Seminar. Athens, GA. “Coweeta Long-term Ecological Research (LTER) Program and Research Opportunities”


2000 University of Georgia, Institute of Ecology - Ecology 8000 Seminar. Athens, GA. “Coweeta Long-term Ecological Research (LTER) Program: Regional and International Research Opportunities”


2000 LTER Network All Scientists Meeting. Snowbird, UT. "Eastern deciduous forest net primary productivity at Coweeta Hydrologic Laboratory".

2000 LTER Network All Scientists Meeting. Snowbird, UT. "Interactive mapping for research project management" with E.P. Gardiner and R. Rouhani.

2000 LTER Network All Scientists Meeting. Snowbird, UT. "Small watershed research at Coweeta Hydrologic Laboratory" with W.T. Swank.

2000 LTER Network All Scientists Meeting. Snowbird, UT. "Coweeta LTER Program Overview" with D.C. Coleman, and J.M. Vose.

1999 Ecological Society of America - 84th Annual Meeting. Spokane, WA. “Aboveground forest biomass, net primary productivity, and nitrogen content across a complex
gradient at Coweeta Hydrologic Laboratory, North Carolina”, with N.R. Hayden, J.S. Clark, M.D. Hunter, and B.C Reynolds.


Research Presentations (continued)


1999  Invited Speaker: Baltimore Ecosystem Study (BES) Information Management Workshop. Baltimore, MD. “Information Management in the Coweeta LTER Program”.


1999  University of Georgia, Institute of Ecology. Athens, GA. “Carbon dynamics along forest ecosystem gradients”.


1998  Central Europe International LTER Workshop, Madralin, Poland. “Terrestrial carbon cycling and ecosystem productivity in responses to land use change at the Coweeta LTER site, USA”.

1998  Institute of Dendrology, Polish Academy of Sciences, Kornik, Poland. “Larix spp. and evergreen conifer comparisons of carbon and nitrogen use efficiency and foliar carbon isotope concentration”.

1998  Department of Forestry, North Carolina State University, Raleigh, NC. “Wood respiration and biomass allocation across a chronosequence and topographic gradient in southern Appalachian hardwood forests”.


Research Presentations (continued)


Curriculum Vitae
ROBERT J. “TRIP” KRENZ III
336 Stillwell Building
Department of Geosciences and Natural Resources
Western Carolina University
Cullowhee, NC 28723
540.315.8934
rjkrenz@wcu.edu

EDUCATION

Ph.D., Forest Resources and Environmental Conservation, Virginia Tech 2009-2015
Dissertation title: Organic matter processes of constructed streams and associated riparian areas in the coalfields of southwest Virginia.

M.S., Biological Sciences, Eastern Illinois University 2007-2009

B.S., Biological Sciences, Environmental Biology, Eastern Illinois University 2002-2006

PROFESSIONAL EXPERIENCE

Visiting Assistant Professor, Western Carolina University, Geosciences and Natural Resources, Natural Resources Conservation and Management Program 2015-present
Department head: Mark Lord, Ph.D.
Program chair: Pete Bates, Ph.D.

Research Associate, Virginia Tech, Crop and Soil Environmental Sciences 2014-2015
Supervisor: Carl E. Zipper, Ph.D.
Research activities: Evaluating hydrologic patterns and major ion composition of surface water draining experimental valley fills in southwest Virginia coalfields relative to traditional valley fills and reference headwaters. Characterizing long-term soil development and establishment, diversity, and abundance of vegetation on reclaimed mine sites following differential spoil handling and seeding treatments.

Graduate Teaching Assistant, Virginia Tech, Biological Sciences 2014-2014
Supervisors: Catherine M. Sarmadi, Biology Laboratory Coordinator; Arthur L. Buikema, Jr., Ph.D., Biology Laboratory Co-coordinator and Alumni Distinguished Professor

Graduate Research and Teaching Assistant, Virginia Tech, Forest Resources and Environmental Conservation 2009-2013
Co-advisers (Research): Stephen Schoenholtz, Ph.D., Virginia Water Resources Research Center Director and Professor of Forest Hydrology and Soils; Carl Zipper, Ph.D., Powell River Project Director and Professor of Environmental Science
Supervisor (Teaching): John R. Seiler, Ph.D., S.H. Short Endowed Professor and Alumni Distinguished Professor of Forestry
Graduate Research Assistant, Eastern Illinois University, Biological Sciences 2007-2009
Adviser: Charles Pederson, Ph.D., Professor of Aquatic Ecology and Limnology
Student Conservation Association AmeriCorps Intern, Mammoth Cave National Park,
Science and Resource Management Division 2006-2006
Supervisor: Brice Leech, Natural Resources Specialist
Undergraduate Research Assistant, Eastern Illinois University,
Supervisor: Eric Bollinger, Ph.D., Professor of Conservation Biology and Nathan Hudson, M.S. student
Animal Diversity Laboratory Teaching Assistant, Eastern Illinois University, Biological Sciences 2004-2004
Supervisor: Paul Switzer, Ph.D., Professor of Entomology
Conservation Technician Summer Intern, Richardson Wildlife Foundation 2003-2003
Supervisor: Terry Moyer, Vice President, Site Manager, and Wildlife Biologist

TEACHING PHILOSOPHY
The multifaceted, science-based approach to education that I employ fosters critical thinking and problem solving in the context of natural resources management and conservation. I focus on active learning strategies that accommodate various learning styles and that integrate fundamental subject matter with opportunities for students to refine their communication skills. This promotes development of adaptable students with skills that are transferrable to a number of career paths. Environmental issues cross disciplinary boundaries and are increasingly important at local, regional, and global scales. By providing a learning environment that encourages students to intelligently evaluate these issues, I strive to empower students to actively contribute to the conservation and management decisions they will encounter throughout their lives.

COURSES TAUGHT

NRM 140. Natural Resources Conservation and Management, Instructor of record. 2015
NRM 210. Methods in Natural Resources Management, Co-instructor of record. 2015
BIOL 1116. Principles of Biology Laboratory, Sole instructor of three sections. 2014
FOR 2324, Dendrology Laboratory, Co-taught rotating groups of ~15 students. 2011
FOR 2314, Forest Biology and Dendrology, Teaching assistant responsibilities. 2009
BIO 1300G, Animal Diversity, Teaching assistant responsibilities. 2003

Peer-reviewed Publications


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### Other Publications and Reports


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### Contributed Presentations


Krenz III, R.J. and C.L. Pederson. 2008. Use of photopigments as descriptors of phytoplankton assemblages for biotic assessment of Illinois reservoirs. 69th Annual Meeting of the Association of Southeastern Biologists. Spartanburg, South Carolina. (Oral)

Research Grants Awarded


Other Academic Awards and Recognition


2006, **Summa Cum Laude** and **Honors College graduate**. Eastern Illinois University (undergraduate).
2006, **AmeriCorps Education Award**. $1,000. AmeriCorps, through the National Service Trust.
2005, **Hunt Environmental Biology Scholarship**. $500. Eastern Illinois University Department of Biological Sciences.
2002-2006, **Dean's List, College of Sciences**. Eastern Illinois University (undergraduate).
2002-2006, **Elks National Foundation Most Valuable Student Scholarship**. $1,000 per annum. Elks National Foundation.

### Relevant Service/Outreach

2015, **Mine engineer “Constructing streams as mitigation for forested headwater stream losses: important considerations” continuing education seminar**. VT Department of Crop and Soil Environmental Sciences coordinated program, Wise, VA. (Presenter)
2013, **Stroubles Creek cleanup**. American Water Resources Association student chapter, Blacksburg, VA. (Organizer and participant)
2012, **Montgomery County Park cleanup**. Forestry Graduate Student Association, Blacksburg, VA. (Participant)
2011-2012, **Various projects raising money for Amman Imman well installation in Azawak region of West Africa**. VT American Water Resources Association chapter, Blacksburg, VA. (Organizer and participant)
2010, **Stroubles Creek stream restoration tree planting, coir fiber and log installation**. VT Dept. of Biological Systems Engineering restoration efforts, Blacksburg, VA. (Participant)
2010, **Virginia elementary and middle school teacher in-service training—Water Education for Teachers (Project WET)**. Izaak Walton League, Christiansburg, VA. (Organizer and participant)
2008-2009, **1st grade “Biology in your backyard” classroom demonstrations**. EIU Fish and Wildlife Club annual visits to Carl Sandburg Elementary, Charleston, IL. (Organizer and participant)
2008, **Native plant landscaping**. Douglas-Hart Nature Center, Charleston, IL. (Participant)
2007-2008, **Lake Charleston cleanup**. EIU Fish and Wildlife Club, Charleston, IL. (Organizer and participant)
2006, **American chestnut, American elm, and native giant cane plantings**. Park personnel and Western Kentucky University volunteers, Mammoth Cave, KY. (Supervisor and participant)
2006, **Creosote timber removal from cave and cutting of forest fireline for prescribed burns**. Park personnel and Western Kentucky University volunteers, Mammoth Cave, KY. (Supervisor and participant)
2003, **Aging deer and ensuring permit compliance at deer check station**, Eastern Illinois University volunteer support for Illinois Department of Natural Resources, Watson, IL. (Inspector)

### Technical and Administrative Skills

#### Management and Leadership

- Prepared biennial data reports and quarterly activities reports to funding entities as a research associate.
- Managed and maintained shared research equipment and vehicle as a research associate.
- Managed and trained 6 undergraduates and coordinated research with 2 graduate students during Ph.D.
- Prepared annual progress reports and presentations for funding entities during Ph.D.
- Managed and trained 4 undergraduates and coordinated research with 4 graduate students during M.S.
- Designed research and implemented field and lab methods for both graduate degrees.

#### Field Techniques

- Proficient at operating and maintaining **remote sensors** (e.g., Onset-HOBO temperature, pressure, and conductivity sensors).
- Proficient with **physical survey techniques** using clinometers, optical transit, and laser-based systems.
- Proficient with **riparian and lotic sampling and characterization** methods (e.g., water quality, physical habitat, stream discharge, benthic macroinvertebrates, and primary production).
• Proficient with **lentic sampling and characterization** methods (e.g., phytoplankton, zooplankton, benthic macroinvertebrate, and water and sediment chemical sampling).
• Proficient with **USEPA Rapid Bioassessment Protocol (RBP)** methods.
• Proficient with **QA/QC procedures in the field and laboratory.**
• Proficient at **orienteering** (map and compass) and using **Global Positioning Systems (GPS).**
• Proficient at operating and maintaining **Eureka, Hanna, YSI,** and **Hydrolab Quanta** water quality meters.
• Proficient at operating many types of **heavy equipment, off-road vehicles,** and **power tools.**
• Experienced performing **field-based wetland delineation** including soil and vegetation characterization.
• Experienced **electrofishing, electroseining,** and **seining** for fish in both lentic and lotic systems.
• Experienced at **aging deer** by jaw and teeth.
• Experienced **tagging deer** and **banding waterfowl.**

**Lab Techniques**

• Proficient at **processing organic matter** to determine leaf breakdown rates, litterfall input rates, and periphyton biomass accrual rates and standing crop.
• Proficient at **identifying benthic macroinvertebrates** to genus and characterizing the benthic assemblage using a variety of community-based assessments.
• Proficient with several laboratory SOPs for **analytical water chemistry** determinations including ion chromatography (broad anions), inductively coupled plasma spectroscopy (dissolved metals and cations), and auto-analyzer methods (major nutrients).
• Proficient at performing many laboratory analyses by hand according to **APHA Standard Methods** (e.g., phaeopigments, chlorophyll-a, alkalinity, phosphorus, nitrogen).
• Proficient at using **HPLC** to characterize phytoplankton assemblages based on **photopigment profiles.**

**Software and Web Technologies**

• Proficient with **Microsoft Office Suite** including **Word, Excel,** and **PowerPoint.**
• Proficient with statistical software including **SAS, Primer-E, Minitab,** and **JMP.**
• Proficient at analyzing and managing geospatial data with **ESRI ArcGIS** and **ArcCatalog** software.
• Proficient with the **Ecological Data Application System (EDAS 3.0)** for characterization of benthic macroinvertebrate assemblages.
• Experienced with **USEPA EnviroMapper** and **USDA-NRCS Web Soil Survey.**
• Experienced in **WordPress.**
• Familiar with **BSTEM** and **HEC-RAS** models and their application to stream restoration engineering.

**Laws and Regulations**

• Proficient understanding of compliance and enforcement of National Environmental Policy Act (NEPA), Clean Water Act (CWA), and Surface Mining Control and Reclamation Act (SMCRA).
• Experienced with application of the U.S. Army Corps of Engineers Wetland Delineation Manual.
• Experienced understanding of USDA-NRCS “Big Blue Book of Stream Restoration”. 210-NEH-654.

**Current Certifications**

• American Canoe Association (ACA) swift water rescue certified (level 4, 2012).
• National Safety Council (NSC) first aid and CPR certified (2014).

**Professional Affiliations**

Society for Freshwater Science, formerly known as the North American Benthological Society.
American Water Resources Association, student chapter Treasurer (2010-2011) and Secretary (2012-2013).
Sigma Xi, associate member.
Association of Southeastern Biologists.
EDUCATION

Ph.D.  University of North Dakota (1988), Geology
M.S.  University of North Dakota (1984), Geology
B.S.  State University of New York College at Cortland (1981), Geology, with honors

ACADEMIC LEADERSHIP EXPERIENCE

Department Head, Geosciences and Natural Resources, 2006 - 2011; July 2013 to present.

The Department is home to about 20 faculty in four undergraduate academic programs (geology, natural resources conservation and management, environmental science, and geography) and is affiliated, to different degrees, with three centers. The student majors in the department currently number about 200 and are increasing. Between major, general education, and service classes, the department enrolls over 1000 students per semester in about 50 sections of courses. The geology program also contributes to the interdisciplinary Secondary Science Education degree program.

Responsibilities: provide leadership on departmental and university initiatives, quality of student educational experience, budget management and request (~$1M with ~$70K operational), curriculum, faculty evaluation and development, course scheduling, staffing and hiring, assessment, development, and is a member of College of Arts and Sciences leadership.

Acting Provost, WCU, May 2013

Interim Associate Provost, WCU, August 2011 - June 2013

Responsibilities: key ongoing responsibilities included oversight of the tenure-promotion-reappointment process, curriculum on-campus and liaison with the general administration of the University of North Carolina System, oversight of summer instructional programs, liaison with faculty senate on matters of evaluation of faculty and academic policies, support and professional development for department heads, oversight of new faculty orientation, liaison with legal counsel on most matters related to Academic Affairs, and Academic Affairs member of the Student Crisis Response Team. Administrative oversight responsibilities included the Coulter Faculty Commons, the Registrar’s Office, One Stop, Disability Services, and Student Support Services. Select ad hoc roles and activities included taking
part in or leading enrollment management and projection, academic affairs budget prioritization, campus safety training, student problems, 5th year report for Southern Association of Colleges and Schools Commission on Colleges (SACSCOC), faculty workload, external grants indirect policies, faculty quality of life, and academic program prioritization.

**Chair, Secondary Science Education Advisory Committee, WCU, 2006-2011**

*This role could be listed under service, but I highly valued this role and think it was important. I initiated and formalized this committee that has, I think, given strong support to this important program and contributed to its increase in quality and numbers. By design, it includes membership from three science departments, and the associate deans of the College of Arts & Sciences and the College of Education and Allied Professions. Concurrent with this establishment and work of this committee, we revised the science education curriculum to include a science course that models best practices in inquiry-based education and a senior science research requirement.*

**FACULTY & PROFESSIONAL EXPERIENCE**

1998-Present: Professor of Geology (Assistant 98-03, Associate 03-08), Department of Geosciences and Natural Resources, Western Carolina University


*The FCEEP was a hands-on, investigative, natural science education outreach program which partnered college and precollege students in a holistic study of a watershed (FCEEP program enlarged; now named Creek Connections)*

1990-1998: Assistant Professor of Geology, Department of Geology, Allegheny College

1988-1990: Assistant Professor of Earth Science, University Arkansas at Little Rock

1987: Geologist (part-time), North Dakota Geological Survey

**TEACHING PHILOSOPHY AND COURSES TAUGHT**

*My overarching goal as a faculty member (and in administration) is to use my position to provide the best education possible to students. Achievement of this goal must include teaching quality courses, providing students with valuable out-of-class experiences; good advising; continued growth as a scientist and educator; involving students in doing research—with some of it directed towards serving the needs of the region; providing a curricular framework to best support education; working with colleagues at the program, department, college, and university levels; and a myriad of other things faculty do to try to serve students. I’ve taught a wide variety of courses, from general education to upper level courses with some graduate students. The primary courses I’ve taught recently are listed below, not including special topics or independent research courses.*
EnvSci 110 Environmental Science  
Geol 140 Investigations in Environmental Geology  
Geol 150 Methods in Geology (aka Physical Geology)  
Geol 302 Geomorphology  
Geol 305 Soils and Hydrology  
Geol 394 Smoky Mountains Field Trip  
Geol 394 Ancient Sedimentary Environments Field Trip  
Geol 405/505 Hydrogeology  
Geol 495 Seminar: Research in Hydrology

SCHOLARSHIP

My disciplinary scholarship focuses on problems of hydrology in the context of the geologic setting and history that are relevant to understanding the potential role of humans in environmental systems. My scholarship of teaching and learning focuses on the role of undergraduate research and project-based investigations in effective learning. My scholarly record includes publications in the four areas of Boyer Scholarship valued by WCU. In addition, my scholarly activity and record includes regional, national, and international research.

Publications


GRANTS AND AWARDS (SELECTED)

I have been the principle or co-principle investigator on over 30 successful grants/contracts through a mix of funders, including federal (e.g. NSF, EPA, USDA), State, and foundation sources. Collectively, these awards have resulted in over $1.4 million, provided direct opportunities and support for dozens of students, and help build curricular and facilities infrastructure to support education and science in the region.


2013, Monitoring and Evaluation of the Big Harris Creek Mitigation Site, Cleveland County, North Carolina. North Carolina Department of Environment and Natural Resources: Ecosystems Enhancement Program, Jerry Miller and Mark Lord, awarded $25,980.


2011, Groundwater Recharge in Different Landscape Elements, Western North Carolina, WCU via National Oceanic and Atmospheric Administration (NOAA) funds: David Kinner and Mark Lord, with Jerry Miller and Ben Tanner: awarded $43,800.

2010, Establishment of Western Carolina Hydrologic Research Station as a State Hydrologic Research Station, focused on groundwater-surface water interaction: North Carolina Department of Environment and Natural Resources, Resource Evaluation Program, in kind, 41 groundwater wells installed at three sites along Cullowhee Creek – Long Branch drainages, Ted Campbell (DENR) and Mark Lord (WCU). (estimated funding ~ $100,000).


2007, Determination of sediment sources and transport pathways, Mgeni and Berg Catchments, South Africa, National Science Foundation--International Travel Grant: Jerry Miller, Dave Kinner, Mark Lord (participated through match funds), awarded $13,559.


2006, Water Quality Monitoring Program, Allens Creek Town of Waynesville, NC: Jerry Miller and Mark Lord, awarded $30,000.

2006, Supplemental Grant for Geomorphic, Hydrologic and Vegetation Interactions Related to Meadow Complexes in the Central Great Basin – Implications for Restoration, U.S. Forest Service, Mark Lord and Jerry Miller, awarded $9,000.

2006, Proposal for Developing a Water Quality Monitoring Plan for potential implementation of a Forest Management Plan, Mark Lord and Jerry Miller, in Bates, Peter (lead PI), Proposal to
develop a forest management plan for the Waynesville Watershed: Town of Waynesville, NC, awarded for Water Quality component ~$7,000.

2005, Geomorphic, Hydrologic and Vegetation Interactions Related to Meadow Complexes in the Central Great Basin – Implications for Restoration, Phase III: EPA Ecosystem Restoration through the U.S. Forest Service, Mark Lord and Jerry Miller, awarded $51,183.

2005, Monitoring of Cullowhee Creek Restoration Project, Monitoring program for the Cullowhee Creek restoration: Mountaintop Land Development Company, Larry Kolenbrander, Jerry Miller, Mark Lord, and Tom Martin, awarded $27,000.


2003, Geomorphic, Hydrologic and Vegetation Interactions Related to Meadow Complexes in the Central Great Basin – Implications for Restoration, Phase II: EPA Ecosystem Restoration through the U.S. Forest Service, Jerry Miller and Mark Lord, awarded $50,394.

2002, Hydrologic and geomorphic characterization and development of the actively incising Indian Creek Valley, central Nevada, U.S. Forest Service: Mark L. Lord and Jerry R. Miller, awarded $24,993.


1999, Geological Society of America Field Trip: Hydrogeology and Wetlands of the Mountains and Foothills near Denver, Colorado: Western Carolina University, Microgrant, Mark Lord, awarded $391.


1998, Research enhancement: Western Carolina University, New Faculty Initiative Program, Mark Lord, awarded $500.

1998, Development of an on-campus environmental/hydrological laboratory site, using geophysical equipment to enhance student involvement in quantitative, inquiry-based activities across the geology and physics curriculum: National Science Foundation: Course, Curriculum, and Laboratory Improvement Program, Virginia Peterson, Kurt Vandervoort, and Mark Lord, awarded $116,329.


1996, The French Creek Environmental Education Project: French Creek Project (a regional environmental group), **awarded $2000.**

1996, The French Creek Environmental Education Project: CNG Foundation Award for Excellence in Education, Consolidated Natural Gas Company, The FCEED was nominated this $100,000 award. Finalist (in final 7 of over 100 nominations), **awarded $1000.**

1995, Proposal for an Environmental Education Program on French Creek: USA Toyota Foundation, James Palmer and Mark Lord, with Allegheny College, **awarded $169,394.**

*This grant initiated the French Creek Environmental Education Project, FCEED.*

1996, The French Creek Environmental Education Project: CNG Foundation Award for Excellence in Education, Consolidated Natural Gas Company, The FCEED was nominated this $100,000 award. Finalist (in final 7 of over 100 nominations), **awarded $1000.**

1993, Support to perform geologic and paleohydrologic field work in Saskatchewan: Allegheny College Faculty Development Committee, **awarded $1600.**

1993, Expenses for invited participation in international symposium and field trip on “Termination of the Pleistocene”, History and Drainage of Large Ice-Dammed Lakes, International Geologic Correlation Project 253: University of Manitoba, Winnipeg, Canada, **awarded $600.**

1993, Support for field work of surficial bedforms in Montana and Saskatchewan, Allegheny College Faculty Development Committee, **awarded $900.**

1989, Computer system and Environmental Monitoring Equipment for Field Studies for Undergraduates: National Science Foundation, Instrumentation and Laboratory Improvement Program, Al Karlin, Charles Preston, Phil Kehler, and Mark Lord, **awarded $124,522.**

**Presentations/Published Abstracts at Professional Meetings** (students underlined)

*Presentations at professional meetings reflect scholarly activity and participation of students in my scholarly program. At Western, I have had about 67 student coauthors (~50 different individuals) of presentations at professional meetings.*

Lord, Mark; Kinner, David; Mountjoy, Bryant; and Cato, Michael, 2015, Role of undergraduate research fellows to facilitate course-based undergraduate research: Geological Society of America Abstracts with Programs, Vol. 47. No. 7.

Lord, Mark; Kinner, David, and Burton, Carol, 2015, Together: Grass roots, institutional support, and accreditation to foster (not mandate) growth in undergraduate research: Council of Undergraduate Research Meeting, Norman, Oklahoma, June 23-27, 2015.

Stephens, Chelsea; Keever, Michael; Beck, Hans; Hudspeth, Reece; Lord, Mark; Gannon, JP; Kinner, David; and Campbell, Ted, 2015, Hydrogeomorphic influences of hyporheic exchange in a headwater stream, Cullowhee, NC: Geological Society of America Abstracts with Programs, Vol. 47.

Bartl, Eric; Mountjoy, Bryant; Hartigan, Sean; Gatlin, Jesse; Lord, Mark; Kinner, David; and Gannon, JP, 2015, Hydrogeologic traits and setting of a headwaters stream bound by alluvial and colluvial deposits with a disturbance history typical of the southern Appalachians: a case study: Geological Society of America Abstracts with Programs, Vol. 47.
Mountjoy, Bryant; Cato, Michael; Padgett, Mark; Ferri, Kelly; Fuller, Joshua; Lord, Mark; Kinner, David; and Walsh, Danvey, 2015, Managing a hydrogeologic research station at Western Carolina University: an undergraduate perspective: Geological Society of America Abstracts with Programs, Vol. 47.


Ferri, Kelly; Bright, John; Printz, S. Henry; Lord, Mark; Kinner, David; and Campbell, Ted, 2013, Heterogeneity of groundwater-stream water interactions in a headwaters southern Appalachian watershed, Cullowhee, North Carolina: Clemson 2013 Hydrogeology Symposium, 4 April 2013, Clemson University, Clemson, SC.


Lord, Mark; Kinner, David; and Campbell, Ted, 2012, Hydrometric and geochemical characteristics of shallow groundwater, western North Carolina: Geological Society of America Abstracts with Programs, Vol. 44.


Lorentz, Simon; Kollongei, Kipkemboi; Miller, Jerry; Mackin, Gail; Lechler, Paul; and Lord, Mark, 2012, Event Based Hydraulic Control and Connectivity Influences of Nutrient and Sediment Migration, Mkabela Basin, South Africa: 7th Annual International Symposium on Environment, 14-17 May 2012, Athens, Greece.

Hiatt, Chad; Kinner, David; Lord, Mark; Tanner, Benjamin; Campbell, Ted, and Padgett, Mark, 2011, Hydrogeologic properties of different geomorphic settings in a small disturbed watershed, western North Carolina: Geological Society of America Abstracts with Programs, Vol. 43.


Tennant, C., Morgan, V., Means, C., Lord, M.L., Jewett, D.G., and GBEMP Research Group, 2006, Hydrogeologic setting and characteristics of riparian meadow complexes in the


Peterson, Virginia; Lord, Mark; and Vandervoort, Kurt; April 2004, Cullowhee Creek Environmental Field Station, National Science Foundation Workshop on CCLI projects.


Miller, Jerry R., Mark L. Lord, Steve P. Yurkovich, Larry G. Kolenbrander, and Gail Mackin, 2002, Can geochemical fingerprinting be used to determine the relative contributions of sediment through time from different source areas?—A pilot study in the southern Appalachians, North Carolina, The Water Resources Research Institute of The University of North Carolina Annual Conference, Raleigh, N.C., April 9, 2002.


EDUCATION AWARDS & NOMINATIONS
Chancellor’s Meritorious Award for Engaged Teaching, 2007-2008, WCU
Nominated for College of Arts and Sciences Teaching Award, WCU, (I have been nominated 5X but have not pursued consideration for the award)

Governor’s Award for Environmental Excellence in Education & Outreach, The French Creek Environmental Education Project, State of Pennsylvania, Fall 1998.

A Pledge and a Promise Environmental Award, Anheuser-Busch, The French Creek Environmental Education Project, April 1997, Finalist, 3rd Place, $2,500 Award.


Excellence in Education, CNG Foundation Award, Consolidated Natural Gas Company, The French Creek Environmental Education Project, 1 of 7 Finalist for $100,000 award, 1996.

SERVICE (selected)
Service and engagement are an important and valued part of my positions and profession. My primary focus areas on campus are related to promoting undergraduate research, engaged learning, and science education. Off campus, I work with a wide variety of water-related groups/agencies and work with science educators.

Western Carolina University
- Task Force on two-year learning communities with High Impact Practices (2014-present)
- Master planning implementation subcommittee on sustainability (2014-present)
- Academic Program Prioritization Implementation Committee, (8/2013-1/2014)
- Academic Program Prioritization Coordination Committee, chair (April-June 2013)
- Academic Program Prioritization, co-chair, (spring 2013)
- 2020 Commission Sub-Committee - Fulfilling Educational Needs of State and Region (2012)
- Council of Deans (2011-2013)
Mark Lord

- Chancellors Leadership Council (2011-2013)
- Student Crisis Response Team (2011-2013)
- Search Committee, Assistant Vice Chancellor for Student Success, Chair (Spring 2013)
- Search Committee, Director of Academic Resources (Spring 2013)
- Associate Deans Council, Chair (2011-2013)
- Professional Education Council (2011-2013)
- Provost Executive Committee (2011-2013)
- Academic Restructuring Task Force (2011)
- Academic Policy and Review Council, ex-officio member (2011-2013)
- Academic Calendar Committee, Chair (2011-2013)
- University Strategic Planning Council (2009-2011)
- Dean’s Evaluation Task Force (2009)
- Ad hoc leadership group to work with administration to enhance and formalize use of WCU outdoor spaces for instruction and research (2008-2009)
- Committee to Institutionalize Undergraduate Research and Creative Scholarship (2007-2011)
- Department Heads Council (2006-2011, 2013-present)
- Cullowhee Creek Stream Restoration, ad hoc Committee (2003-2006)
- Executive Steering Committee, Environmental Science Program (2003-2011)
- Environmental Science Degree Planning, ad hoc Committee (1999-2002)

**College of Arts & Sciences**
- Tenure and Promotion Committee (2008-2011)
- Curriculum Committee (2007-2008)
- Strategic Planning Committee (2007-2008)
- Sciences & Mathematics Advisory, ad hoc Committee (2006)
- Dean's Advisory Board (2005-2006)
- Technology Committee (2002-2003)
- Student Recruitment Committee (2002-2005)

**Department of Geosciences & Natural Resources**
- Academic Program Review ad hoc committee (2014-present)
- Recruiting and Retention Committee (2008-2011; 2013-present)
- Faculty Affairs (2005-2007)
- Strategic Planning (2003-2004)
- Department building space and renovation planning Committee (2002-2004)
- Faculty Search Committees (~11, several as chair)
- Geology Program Assessment Coordinator (2001-2011; 2013-present)
- Scheduler, Geology Program Academic Class Schedules (2001-2011; 2013-present)
Community and Professional Service (selected)

- 2014-present, Councilor for Geosciences Division of Council for Undergraduate Research (CUR) [elected twice to this position by CUR geoscience membership]; serve on program review committee.
- 2013-present, Cullowhee Community Planning Advisory Committee: this committee was formed by the Jackson County, NC Commissions. I serve in an appointed position as WCU's representative.
- 2010-2012, Jackson County, NC Water Resources Board, Vice Chair
- 2008-2009 Jackson County Water Task Force, Appointed by Provost to represent WCU.
- High School Science Teacher Dialogue, WCU, Oct. 2008, One-day meeting/conversation arranged with about 35 high school science teachers from the mountain areas of North Carolina. Three goals of conversation: 1) review of College Science Education curriculum, 2) recruiting and retention of science educators, and 3) how to improve partnership between schools and WCU. Dialogue developed with Kefyn Catley, Mark Lord, and other faculty on the science education committee, and in collaboration with College of Education and Allied Professions.
- Judge, most years 2006-present, Western NC Regional Science and Engineering Fair
- Water Quality Issues in Western North Carolina Round Table, May 2008, At WCU, sponsored by the newly formed Institute or Watershed Research and Management—a largely GNR initiative (about two dozen people from wide variety of agencies and NGOs).

Professional Development

I have attended numerous broad meetings/conferences related to higher education in addition to near continuous participation at disciplinary professional meetings. The conferences listed below required acceptance of proposals to attend.

- AAC&U Institute on High Impact Practices and Student Success (June 18-20, 2014), Vanderbilt University, Nashville, TN
- Future of Geoscience Undergraduate Education, NSF Sponsored Summit (Jan. 10-12, 2014), University of Texas at Austin, Austin, TX.
- 2012 COACHE Leaders Workshop (June 17-18, 2012) (Collaborative on Academic Careers in Higher Education), Hosted by the Graduate School of Education, Harvard University, Cambridge, MA.
JERRY R. MILLER
Western Carolina University, Department of Geosciences & Natural Resources
Cullowhee, NC 28723 USA
828-227-2269
jmiller@wcu.edu

EDUCATION
Ph.D. Geology Southern Illinois University, Carbondale 1990
Influences of Bedrock Geology and Karst Processes on the Morphology and Dynamics of Fluvial Systems in the Crawford Upland, South-Central Indiana
M.S. Geology University of New Mexico, Albuquerque, M.S., 1985
B.S. Geology Southern Illinois University, Carbondale 1982

PROFESSIONAL EXPERIENCE
Whitmire Distinguished Professor of Environmental Science, Western Carolina University, Cullowhee, North Carolina 8/1999-Present
Director, Institute of Watershed Research & Management, Western Carolina University, Cullowhee, North Carolina 2007-2010
Adjunct Faculty Member, Institute of Environmental Toxicology & Department of Biology, Clemson University 2006-10
Senior Research Scientist, Land and Water, CSIRO, Townsville, Australia (12 months; on-leave from WCU) 2005
Associate Professor, Department of Geology, Indiana University 8/96-8/99
Purdue University, Indianapolis, Indiana
Associate Research Professor, Quaternary Sciences Center, Desert Research Institute, Reno, Nevada 7/95-8/96
Assistant Research Professor, Quaternary Sciences Center, Desert Research Institute, Reno, Nevada 7/90-6/95
Associate Faculty, Graduate Program of Hydrologic Sciences, University of Nevada, Reno, Nevada 8/92-8/96
Assistant Geologist; Groundwater Section, Illinois State Geological Survey 8/84-8/86

TEACHING PHILOSOPHY
Students of all ages learn by being actively engaged in the experience. My goal is to provide students with a wide range of opportunities, both in- and outside of the classroom, that allows them to participate in the learning activity. I am a firm believer in the teacher-scholar model, and extensively utilize field based, “real-world” problem solving projects that require students to design the approach, collect, manipulate, and
interpret the necessary data, and present their results in both written and oral formats.

**COURSES TAUGHT**
- Geol 410/510  Fluvial Geomorphology
- Geol 423/523  Contaminated Rivers: A Geomorphological-Geochemical Approach to Site Assessment and Remediation
- Geol 393  Research Topics in Geology
- Geol 499  Senior Thesis

**PROFESSIONAL ORGANIZATIONS**
- Geological Society of America  American Geophysical Union
- International Association of Hydrological Sciences

**RESEARCH INTERESTS**
Analysis of fluvial geomorphic responses to natural and anthropogenic disturbances; application of alluvial stratigraphic to applied geomorphic problems; restoration of river and riparian ecosystems; assessment of the environmental impacts of metal mining on the environment; the transport and fate of heavy metals and other contaminants in rivers and lakes; sediment geochemical fingerprinting using multivariate and isotopic methods; analysis of the controls on water quality.

**HONORS AND AWARDS**
- 2005  U.S. Forest Service, Rocky Mountain Research Center publication of the year; with Jeanne Chambers & colleagues for an edited book volume
- 1989-1990  Dissertation Research Award; Southern Illinois University
- 1988-1989  Graduate Fellowship Award; Southern Illinois University
- 1987-1989  Karst Research Fellowship; Cave Research Foundation
- 1987-1989  Geological Society of America Grant Awards
- 1983-1984  DOE Master's Thesis Award for Nuclear Waste Management
- 1982  Outstanding Senior Geologist, Southern Illinois University

**PROFESSIONAL SERVICE**

**Local and State Organizations**
- 2001-P  Technical Advisory Committee, Haywood County Waterways Association, North Carolina
- 2008-11  Technical Advisory Member, NC Ecosystem Enhancement Program’s Little Tennessee Watershed Planning Committee
- 2008  Southeastern Stream Restoration Conference Organizing Committee
- 2007-08  Little Tennessee River, NC Non-point Source Management Team
Service to Professional Organizations


2012  Theme session co-organizer for Southeastern Geological Society of America Meeting, Asheville, NC (with Dave Kinner and Mark Lord)

2008-10 Project Steering Committee, South African Water Research Commission, Definition of Process Zones and Connectivity in Catchment Scale NPS Processes

2009  Geological Society of America, J. Hoover Mackin Award Selection Committee, QG&G Division

2008  Symposium co-organizer, Plenary Session on River Restoration, Annual GSA Meeting, Houston, Texas


2000-02 NC Water Resources Research Institute Technical Committee

2000  Panel Member, U.S. National Assessment of the Consequences of Climate Change; Rocky Mountain/Great Basin Regional Climate-Change Workshop, March, 2000, Salt Lake City

1999  Symposium co-organizer, 1999 ESA Meeting, Portland; Watershed and Riparian Ecosystem Responses to Global Change: Understanding the Linkages between Geomorphic and Ecological Processes

1999  Theme Session co-organizer, GSA 1999 Annual Meeting, Denver, Colorado; Geomorphic and Ecological Responses to Natural and Anthropogenic Disturbances (T47)

1998  Citationist for the 1998 Distinguished Career Award, GSA Quaternary Geology and Geomorphology Division, Annual Meeting, Toronto

1996 & 99  J. Hoover Mackin and Arthur D. Howard Research Award Review Committee; GSA Quaternary Geology and Geomorphology Division.

1996-1997  Sacramento River Mercury Control Planning Project, Technical Committee

Editorial Activities

2014-P  ACCDON, Science Editor

2004-07  Associate Editor, Journal of the American Water Resources Association

GRADUATE STUDENT ADVISEMENT

Graduate Student Supervision (completed M.S. theses under my direction): 12

Current M.S. Supervision: 1 – Danvey Walsh

Senior Thesis Supervision (includes co-advisement at WCU & IUPUI): 5

Current Senior Thesis: Bryant Mountjoy (co-advisor); Eric Bartl

Additional Graduate Committees Served On: Ph.D.: 6  M.S.: 19
PUBLICATIONS

Refereed Books and Edited Volumes


Refereed Journal, Book Chapters, and Technical Articles (student authors in bold, italics)


Non-Refereed Proceedings Papers and Guidebook Articles


**Abstracts and Presentations**

**Summary**

More than 70 presentations given at professional meetings, symposia, and colloquia series. Complete list can be obtained upon request.

**Abstracts and Presentations - Last Five Years (student co-authors in bold, italics)**


Invited Presentations at University Colloquia
(1) Bucknell University, Environmental Sciences Program, 2007
(2) Clemson University, Institute for Ecotoxicology, Spring, 2006
(3) NC State University & WRRI, Seminar Series, 2004
(4) University of Montana, Department of Geology, Spring, 2002
(5) Bucknell University, Department of Geology, Spring, 1997
(6) University of Oklahoma, Department of Geography, Spring, 1999
(7) University of Chicago, Department of Geology, Spring, 1998
(8) Southern Illinois University, Department of Geology, Spring, 1998

Keynote Addresses
(2) 2008 Southeastern Stream Restoration Conference, Asheville
(3) University of Montana, Center for Riverine Science & Stream Naturalization, Fall, 2000

Contract Reports (past five years)


RESEARCH GRANTS (Includes Collaborative Studies)

Total Number of Grants Received: ~35  Total External Funding: ~$3,000,000
Total Internal Funding: ~$238,000

Current and Past External Grants (most recent to oldest; not exhaustive)
(first author listed represents lead P.I.)

McDonald, M., Bird, G., Miller, J., and many Indonesian Investigators
Agency: British Council & US Department of State (Global Innovative Initiative)
Title: Establishing a network of research excellence for mine reclamation in southeast Asia”
Project Duration: 2-years, 2015-17
Total Budget: ~$220,500

Miller, J.R. and Orbock Miller, S.M.
Agency: Pigeon River Fund
Title: Faculty and Student Training in the Collection and Interpretation of Water Quality Data
Project Duration: 1-years, 2014-15
Total Budget: $18,053

Miller, J.R.
Agency: U.S. Fish and Wildlife Service
Title: Mineralogical and Geochemical Analysis of Water and Sediment within the Little Tennessee River Basin
Project Duration: 2-years, 2012-14
Total Budget: $28,000

Miller, J.R.
Agency: North Carolina Ecosystem Enhancement Program
Title: Monitoring and Evaluation of the Big Harris Creek Stream Restoration Project, Cleveland County, North Carolina (IMS # 739)
Project Duration: 3-years, 2012-2016
Total Budget: up to $300,000; based on task orders during four year period; six task orders currently active (~$100,000)
Miller, J.R., Bates, P., and Lord, M.
Agency: Town of Waynesville, North Carolina
Title: Water Quality Monitoring Program, Allen Creek
Project Duration: Multiple-year program; initiated in 2007 & funded through 2015
Total Budget: ~$9,000 per year, plus initial equipment investment of $30,000 in 2006.

Miller, J.R., Lechler, P.J., and Mackin, G.
Agency: U.S. Fish and Wildlife Service
Title: Decline of the Appalachian Elktoe in the Upper L. Tennessee River: Identification of Potential Causes and Planning for Watershed Restoration
Project Duration: 3-years depending on USFWS Budget (2010, $48,300)

Miller, J.R., Atwood, S., Ethridge, M., Flowe, S, and Orbock Miller, S.
Agency: Pigeon River Fund
Title: An Experiential Student Training Program in the Collection, Manipulation, and Interpretation of Water Quality Data.
Project Duration: 1-year (2011-2012)
Total Budget: $24,994

Miller, J.R., and Lechler, P.J.
Agency: National Science Foundation
Title: Geochemical Tracing of Metal Contaminants, Rio Loa Basin, Chile
Project Duration: 1-year (2009-2010); Travel Grant for Project Planning
Total Budget: $11,106

Miller, J.R., Lechler, P.J., Lord, M., and Mackin, G.
Agency: South African Water Research Commission & Whitmire Endowment
Title: Definition of Process Zones and Connectivity in Catchment Scale NPS Processes
Project Duration: 2-year (2009-2010); Joint project with S. Lorentz, KwaZulu-Natal, Pietermaritzburg; funding covered analytical costs and travel to South African field site.
Total Budget: ~$20,000

Miller, J.R., Kinner, D., Acharya, K. (and Lord, M. funded through other sources)
Agency: NSF, International Programs
Title: Determination of sediment sources and transport pathways, Mgeni and Berg Catchments, South Africa
Project Duration: 1-years; Travel/Planning Grant
Total Budget: $13,559
EMILY S. STAFFORD
Instructor, Western Carolina University
Department of Geosciences and Natural Resources
Cullowhee, NC, 28723
(484) 354-3277       esstafford@email.wcu.edu

EDUCATION
Ph.D., Earth & Atmospheric Sciences, University of Alberta       2015
   Dissertation:
M.Sc., Earth & Atmospheric Sciences, University of Alberta       2010
B.S., Geological Sciences, The Ohio State University       2007
B.S., Evolution & Ecology, The Ohio State University       2007

PROFESSIONAL EXPERIENCE
Instructor, Geology, Western Carolina University 2015 – present
Adjunct Instructor, Geology, Western Carolina University        2014
Researcher, Program for the Study of Developed Shorelines,       2014
   Western Carolina University
Lecturer, Geology, Eastern Michigan University 2013 – 2014
Lab Instructor, Biology, Saginaw Valley State University        2014
Graduate Teaching Associate, Earth Science and Paleontology, 2009 – 2013
   University of Alberta
Research and Teaching Assistant, Friday Harbor Laboratories 2008
Teaching Assistant, Geology, San Diego State University 2007 – 2008

TEACHING PHILOSOPHY
As an instructor and a scientist, I believe that geology is an ideal vector for introducing students
to the principles of science and sparking curiosity about our natural world. Hands-on activities
and real-world applications allow students to engage with the subject in meaningful, lasting
ways. In the classroom, I focus on activities, discussions, and inquiries that relate geological
concepts to relatable, everyday experiences, to prepare students for their role as members of our
advanced but changing society.

COURSES TAUGHT
Methods in Geology, Western Carolina University       Fall 2015
Investigations in Environmental Geology, Western Carolina University       2014 – present

PUBLICATIONS
ichnogenus representing predatory attack on the gastropod shell aperture. *Ichnos*, vol. 22, pp.
87 – 102.

Stafford, E.S., L.R. Leighton, and C.L. Tyler (2014). Shell repair frequency tracks predator
abundance in intertidal gastropods. *Marine Ecology*, published online before inclusion in
print issue.

Stafford, E.S. and L.R. Leighton (under revision). Drilling, durophagy, and a test for trophic
cascades in the Miocene St. Mary’s formation. *Paleobiology*

Stafford, E.S. Foraging and handling behavior of a predatory crab on gastropod and hermit crab prey.


**PROFESSIONAL ABSTRACTS** (*WCU undergraduate student authors*)


Stafford, E.S., C.L. Tyler, L.R. Leighton, and F.L. Forcino, 2010. Repair frequency and predation risk in intertidal gastropod populations. GSA Abstracts with Programs vol. 42, no. 5, p. 322.


GRANTS AND AWARDS
2015: First Year Advocate Award Nominee, Western Carolina University
2012: University of Alberta Graduate Student Teaching Award

PROFESSIONAL SERVICE
2015: Session Chair for Geological Society of America, Southeastern Section Meeting
2015: Peer reviewer for Biological Journal of the Linnean Society.
2013: Peer reviewer for PALAIOS; article: Mallick et al. (2013, vol. 28, pp. 683-696)

LOCAL OUTREACH EXPERIENCE
2015: Created and led a fossil exploration activity for elementary age students, Rocket to Creativity Program, Western Carolina University.
DIANE M. STYERS  
Western Carolina University, Geosciences and Natural Resources, Cullowhee, NC 28723 USA  
Phone: 828.227.3819  
Email: dmstyers@wcu.edu

EDUCATION
Ph.D.  Forestry and Ecology (minor)  |  Auburn University  2004-2008  
“Urban Sprawl and Atmospheric Pollution Effects on Forests in the Georgia Piedmont”
M.A.  Geography  |  Georgia State University  2002-2005  
“Ozone Damage Potential to Loblolly Pine Ecosystems in Atlanta, Georgia”

PROFESSIONAL EXPERIENCE
Assistant Professor, Western Carolina University  2011-present
Postdoctoral Research Fellow, University of Washington  2010-2011
Research and Teaching Assistant, Auburn University  2004-2008
Teaching Assistant, Georgia State University  2003-2004
Assistant to the Editor, Professional Geographer  2002-2003

TEACHING PHILOSOPHY
I believe successful teaching should foster self-motivation, critical thinking, a collaborative spirit, and aptitude for problem solving. I think a professor in the natural sciences is successful if her students develop an understanding of scientific ideas and learn how to study the natural world. To develop knowledge, students must learn to ask questions, use evidence to answer them, and defend their conclusions. Beyond a basic understanding of material, at the heart of this paradigm are the abilities to think critically and effectively communicate those thoughts. I design and deliver my courses using a teacher-scholar model with these objectives as priorities.

COURSES TAUGHT
Western Carolina University
GEOG 150: Environmental Geography
GEOG 221: Introduction to Geospatial Analysis
GEOG 300: Weather and Climate
GEOG 324: Introduction to Remote Sensing
NRM 140: Natural Resource Conservation & Management
NRM 210: Methods in Natural Resource Management (Lab)
NRM 440: Integrated Resource Management
NRM 472: Geospatial Analysis
NRM 480: Independent Study in Remote Sensing

Elsewhere
ESRM 430: Remote Sensing, University of Washington, Guest Lecturer
FORY 3100: Dendrology, Auburn University, Teaching Assistant
GEOG 1112: Weather & Climate, Georgia State University, Instructor
GEOG 1113: Landforms, Georgia State University, Instructor
REFEREED PUBLICATIONS


MANUSCRIPTS IN REVIEW


MANUSCRIPTS IN PREPARATION


OTHER PUBLICATIONS


GRANTS AND PROPOSALS ($120,490)

Response of the Soil Microbiome to Invasive Species Management, Western Carolina University, Provost External Funding Support Grant (FY 2014-15); T. Driscoll, C. Kelly, D.M. Styers, and B. Bintz, co-PIs ($15,000) July 2014*

Land use/Land cover and Community Demographics: Implications to Natural Resource Management in and around Olympic and Great Smoky Mountains National Parks (extension to existing grant), USDA Forest Service; D.M. Styers and L.K. Cerveny, co-PIs ($10,000) June 2014*

Community Demographics and Landscape Values: Implications to Natural Resource Management in Great Smoky Mountains National Park, Nantahala National Forest, and southwestern North Carolina, Western Carolina University, Provost External Funding Support Grant (FY 2013-14); D.M. Styers, PI ($9,829) May 2014

Land use/Land cover and Community Demographics: Implications to Natural Resource Management in and around Olympic and Great Smoky Mountains National Parks, USDA Forest Service; D.M. Styers and L.K. Cerveny, co-PIs ($14,996) June 2012*

Characterizing Southern Appalachian Forest Stands using LiDAR Data and Object-Based Image Analysis, Western Carolina University, Faculty Research Award; D.M. Styers, PI ($5,000) January 2012*

Geospatial Relationships of Urban Forest Conditions, Stewardship Activity and Environmental Equity, University of Washington, Royalty Research Fund; L. Monika Moskal, PI ($27,777) June 2011*

Tacoma Canopy Cover Assessment, Washington State Department of Natural Resources, Urban and Community Forestry Program; L. Monika Moskal, PI ($29,888) August 2010*

Urban Natural Resources Stewardship: Geospatial Data Assessment and Management - Supplement and Extension, USDA Forest Service; L. Monika Moskal, PI ($8,000) August 2010*

Note: *Funding has supported student research assistantships.
PROPOSALS IN REVIEW


AWARDS
Chancellors Travel Fund Award, 2014-15, Western Carolina University ($1,200)
Chancellors Travel Fund Award, 2013-14, Western Carolina University ($1,200)
Chancellors Travel Fund Award, 2012-13, Western Carolina University ($1,000)
Chancellors Travel Fund Award, 2011-12, Western Carolina University ($1,000)

INVolvement in OTHER COLLABORATIVE RESEARCH

Landscape-Scale Thresholds of Early Successional Habitat: Reconciling Biodiversity, Public Perception, and Timber Yield In Managed Forests, USDA National Institute of Food and Agriculture, S. Loeb, B. Collins, L. DeWald, and J. Hyman, co-PIs, D.M. Styers, participant ($499,145)

Undergraduate Student Research Projects Directed
Barnett, R.B., Examination of the relationship between evergreen health and precipitation in Mount LeConte, Tennessee using satellite-derived NDVI data, Fall 2014
Powell, P.J., Estimating fire severity in the southern Appalachians from Landsat dNBR and other indices, Fall 2014
Vang, M., Vegetation Phenology in Great Smoky Mountains National Park, Fall 2013
Johnston, R.W., Mapping Forest Community Types Using Segmentation Analysis of LiDAR, Fall 2011

Graduate Student Committees
Hawk, A.M., Habitat modeling of the rare endemic species Trillium simile: A comparison of the methods Maxent and DOMAIN for modeling rare species-rich habitat, April 2015-present

Scholarly Presentations by Students * indicates student author
SCHOLARLY PRESENTATIONS (ALL PEER-REVIEWED) * indicates student author


Styers, D.M. *Examination of MODIS-Derived Vegetation Phenology in Great Smoky Mountain NP.* Presented at the Annual Meeting of the Association of American Geographers, April 8-12, 2014, Tampa, FL.

Styers, D.M. *Characterizing Southern Appalachian Forest Stands using LiDAR Data and Object-Based Image Analysis.* Presented at the Annual Meeting of the Association of American Geographers, April 9-13, 2013, Los Angeles, CA.


Styers, D.M.* and A.H. Chappelka. *Use of Lichens as Bioindicators of Urbanization and Atmospheric Deposition in the West Georgia Piedmont, USA.* Presented at the Emerging Issues along Urban/Rural Interfaces II Conference, April 9-12, Atlanta, GA.

Styers, D.M.* and A.H. Chappelka. *Developing a Land Cover Classification to Select Indicators of Forest Health in a Rapidly Urbanizing Landscape in West Georgia Piedmont, USA.* Presented at the 3rd Annual GIS Symposium, November 1, 2006, Auburn, AL.


Styers, D.M.* and A.H. Chappelka. *Urbanization effects on forest condition in the Georgia Piedmont.* Presented at Auburn University’s Earth Day Science Competition, April 20, 2006, Auburn, AL.

Styers, D.M.* and A.H. Chappelka. *Urbanization effects on forest condition in the Georgia Piedmont.* Presented at the 38th Annual Air Pollution Workshop, April 10-13, 2006, Charlottesville, VA.

Styers, D.M.* and A.H. Chappelka. *Urbanization Effects on Forests near Columbus, Georgia.* Presented at Auburn University’s Earth Day Science Competition, April 14, 2005, Auburn, AL.


CONFERENCE SESSIONS CHAIRED/ORGANIZED


INVITED LECTURES AND WORKSHOPS

Styers, D.M. Using Big Data to Engage Undergraduate Students in Authentic Science. To be presented at the North Carolina Project Kaleidoscope (PKAL) 2015 Spring Regional Network Meeting, March 27, 2015, Winston-Salem, NC (meeting cancelled).

Styers, D.M. Scale Matters: Ecological Health along the Urban-Rural Interface near Columbus, Georgia. Presented at the USDA Forest Service PNW Research Station, March 6, 2008, Seattle, WA.

PROFESSIONAL MEMBERSHIPS

Association of American Geographers, 2003-present
Ecological Society of America, 2005-2009

PROFESSIONAL DEVELOPMENT

Institute on Project-Based Learning, Worcester Polytechnic Institute, June 25-27, 2015.

*The institute will bring together 18 college and university teams to work on projects to advance project based learning on their campuses in collaboration with over 20 WPI faculty.*

Community Scholarship Incubator, Western Carolina University, February 27-28, 2015

*A workshop designed to make connections with community partners across disciplines with the goal of setting a research/action agenda to collaboratively pursue at the end of the CSI retreat.*

Ecological Research as Education Network (EREN) Meeting, Augustana College, June 25-27, 2014

*Meeting foci: incorporating EREN research into undergraduate teaching and development of formal assessment tools for measuring educational outcomes*

Consortium for Geospatial Information, University of Washington, 2010-2011

*Participant in University-wide group promoting the education and use of geospatial technologies*

Center for Studies in Demography and Ecology, University of Washington, 2010-2011

*Participant in weekly seminars*

Northwest Center for Public Health, Healthy Places Research Group, University of Washington, 2011

*Participant in monthly training meetings*

Fundamentals of Ecosystem Ecology (FEE), Cary Institute of Ecosystem Studies, January 2007

*Participant in intensive short course in ecosystem science, with lectures taught by Institute scientists*
PEER REVIEWER

International Journal of Environmental Research and Public Health
Journal of Applied Remote Sensing
Papers of the Applied Geography Conference
Remote Sensing
Science of the Total Environment

SERVICE TO UNIVERSITY (WCU)
Current Number of Undergraduate Student Advisees: 25

Department, College, and University Committees

College of Arts and Sciences
Curriculum Committee, January 2014-May 2016

Department of Geosciences and Natural Resources
Collegial Review Committee, Spring 2015
Program Review Steering Committee, January 2015-present
Resources Committee, 2014-15 academic year
Collegial Review Committee, Spring 2014
Resources Committee, 2013-14 academic year
Faculty Affairs Committee, 2012-13 academic year
Faculty Affairs Committee (non-voting member), 2011-12 academic year

Faculty Search Committees
Visiting Assistant Professor in NRCM, Spring 2015
Human Geography Instructor Position, Spring 2014
Human Geography Lecturer Position, Spring 2013
Watershed Management Tenure-Track Position, Spring 2013

Other Institutional Service
Safe Zone certification, March 2015
Open House, 2012-2015
Freshman Move-In Day, 2012-2014
Presented at the Biology Department's Paul Burton Seminar Series, Seeing the Forest for More than the Trees: Mapping and Valuing Forest Ecosystem Services on October 25, 2013

SERVICE TO COMMUNITY
Western Regional Science Fair, Judge, Western Carolina University, 2012-2015
Cherokee Preservation Foundation and Southwestern Community College, Provider of maps/graphics for “The Traveled Path” (a student-led eco-tourism art piece benefiting the tribe), September 2012
Public Laboratory for Open Technology and Science, Collaborative Infrared Tool Development, Workshop Participant, Asheville, North Carolina, October 21-23, 2011
EDUCATION

Ph.D., Earth and Planetary Sciences, University of Tennessee 2005
Dissertation Title: “C3/C4 Variations in Higher Salt Marsh Sediments: An Application of Compound Specific Isotopic Analysis of Lipid Biomarkers to Late Holocene Paleoclimatic Research”
Committee Chair: Maria E. Uhle, Ph.D.

M.S., Quaternary and Climate Studies, University of Maine 2001
Thesis Title: “Lithic Analysis of Chipped Stone Artifacts Recovered from Quebrada Jaguay, Peru”
Committee Chair: Daniel H. Sandweiss, Ph.D.

B.S., Anthropology, Florida State University 1999

PROFESSIONAL EXPERIENCE

Associate Professor of Geology, Western Carolina University 2011-Current
Assistant Professor of Geology, Western Carolina University 2005-2011
Adjunct Professor of Natural Sciences, Maryville College 2005
Teaching Associate, University of Tennessee 2003-2005
Teaching Assistant, University of Tennessee 2001-2003
Research Assistant, University of Maine 1999-2001
Laboratory Technician, Museum of Florida History 1998-1999

TEACHING PHILOSOPHY

I believe that it is a teacher’s responsibility to present academic material in a way that is accessible, interesting, and applicable to students. I have found that field-based didactic approaches encourage direct involvement in the subject matter, and it is this kind of hands-on learning that reinforces concepts discussed in lecture and clarifies difficult ideas. Also, I find that students are better engaged in the material when they see that it is relevant and applicable to their local surroundings. When students are engaged in their local surroundings they become curious about the processes and mechanisms that have brought about what they are seeing, and ultimately, I believe, they become much more open to the larger learning process.

COURSES TAUGHT

GEOL 140, Investigations in Environmental Geology, Western Carolina University
GEOL 150, Methods in Geology, WCU
GEOL 191, Geology, Landscapes and the Human Psyche, WCU
GEOL 310 Lab, Soils and Hydrology, WCU
GEOL 455/555, Wetlands, WCU
GEOL 465/565, Environmental Geochemistry, WCU
GEOL 494/591, Topics in Geology: Wetland Identification and Delineation
GEOL 495, Senior Research Seminar (Capstone Course), WCU
GEOL 491, Topics in Geology: Coastal Fieldtrip, WCU
GEOL 491, Topics in Geology: Global Climate Change, WCU
GEOL 494, Topics in Geology: Great Smoky Mountains National Park Fieldtrip, WCU
Natural Science: Earth Science and the Environment, Maryville College
Environmental Geology, University of Tennessee
Physical Geology, University of Tennessee

PEER REVIEWED PUBLICATIONS (Bold indicates student author)


PRESENTATIONS AND CONFERENCE ABSTRACTS (Bold indicates student author)


Corcoran, K., Dunlap, C., Tanner, B., 2015, Soil cores of four organic-rich wetland deposits from Western North Carolina provide a record of Holocene environmental change for the Southern Appalachians, Geological Society of America Abstracts with Programs, Vol. 47, No.2.

Tanner, B.R., 2014, Western NC Wetland Peat Core Records and Environmental Change. WCU Biology Paul Burton Seminar Series. (Invited)


Tanner, B.R., 2007, Determination of Carbon Sources to Salt Marsh Sediments Using n-Alkane Distributions and δ13C Analysis, Baruch Marine Field Laboratory, University of South Carolina. (Invited)


Tanner, B.R., and Uhle, M.E., 2004, Compound Specific Isotopic Analysis Provides Paleoenvironmental Information about a Machiasport, Maine Salt Marsh, Gordon Research Conference on Organic Geochemistry, Plymouth, NH.


GRANTS and CONTRACTS – PRINCIPLE INVESTIGATOR or CO-PI (Asterisk indicates prior relevant research that the proposed scholarly development assignment will enhance.)

NSF EAR 1502152, 2014 submission, Not Funded
“Collaborative Research and RUI: Reassessment of Late-Quaternary Paleoclimatology in the Southeastern United States with the Application of Geographically Novel Proxies at New and Established Sites”, $122,797 (Tanner portion of request)
- Lane, C. (UNCW), Tanner, B., Porinchu, D. (UGA)

WCU Faculty Research and Creative Activities Award, WCU, 2013-2014
“Paleoenviromental Analysis of Local Wetlands”, $5000
- B. Tanner is the principle investigator on this grant proposal

NOAA Grant, to WCU, 2011-2012
“Monitoring of coastal wetland plant community change under a regime of sea level rise: Implications for marsh migration and carbon sequestration”, $29,500
- B. Tanner is the principle investigator on this grant

Cherokee Preservation Foundation, 2010-2011
“Rivercane Restoration Project”, $12,000
- B. Tanner is a collaborator and partner on this grant and is in charge (w/Dave Kinner) of money allocated to WCU through a contract from this grant.

Schoodic Research Fellowship, Acadia National Park, 2009
“Determination of Carbon Sequestration Rates in Salt and Freshwater Marshes in the Schoodic Section of Acadia National Park”, $5,000
- B. Tanner is the principle investigator on this grant
QEP Faculty Development Grant, 2008
QEP Development Grant in Support of Course Related Fieldtrip, $770.44

Cherokee Preservation Foundation, 2007-2008
“Western Carolina University Rivercane Project”, $50,000
  - B. Tanner is a co-PI on this grant

Maine Sea Grant, 2007-2008
“Use of Biomarkers to Determine Life Cycles of Maine Salt Marsh Pannes”, $3,000
  - B. Tanner is the principle investigator on this grant

Baruch Marine Field Laboratory, 2007
Visiting Scientist Award (Salt Marsh Carbon Sequestration Study), $3,000
  - B. Tanner is the principle investigator on this grant

WCU Faculty Research Grant, 2006-2007
“Oxygen Isotope Record of Hurricane Activity Recorded in Tree Rings of Longleaf Pine”, $12,500
  - B. Tanner is the principle investigator on this grant

Cherokee Preservation Foundation, 2006-2007
“Western Carolina University Rivercane Project”, $101,000
  - B. Tanner is a co-PI on this grant

WCU Arts & Sciences Technology Committee, 2006
“Technology Development Grant for acquisition of Geochemist’s Workbench v.6 software”, $1,000

Sigma Xi Grants-in-Aid of Research, 2004
“Maine Salt Marsh Project”, $752

UT Department of Earth and Planetary Sciences, 2004
Discretionary Funds Award Supporting Maine Salt Marsh Research, $650

Geological Society of America, 2004
“Maine Salt Marsh Project”, $2,000

Geological Society of America, 2003
“Maine Salt Marsh Project”, $1,800

University of Tennessee, 2002
Scholarly Activity and Research Incentive Fund (SARIF), $3,000

HONORS AND AWARDS

Provost Fellow for Academic Community Engagement, WCU 2014-2015
Scholarly Development Assignment Program, WCU 2015
Chancellor’s Meritorious Award for Engaged Teaching, WCU 2007
Research Fellow, Program for the Study of Developed Shorelines, WCU 2007-Present
Outstanding Achievement in Interdisciplinary Research, University of Tennessee 2005
Gene Tipton Graduate Mineralogy Award, Knoxville Gem & Mineral Society 2004
Highest Graduate Student GPA, departmental award, University of Tennessee 2003

PROFESSIONAL ORGANIZATIONS

American Quaternary Association
INTERNAL SERVICE

Marine Science Undergraduate Program Committee (UNC System) 2013-2014
UNC Engagement Council (UNC System) 2014-2015
Provost Advisory Board for Academic Community Engagement (Univ. Level) 2014-Current
Service Learning Course Designation Sub-committee (Univ. Level) 2015
WCU Community Scholarship Incubator Retreat Planning Committee (Univ. Level) 2014-2015
Faculty Scholarship Task Force (Univ. Level) 2010-2011
Faculty Scholarship Advisory Council (Univ. Level) 2010-2011
  Chair of Committee 2010-2011
University Research Council 2009-2010
Environmental Sciences Executive Committee (A&S) 2011-Current
College of Arts & Sciences Collegial Review Committee 2014-Current
College of Arts & Sciences Strategic Planning Committee 2013
College of Arts & Sciences Research Tech. Search Committee 2011
College of Arts & Sciences Safety Committee 2007-2014
College of Arts & Sciences Technology Committee 2007-2009
Geosciences & NRCM AFE Committee 2007-2008, 2012-Current
  Chair of Committee 2012, 2015
Geosciences & NRCM CRD Committee 2011-Current
Geosciences & NRCM Student Recruitment and Retention Committee 2011-2012
Geosciences & NRCM Faculty Affairs Committee 2007-2013,
  Chair of Committee 2009, 2010, 2013
Geosciences & NRCM Business and Space Affairs Committee 2006/2007
Departmental Liaison for Career Services 2006-2010
Departmental Liaison for State Employees Combined Campaign 2006-2007
Geosciences QEP Point Person 2009-Current
Geosciences Search Committee for full time faculty hire 2005, 2006, 2010, 2013,
  2014
  Chair of Committee 2013
Chair of Geoscience Search Committee for adjunct hire 2015

REVIEWS

Book Chapter Review (Natural Disturbances and Range of Variation: Type, Frequency, Severity, and Post-disturbance Structure in Central Hardwood Forests) 2014
Organic Geochemistry 2013
Wetlands 2011
Southeastern Geology 2009
Environmental Pollution 2008
Latin American Journal of Sedimentology and Basin Analysis 2008
National Science Foundation CAREER Program 2006, 2007
Antarctic Science 2007
Journal of Coastal Research 2006

EXTERNAL SERVICE

Dept. of Earth and Planetary Sciences Alumni Advisory Board, Univ. of TN 2015-Present
Geological Society of America, SE Section theme session convener 2006, 2015
Geological Society of America, SE section student poster contest judge 2015
Student Volunteer Coordinator for SE Geological Society of America
Meeting, Asheville 2011-2012

Science Fair Judge, Cullowhee Valley School 2009, 2010
Presentation to Boy Scout regional meeting 2006

UNDERGRADUATE STUDENT THESES SUPERVISED

Chris Dunlap – Environmental change at a Southern Appalachian wetland 2015
Joel Bostic – Effects of hard stabilization on coastal salt marsh 2014
Blake Roberts – South Carolina salt marsh carbon sequestration 2013
Erin Parris – Biomarker analysis and environmental change at Panthertown Bog 2012
Lee Sorrels – Maine salt marsh carbon sequestration 2010
Harrison Carter – Carbon sequestration at Jackson Cty. Park wetland 2010
Evan Allen – Stratigraphic signature of Maine salt pools 2008
Katie McDowell – Rivercane soil characteristics 2007
CURRICULUM VITAE

CHERYL WATERS-TORMEY
Dept. Geosciences and Natural Resources, Western Carolina University, NC, USA
+1 828-227-3696 (office)       +1 828-575-4565 (mobile)
cherylwt@wcu.edu

EDUCATION
Ph.D., Structural Geology, University of Wisconsin (Minor: Geophysics) 1999-2004
Strain heterogeneity in lower continental crust: Mt. Hay region, Arunta Block, Central Australia

M.S., Structural Geology, University of North Carolina 1997-1999
Mapping and related studies of pre-Alleghenian tectonic features within the Blue Ridge thrust complex of western North Carolina: Micaville Quadrangle

B.S., Geology, Duke University 1991-1995
Honors thesis: Crystal Size Distribution Theory: Application to Chromitite from the Stillwater Complex, Montana

PROFESSIONAL EXPERIENCE
Collaborator, Northern Territory Geological Survey, Australia 2013-present
Associate Professor (tenured), Western Carolina University 2004-present

TEACHING PHILOSOPHY
Three overall goals represent my teaching philosophy: (1) to build students’ respect for and joy in the physical world; (2) to encourage students to be thoughtful, self-aware, informed, and communicative local and global citizens; (3) to prepare students to be practicing geologists through major classes and research experiences.

COURSES TAUGHT (last 5 years)
Investigations in Environmental Geology (Geol 140; each semester)
Geophysics (Geol 330 or 393; alternate years)
Structural Geology (Geol 371; alternate years)
Tectonics (Geol 471; alternate years)
Topical seminars (Geol 491 or 494; alternate years): Piedmont field trip course, Careers in Geology
Undergraduate research (yearly): Capstone research seminar (Geol 495) and/or senior thesis (Geol 499)

PUBLICATIONS IN REVIEW

PUBLICATIONS


CONFERENCE PRESENTATIONS, last five years  *


**SHORT COURSES AND PROFESSIONAL TRAINING**

2015 Geological Mechanics on the Rocks: Stress, Deformation, and Rock Properties with Application to Reservoir Stimulation and Management: Casper, WY, AAPG ACE (4 days)

2014 Shale reservoir evaluation short course by Core Labs: Houston, TX, AAPG ACE (1 day)

2010 Field Safety Leadership short course by ExxonMobil Research Co.: Denver, CO, GSA (2 days)

2003 Integrated Basin Exploration Short Course, sponsored by ExxonMobil Upstream Research and Exploration Companies: Salt Lake City, UT (3 days)

1996-7 Analysis of Geological Data, Exploration Geophysics, Sequence Stratigraphy, Reflection Seismic Processing: graduate course work, Rice University, Houston, TX (2 semesters)

1995 Woods Hole Oceanographic Institution Summer Fellow (deep submersible vehicle ALVIN science team, Blanco Fracture Zone, Juan de Fuca mid-ocean Ridge, northeastern Pacific)
### Appendix 4.2: GNR Grant Awards Active or Awarded Since 2008.

<table>
<thead>
<tr>
<th>AWARD NO</th>
<th>AWARD TITLE</th>
<th>AWARD AMOUNT</th>
<th>ORIGINAL LEAD PI</th>
<th>PERSONNEL</th>
<th>SPONSOR</th>
<th>PROJECT BEGIN DATE</th>
<th>PROJECT END DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A15-0041-001</td>
<td>Grandfather Restoration Project Fire Effects Monitoring</td>
<td>$35,000</td>
<td>Bates, Peter</td>
<td>Bates, Peter</td>
<td>USDA National Forest Service (NFS)</td>
<td>6/18/2015</td>
<td>7/1/2018</td>
</tr>
<tr>
<td>A14-0035-001</td>
<td>Faculty and Student Training in the Collection and Interpretation of Water Quality Data</td>
<td>$11,317</td>
<td>Miller, Jerry</td>
<td>Miller, Jerry</td>
<td>Community Foundation of Western North Carolina</td>
<td>6/16/2014</td>
<td>6/15/2015</td>
</tr>
<tr>
<td>A14-0031-001</td>
<td>Prescribed Fire Effects in Oak-Hickory, Yellow Pine, and High Elevation Red Oak Communities in the Southeastern United States</td>
<td>$22,000</td>
<td>Bates, Peter</td>
<td>Bates, Peter</td>
<td>USDA NRE US Forest Service (FS)</td>
<td>4/1/2014</td>
<td>12/31/2015</td>
</tr>
<tr>
<td>A13-0063-001</td>
<td>Proposal to Assess Prescribed Fire Effects on Forest Stand Condition in the Southern Blue Ridge</td>
<td>$57,321</td>
<td>Bates, Peter</td>
<td>Bates, Peter</td>
<td>USDA NRE US Forest Service (FS)</td>
<td>7/1/2013</td>
<td>11/30/2013</td>
</tr>
<tr>
<td>A13-0015-001</td>
<td>Mineralogical and Geochemical Analyses of Water and Sediment Within the Little Tennessee River Basin</td>
<td>$14,000</td>
<td>Miller, Jerry</td>
<td>Miller, Jerry</td>
<td>US Fish and Wildlife Service</td>
<td>7/1/2012</td>
<td>7/1/2015</td>
</tr>
<tr>
<td>A12-0035-001</td>
<td>Land use/Land cover and Community Demographics: Implications to Natural Resource Management in and around Olympic and Great Smoky Mountains National Parks</td>
<td>$14,996</td>
<td>Styers, Diane</td>
<td>Styers, Diane</td>
<td>USDA NRE USFS Pacific Northwest Research Station</td>
<td>6/1/2012</td>
<td>6/30/2015</td>
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Appendix 4.3: GNR Faculty Distributions 2009-2014

Faculty distributions

College of Arts and Sciences

Geosciences and Natural Resources

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# Course summary by Academic Year and Instructor

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Prepared by Office of Institutional Planning and Effectiveness (uQnPEh) 10/02/2014
Appendix 5: GNR Program Students

5.1: GNR enrollments over past 5 years

5.2: Sample student recruiting materials

5.3: Academic Metrics of Incoming Majors
## Number of NRCM, Geology, and SEES majors from 2008 through 2015 and percent increase during that period.

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<th>Major</th>
<th>Fall 08</th>
<th>Fall 09</th>
<th>Fall 10</th>
<th>Fall 11</th>
<th>Fall 12</th>
<th>Fall 13</th>
<th>Fall 14</th>
<th>Fall 15</th>
<th>Increase from 2008 to 2015 (%)</th>
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<td>Geology</td>
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<td>47</td>
<td>51</td>
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<td><strong>71</strong></td>
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<tr>
<td>SEES</td>
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<td>7</td>
<td>8</td>
<td>6</td>
<td>5</td>
<td><strong>-28</strong></td>
</tr>
</tbody>
</table>
Climb to New Heights!

Created for students with an interest in protecting our environment, Western Carolina University's Bachelor of Science degree in Natural Resource Conservation & Management offers students the opportunity to develop expertise in land management that promotes the sustainable use of forest, soil, water, wildlife and other natural resources.
Who we are... housed in the Department of Geosciences and Natural Resources, Western Carolina’s Natural Resource Conservation & Management Program provides you with exceptional opportunities to immerse yourself in hands-on learning, get outside, and conduct research with an outstanding internationally recognized faculty committed to excellence in and out of the classroom.

Our program uses a unique approach to undergraduate education that includes field experiences in most classes, as well as training in geospatial hardware, software, and data. Each of these provides you with opportunities to gain practical skills sought by employers and graduate schools.

Why choose Western Carolina?
Located in the heart of the southern Appalachians and surrounded by 6,000-foot peaks, national forests, national parks, and some of the highest biological diversity in the world, the Natural Resource Conservation & Management Program at Western Carolina boasts a natural laboratory for hands-on learning, perfect for studying the protection and sustainable use of our natural resources.

Opportunities in the real world
Students, faculty, and staff in the Natural Resource Conservation & Management Program benefit from a wealth of resources to support and enhance active learning and research experiences in both the field and classroom.

Faculty in the program have developed partnerships and collaborations with a wide variety of government, private, and non-profit agencies, which provide ample opportunities for internships and research experiences working on real-world problems. For example, two NRCM students were recently selected from 467 applicants to participate in the NASA Digital Earth Virtual Environment Learning Outreach Project (DEVELOP) Program for a 10-week paid internship.

The NRCM program houses Forest Stewards, a non-profit resource management organization that hires numerous undergraduate student interns each year.

There are other opportunities for financial support through scholarships, student research awards, and travel grants to present at professional conferences.

What can you do with a degree in natural resources?
Western Carolina students graduating with a bachelor’s degree in Natural Resource Conservation & Management have many career and educational options. Our alumni are employed with state and federal resource management agencies, conservation organizations, soil and water conservation districts, environmental consulting firms, and many other organizations. Others have gone on to graduate school to study wildlife management, forest management, and other related fields.

Want to learn more?
Visit our website: nrcm.wcu.edu or email: nrcm@wcu.edu

Voted #1 Outdoor School by Blue Ridge Outdoors Magazine
Western Geology  
What We Can Offer You…

How do you distinguish yourself in today's job market?

- Work on faculty projects
- Get hands-on experience
- Get to know our faculty!
- Go on field trips/conferences

Why Geology?  Reason 1:  Focus On Students

Cheryl Waters-Tormey  Mark Laird  Dave Kinner  Jerry Miller  Amy Fagan

Low Student/Faculty Ratio!

Why Geology?  Reason 1:  Focus On Students

Rob Young  Emily Stafford  JP Gannon  Frank Forcino  Ben Tanner

Why Geology?  Reason 2:  Good Career Opportunities

Geology is a profession for those who like to work outdoors….

Why Geology?  Reason 2:  Good Career Opportunities

Bureau of labor statistics: Geoscientists have 21% expected growth from 2010-2020

Median salary for all geoscientist: $84,470

Other Median Salaries:
- Environmental scientist: $62,920
- Wildlife biologist/zoologist $57,430
- Biochemist/biophysicist $79,390
- Physicists $105,430
- Chemist $69,790
- Forestry $57,420
- Conservation Scientists $58,720
Why Geology? Reason 2: Good Career Opportunities

- Environmental Consulting
- Federal Government
- State Agencies
- K-12 Education
- Petroleum Industry
- Mining Industry
- National Laboratories
- Universities
- Graduate School

Why Geology?
Reason 2: Good Career Opportunities

Work on logic, writing and spatial reasoning skills!

Go into public policy, engineering, ecology, public health, or something different! We will work with you to tailor a program!

Evan Allen  
Geology, Class of 2008

Pre Western: Grew up in Arizona. Associates degree from AB Tech

While at Western:
- Research
  - Soils & hydrology of native river cane, NC
  - Active landslide near Waynesville
  - Paleoclimatic indicators of coastal marshes in Maine
    - Senior Thesis: PRESENTED/PUBLISHED

Other Experiences
- Field: Coastal Maine for Senior Thesis Research
- Field: South Carolina Coasts to examine wetlands
- Field: Northern Kentucky to examine ancient environments
- Geology Club Vice President
- Lab: Carbon-Nitrogen Analyst
- Hobbies: Rock climbing, kayaking, mountain biking

After Western (after receiving multiple job offers…)
- Geologist with U.S. Bureau of Land Management, Las Vegas

Amy Daniels  

Pre Western: Grew up in North Carolina

While at Western:
- Started as Elementary Education Major
- Switched major to Secondary Science Education
- Field Research Assistant to study geology & hydrology of mountain meadows of Nevada
- Recipient of Geology/Earth Science Scholarship
- Research Assistant: Data analysis for stream restoration in NC
- Student teacher: Tuscola High School

After Western: Will enter one of the best job markets for educators: a high school science teacher with an Earth Science focus.

Michael Stillwagon  
Geology, graduated May 2011

Pre Western: Grew up in North Carolina

While at Western:
- Full-time summer research experience at Univ. Minnesota
- Field research experience in Argentina for course
- Research project combining computer programming, GIS and rock images to write image analysis program
- Presented research at International American Geophysical Union meeting in San Francisco
- Upward Bound program teaching assistant
- Teaching assistantships in Geology classes

After Western: Working in gas exploration industry, Appalachian basin

Why Geology?  
Reason 3: Study Interesting Environments

Study Coastlines
**Why Geology?**

**Reason 3: Study Interesting Environments**

- Study Mountain Processes
- Study Rivers
- Study Soils, Water and Deposits
- Earth History

**Reason 4: Help Solve Environmental Problems!**

- Acid Mine Drainage
- Mine Reclamation
- Climate Change

**Reason 5: It’s Fun!**

- Active Geology Student Body
- Field trips
- Great Experiences
Subject: WCU Geology

Dear ______:

Congratulations on your acceptance to Western Carolina University! We know that selecting a college and major can be both exciting and challenging. On your application form, you also have indicated your interest in geology as a possible college major. We want to give you some information on the Geology Program at Western, which, hopefully, will be valuable to you as you plan your future.

The Geology Program is a thriving with eight+ faculty members and around 50 majors. The low major to faculty ratio means that people get to know each other well and better meet student needs. We also value our location, nestled in the Smoky Mountains. Students can take advantage of this natural outdoor laboratory by measuring stream flow in Cullowhee Creek, or by examining the relationship between rock type and landslide scars in Great Smoky Mountain National Park. Classes go locally to measure the orientation of highly metamorphosed rocks and to collect rock and mineral samples. Students could find themselves digging through a rare Appalachian bog to learn about climate history or wading streams to study water quality.

In the Geology Program at Western, we practice engaged learning, basically we learn by doing. Geology students spend considerable lab, field, and class time practicing and learning the skills that they will someday use at their jobs. This active learning also means students work directly with faculty on research projects. Other special opportunities which we periodically offer include multiple day field trip (1 credit hour) classes, student presentations at national and regional meetings, and paid positions working on geology research. If you want a taste of the kind of opportunities that we might offer, please take some time to browse our web page geology.wcu.edu.

Aside from the opportunities we can offer you, geology also has great long-term career potential. Many students come to college wanting to make a difference in the world. Our job is to provide our students with analytical and communication skills to solve environmental and geologic problems and the confidence to succeed.

I wish you luck in your future endeavors. Please let me know if we can provide you with any information that may help. You can email me directly at mlord@wcu.edu or call us at 828-227-7367.

Sincerely,

Mark Lord

Geosciences and Natural Resources
Western Carolina University
Cullowhee, NC 28723
(828) 227-7367
Dear

Congratulations on being accepted to Western Carolina University! I understand you have identified Natural Resource Conservation and Management (NRCM) as a possible major, and I want to provide you with some information about the NRCM program to help you as you consider your options. Western North Carolina and WCU are great places to study natural resources. We are surrounded by 2 national forests, 2 national parks, and the most biologically diverse ecosystem in North America. The NRCM program offers a B.S. degree with concentrations in Forest Resources and Soil and Water Conservation. We have a well-established program in natural resource conservation and have hundreds of alumni working in natural resources careers.

We believe strongly in engaged student learning. Our faculty and students participate in a wide range of educational field projects. In 2008 we created Forest Stewards, a non-profit associated entity of WCU that is currently assisting over 200 landowners in the sustainable management of their properties. In the past 3 years, Forest Stewards has provided over 6500 hours of paid student internships (over $70,000). During a recent spring semester, a dozen students spent 2 weeks in Argentina and Brazil using satellite-based radar imaging to develop a land suitability classification for that region. And still others are assisting the NC Wildlife Resources Commission and The Nature Conservancy in the use of prescribed fire and other management practices to improve wildlife habitat.

Again, congratulations on being accepted into college. That is a wonderful accomplishment! I wish you the best of luck with your future endeavors. If you would like more information about our program, I encourage you to visit our webpage http://naturalresources.wcu.edu, or contact me at nrcm@email.wcu.edu or 828-227-3818).

Sincerely,

Peter Bates, Director
Natural Resources Conservation and Management Program
### New Student Averages

#### College of Arts and Sciences

#### Geosciences and Natural Resources

*All Programs*

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<th>Average HS GPA</th>
<th>Average HS Rank</th>
<th>Average SAT Math</th>
<th>Average SAT Verbal</th>
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<th>Average SAT Math</th>
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<td>519</td>
<td>1034</td>
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Appendix 6: *Administrative Structure*

6.1a: Forest Stewards newsletter................................................................. 1
6.1b: Forest Stewards Impact Report............................................................ 5
2012 Summer Crew: Great Experience

Forest Stewards was fortunate to have a hard-working and capable summer crew in 2012, consisting of recent graduates Patrick Lacienski, Ben Collette, and Thomas Pagels, and Senior George Hahn. This year’s crew had a large diversity of projects. The summer began at Coweeta Hydrological Laboratory, where the crew re-measured forest plots originally installed in the 1930’s as part of a project studying long-term vegetation change.

The crew also measured more recent vegetation change in forest stands that were subject to prescribed fire. This data contributes to a scientific study by the Fire Learning Network to determine the long-term impact of repeated prescribed fires in oak dominated forests.

The greatest challenge of the summer came when the interns worked as a team to put together a comprehensive stewardship plan for a Land Trust for the Little Tennessee property. The project required qualitative and quantitative assessment of the forests on 150 acres, stand mapping, data analysis, writing, and most importantly, teamwork.

Teamwork also came in handy when the crew marked a timber sale on a 50 acre conservation property of the Highlands Cashiers Land Trust. This project utilized 100 foot stream buffers and highline cable logging to minimize steep slope impacts.

While the professional experience is great, As Ben commented, “The best part is working with guys who are now your good friends and going to a campsite at the end of the day and hanging around the fire.”

Helping with stewardship plans was a valuable part of the internship. We were out there seeing what was on the land, then in the office writing a plan for it and offering management suggestions. –Ben Collette

Forest Stewards seeks to prepare future generations of forest managers for real life work in the forestry profession and that is precisely what this internship has done for me. –Thomas Pagels

Forest Stewards joins Carbon Canopy

Forests play a major role in protecting the environment from climate change by sequestering carbon dioxide from the atmosphere and converting it during photosynthesis to carbon that is stored in the form of wood, bark, branches, roots, and other forest vegetation.

In an effort to reward forest landowners for the ecological benefits from carbon sequestration, Forest Stewards has recently joined the Carbon Canopy. Co-lead by Dogwood Alliance and Staples, Inc., the Carbon Canopy pulls together a diversity of stakeholders including conservation organizations, landowners, and paper and wood product manufacturers and consumers. These groups are committed to working together to stimulate investment in the conservation, restoration, and management of working forests to a high environmental standard.

The Carbon Canopy’s initial projects are focused on building a credible carbon market model for private landowners. Through several pilot projects, the Carbon Canopy will test how southern forest landowners might benefit financially from expanding forest conservation and restoration. The initial projects will meet the rigorous carbon accounting standards of the California Air Resources Board (ARB) and forest management will be certified to Forest Stewardship Council (FSC) standards.
Landowner Spotlight: Snowball Mountain
Forest Stewards helps a landowner protect old growth forest

By Christine A. Cupido

My husband and I are committed guardians of Snowball Mountain to preserve its wonder and beauty for future generations, and we selected Forest Stewards to assist us in these efforts. First, Forest Stewards created a forest stewardship plan so our property became an FSC “certified forest.” I really enjoy the detailed maps of the forest communities on our property which I carry with me when I hike the land. Forest Stewards identified a small stand of sugar maple trees that we may be able to tap for maple syrup production in the future. Perhaps this will become our retirement hobby when we settle on the mountain in our old age.

Forest Stewards also identified significant old growth forest on the upper 90 acres of our property and suggested that the uniqueness of this old growth eco-system may be of interest to the Southern Appalachian Highlands Conservancy to conserve into perpetuity. We pursued this suggestion and sold the top of the Southern Appalachian Highlands Conservancy to conserve the uniqueness of this old growth ecosystem. Perhaps this will become our retirement hobby when we settle on the mountain in our old age.

Forest Stewards also identified significant old growth forest on the upper 90 acres of our property and suggested that the uniqueness of this old growth eco-system may be of interest to the Southern Appalachian Highlands Conservancy to conserve into perpetuity. We pursued this suggestion and sold the top of the Southern Appalachian Highlands Conservancy to conserve the uniqueness of this old growth ecosystem. Perhaps this will become our retirement hobby when we settle on the mountain in our old age.

Forest Stewards is also a partner of the Fire Learning Network (FLN), a collaborative effort led by The Nature Conservancy. Forest Stewards is leading research efforts within FLN to understand the long-term impacts of reintroducing fire within various forest communities of the southern Blue Ridge region. This research will help us determine the best way to utilize fire to improve forest health and diversity.

Forest Restoration through Prescribed Fire

Fire has historically been a major environmental force shaping the vegetation of the Southern Appalachians. Lightning caused fires and fires set intentionally by Native Americans and early European settlers opened the forest understory, increased plant diversity, and encouraged the establishment and maintenance of yellow pine, oak, hickory, and chestnut dominated woodlands and forests. However, as human population increased, fires began to be viewed as destructive and fire suppression was promoted. Over time, the exclusion of fire has led to a dramatic change in a number of our forest types. Many of today’s forests have denser understories, more closed canopies, less herbaceous plant diversity, and are composed of more fire intolerant tree species. Plant and animal species that benefit from fire have declined in abundance. Fire exclusion has also allowed a potentially hazardous buildup of woody fuels that present a more severe wildfire threat on drier sites. The challenge for today’s natural resource professionals is to reintroduce the beneficial aspects of fire to the landscape in a safe manner.

Forest Stewards has partnered with the Land Trust for the Little Tennessee (LTLT) to increase the capacity for prescribed fire in the region. During the past two spring semesters at Western Carolina University, we have helped train 24 natural resources students in the use of prescribed fire. Students were educated about fire ecology in the Southern Appalachians, current efforts to reintroduce fire across the landscape, the importance of monitoring the effects of fire, and the practicalities of planning and safely implementing controlled burns. Student interns then participated in controlled burns on LTLT lands. Conducted by Forest Stewards, these burns are the first in a series that will reduce fuels, set back fire intolerant shrubs and trees, increase the presence of native warm season grasses, and restore shortleaf pine – oak woodlands from a degraded state.

Forest Stewards is also a partner of the Fire Learning Network (FLN), a collaborative effort led by The Nature Conservancy. Forest Stewards is leading research efforts within FLN to understand the long-term impacts of reintroducing fire within various forest communities of the southern Blue Ridge region. This research will help us determine the best way to utilize fire to improve forest health and diversity.
Intern Spotlight: Water Quality Monitoring

Senior Mandi Carringer has been working with Geology faculty to monitor water quality in the Waynesville watershed (pictured right) in Haywood County.

Her primary duties have been field data collection of water quality samples, equipment maintenance and laboratory analysis.

Asked about her experiences Mandi stated: “I have had the opportunity to work with professional sampling equipment and to work with the long term data that has been collected. We have been using the data collected over the past few years to map out storm events along with their frequency and intensity. It has been a great way to gain valuable experience, and of course I have also enjoyed opportunities to spend the afternoons in the woods.”

Intern Spotlight: Forest Mapping with LiDAR

By intern and mapping technician Wade Johnston

Increasingly, Forest Stewards is using maps generated from LiDAR data to inform our stewardship efforts. LiDAR data comes from a laser sensor attached to the underside of an airplane. By knowing the position of the plane and how high the plane is above the ground, it can measure the height of objects (including vegetation) on the ground.

This type of remote sensing is beneficial in many ways. We can use this data to make informed decisions quickly, before even setting foot on the property. A tree height map can be generated in very little time which can let us know at a glance where disturbed areas and different forest types occur. In addition LiDAR gives us valuable information about the understory and shrub forest layers.

This is useful if a landowner is interested in managing dense understory trees and shrubs that could hinder tree regeneration, or in considering fuel loads when using prescribed burning as a management tool. LiDAR can also indicate the presence of hidden roads and trails in the forest. Managers can delineate old logging roads, which can be useful for making a trail map of a property that is used for recreation or management.

Thank you AmeriCorps Apprentice Foresters

AmeriCorps Ryan Sparks and Jesse Rickard were invaluable assets from September 2011 to July 2012. Here are some parting words.

After graduating with a concentration in sustainable forestry from Warren Wilson College, I was very lucky to be awarded this AmeriCorps apprenticeship with Forest Stewards. Here I have been able to build on my practical knowledge of forestry through extensive field experience. I now feel much better equipped for future forestry jobs and graduate school. I plan on getting my masters in a forestry related field and eventually starting my own nonprofit that will advise landowners on ecological management practices. Thanks to my time at the Forest Stewards I feel more prepared for that undertaking.

I cannot say enough good things about my AmeriCorps experience with Forest Stewards. Being a Western Carolina graduate, I already knew the knowledge student interns gain in forest management by working with Forest Stewards after I spent one of my summers as an intern. The opportunity to come back and work with Forest Stewards as a part of AmeriCorps Project Conserve has been more rewarding than I could have possibly imagined. The experience allowed me to advance my understanding of Southern Appalachian forest ecology and management, while also developing important transferable skills such as teamwork, communication and leadership. As a member of Project Conserve, it is wonderful knowing that there are others working across Western NC to keep our mountains wild and beautiful.
Forest Stewards supports WNC Conservation Groups

Forest Stewards was born out of a partnership that began with Land Trust for the Little Tennessee over a decade ago. Since then, our goal has been to serve both stewardship oriented landowners and the conservation organizations of the Appalachian region. Our partnerships with and service to these organizations is stronger today than it ever has been. Below are a few testimonials attesting to our role supporting conservation in WNC.

“WeForest Stewards has its roots in the Little Tennessee Sustainable Forestry Partnership which launched a decade ago. This partnership between WCU’s Natural Resources Management Program and the Land Trust for the Little Tennessee (LTLT) brought over a million dollars of program funds to these two organizations from the Doris Duke Charitable Foundation and the National Forest Foundation. It led to the protection of over 12,000 acres of headwater forestland, to the training of dozens of undergraduates, and to the establishment of a dozen demonstrations of excellent forest management across the WNC landscape.

Forest Stewards continues to play a key role in LTLT’s mountain conservation strategy by offering state-of-the-art technical advice, applied management capacity for forest ecosystem health, and innovative program work in planning, monitoring and payment for ecological services.” –Paul J. Carlson / Executive Director

“We can never hope to better understand the role of fire in our region if we do not monitor and analyze data from controlled burns. Forest Stewards developed the monitoring protocol that our 20+ partners of the Fire Learning Network enthusiastically adopted, and Forest Stewards has been critical to implementation of that protocol. It would be difficult if not impossible to get the monitoring done if they were not there to skillfully provide the service.

In other instances, I have been a part of Forest Stewards’ work with a landowner, and found them to be a trustworthy advisor on timber issues; and I benefited from a workshop that Forest Stewards put on to teach conservation partners how to use specialized computer mapping data to determine forest conditions on a large scale using Geographic Information Systems—capability we increasingly need for the conservation issues facing western North Carolina.” –David Ray / Former NC Mountains Program Director

“As a land trust, we own many forested tracts of land for conservation purposes. We have a responsibility to make sure these forested properties are healthy. As part of our strategy, we've engaged Forest Stewards on multiple properties to write forest stewardship plans and make recommendations on forest health, mitigating invasive species, and improving forest health and diversity. They clearly understand our main objective of conservation, rather than the more traditional economic purpose of forest management, and we find their recommendations useful, feasible (given our limited resources as a non-profit), and in line with our vision for our properties. Many of our landowners with conservation easements have partnered with Forest Stewards, as well.” –Hanni Muerdter / Stewardship and Conservation Planning Director

“In 2012, Forest Stewards was responsible for forging a connection between Foothills Conservancy and the Carbon Canopy which stimulated the conservancy to explore the innovative opportunity of marketing carbon sequestration credits supplied by its fee-owned preserve lands. Foothills Conservancy intends to utilize this relatively new conservation model to further land and water conservation and has already identified appropriate tracts of land to execute such a project.

Forest Stewards also completed a Forest Stewardship Plan for the conservancy’s 1,200-acre preserve at the headwaters of the Catawba River this year. Their professional staff foresters were attentive to our organization’s conservation objectives for our property and proved more than capable of preparing a long-term forest management plan that respected the complex conservation restrictions applied to the property through multiple conservation easement deeds. Their services exceed traditional forest plan preparation because the underlying philosophy through which the plan was prepared recognized that forested lands serve multiple purposes and supply various benefits to many different stakeholders. Their approach to forest stewardship must serve as the model going forward for forest landowners that recognize their duty to manage forest resources in a way that leaves them in a better state for generations beyond us, as well as to educate those who are unaware of the bounty of our resources and need to protect them.” –Andrew Kota / Stewardship Director

“Forest Stewards has been a great asset for SAHC’s conservation work. For our recent Snowball Mountain acquisition, they were able to delineate old growth forests and stream management zones to maximize our resource protection while also meeting the seller's needs. The Forest Stewardship Plans they create for SAHC's preserves provide excellent mapping of invasive species and forest community types, enabling us to create better management guidelines for the lands we own.” –Michelle Pugliese / Land Protection Director

828-227-3388, info@foreststewards.net  WWW.FORESTSTEWARDS.NET
Our Stewardship Philosophy

Ecological Forest Stewardship: Ecological stewardship employs management strategies that improve or maintain ecosystem function while attempting to mitigate against current and future forest stresses.

Social Forest Stewardship: Appalachian forests have value to all segments of society. These values include clean air, abundant and clean water, productive soils, diverse plant and animal communities, traditional land use, outdoor recreation, hunting, and a sense of place. Forest Stewards recognizes all stakeholders and works to include their views and protect their values.

Economic Forest Stewardship: Southern Appalachian forests provide abundant resources that have supported traditional rural economies for generations. Forest Stewards recognizes the need to sustainably harvest both timber and non-timber forest products to support employment opportunities throughout the region.

Supporters, Partners and Collaborators

Forest Stewards is proud to partner with numerous organizations that share our vision for promoting sound forest management across the southern Appalachian landscape. Below is a list of some of our key partners:

- Land Trust for the Little Tennessee
- The Nature Conservancy
- Southern Appalachian Highlands Conservancy
- Conservation Trust for North Carolina
- Balsam Mountain Trust
- Town of Waynesville
- Town of Sylva
- NC Forest Service
- USDA Forest Service
- NC Extension Service
- NC Wildlife Resources Commission
- Southwestern (NC) Council of Governments
- National Forest Foundation
- Carolina Mountain Land Conservancy
- The Biltmore Estate
- Duke University Nicholas School of the Environment
- Yale University School of Forestry and Environmental Studies
- Dogwood Alliance
- Southern Forest Network
The world of natural resource management and conservation is changing and Forest Stewards at Western Carolina University is evolving as well. Since our inception in 2008, we have greatly expanded our services and our staff to better serve the forests and forest landowners of our region. Our growth has also provided enhanced learning and career-building opportunities for numerous WCU students, through the classroom and professional experience. Partnerships with regional conservation groups, municipalities, and other schools and universities have positioned Forest Stewards well to increase our impact in 2012 and in years to come. I think you will be as impressed as I am with our work to enhance ecological, economic, and social benefits for the Southern Appalachian forest through implementing positive impact forestry and educating the next generation of forest stewards.

Rob Lamb
Executive Director, NC Registered Forester #1416

Serving Landowners

Since our inception in 2008, Forest Stewards has written forest stewardship plans for approximately 30,000 acres and 200 landowners. We have implemented stewardship activities on nearly 700 acres during this period. Landowners who work with Forest Stewards are committed to the responsible stewardship of their forest. Through our work landowners can envision and implement a long-term plan for their forestland that sustains and enhances its many values, ecological, aesthetic, and financial, for generations to come.

“Forest Stewards worked very hard with our unique situation. My father passed and Forest Stewards was able to put together a timber harvest that met my father's final expenses and kept our property intact. The property has been in the family for 220 years. I had an offer earlier for the sale but was hesitant because it seemed to be about the money and then the land. With Forest Stewards, I felt I always had someone on my side. After the harvest began it was very comforting to know I had a professional representing my interests and visiting the property.” —Tim May, Macon County, 1984 WCU Alum

“This land is more than just forest. It is part of our history, and one of the things that has kept our family together. Our thought had been to save the land, not use it, but you showed us a way, through active stewardship, to do both—and this should make it easier for coming generations to be able to hold onto the land. We owe you a debt of gratitude for helping us with a better understanding of our forest.” —Marcela Huguelet, Jackson County

The Need for Forest Stewardship

- A legacy of resource exploitation has left many forests degraded and lacking in overall diversity.
- Present and future forest threats, whether related to pollution, urbanization, climate change, invasive exotic plants, insects, or disease, are typically un-natural and are likely to have more severe impacts than many stresses of the past.
- Positive and proactive forestry can improve the forest condition by making them more resistant to these stresses, and enhance their ability to satisfy the needs of society for future generations.
Creating a Sustainable Local Economy

Forest Stewards works with both the local timber industry and regional conservation organizations to bridge what can be a contentious divide over resource management. Since our inception we have demonstrated that there is a place where pro-active stewardship can serve both environmental goals while sustaining forest industry. Regionally, timber management supports thousands of jobs directly, and thousands more indirectly. However, older and more extractive ways of forest management are unsustainable ecologically, socially, and economically. We challenge and support loggers and timber mills to develop innovative low-impact forest management techniques. We also reach out to environmental and conservation entities to show that there is a place for pro-active forestry that improves and restores ecological health. Our outreach to landowners and project development has lead to active forest management that expect to generate $1,000,000 in revenue.

Selected Resources and Presentations


Impact of Forest Stewards in the 20 western NC counties and on WCU student learning.

Since 2008 Forest Stewards has:

- Hired 35 student interns who worked over 6,500 hours and earned over $70,000 in stipends
- Generated more than $100,000 in funds used to directly support scholarly collaboration with WCU faculty
- Provided teaching materials and instructional support for 11 courses, including teaching NRM 483 Applications in Forest Management
- Assisted more than 200 landowners owning over 30,000 acres of forest
- Implemented stewardship activities that expect to generate $1,000,000 in revenue for landowners and forest industry, which can be correlated to generating approximately 25 jobs and $600,000 in personal income.
Providing WCU student interns the opportunity to integrate their education with real world professional experience is at the core of our mission. Each summer Forest Stewards hires 4-8 full-time student interns to assist in forest stewardship and research projects throughout the western North Carolina mountains. We also employ 5-10 students in part-time work throughout the school year. Forest Stewards staff serves as educators and mentors to student interns to integrate their educational foundation into the development of professional skills and ethics.

### Categories of Intern Work (Hours)

- **Forest Inventory**: 2,445 hours
- **Forest Management**: 1,708 hours
- **GIS mapping**: 1,455 hours
- **Water Quality Monitoring**: 346 hours
- **Writing Forest Management Plan**: 302 hours
- **Data Management**: 157 hours

### Intern Hours July 2008 - July 2011

<table>
<thead>
<tr>
<th>Intern</th>
<th>Major</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark Roloff</td>
<td>NRCM: Forest Resources</td>
<td>928</td>
</tr>
<tr>
<td>Kyle Underwood</td>
<td>NRCM: Forest Resources</td>
<td>850</td>
</tr>
<tr>
<td>Ryan Sims</td>
<td>NRCM: Forest Resources</td>
<td>721</td>
</tr>
<tr>
<td>Wade Johnston</td>
<td>NRCM: Geospatial Anal</td>
<td>568</td>
</tr>
<tr>
<td>Darren Caudle</td>
<td>NRCM: Forest Resources</td>
<td>474</td>
</tr>
<tr>
<td>Tyson Halford</td>
<td>NRCM: Forest Resources</td>
<td>433</td>
</tr>
<tr>
<td>Eric Dodson</td>
<td>Environmental Science</td>
<td>419</td>
</tr>
<tr>
<td>Ryan Sparks</td>
<td>NRCM: Soil &amp; Water Cons</td>
<td>306</td>
</tr>
<tr>
<td>Bill Donaldson</td>
<td>NRCM: Geospatial Anal</td>
<td>262</td>
</tr>
<tr>
<td>Andrew Lawson</td>
<td>NRCM: Geospatial Anal</td>
<td>253</td>
</tr>
<tr>
<td>Matt Kerfonta</td>
<td>NRCM: Geospatial Anal</td>
<td>241</td>
</tr>
<tr>
<td>Weston Vandenabeele</td>
<td>NRCM: Forest Resources</td>
<td>236</td>
</tr>
<tr>
<td>Bobby Wilson</td>
<td>NRCM: Forest Resources</td>
<td>204</td>
</tr>
<tr>
<td>Rachel Tury</td>
<td>Geology</td>
<td>182</td>
</tr>
<tr>
<td>Carey Burda</td>
<td>NRCM: Geospatial Anal</td>
<td>127</td>
</tr>
<tr>
<td>Over 20 additional interns with &lt; 50 hours of work</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td></td>
<td><strong>6,545</strong></td>
</tr>
</tbody>
</table>
Integrating Education with the Real World

Forest Stewards provides faculty access to data and project sites to be used in class exercises, field trips, and other educational activities where such access is permitted by the landowner. We provide classroom support through presentation of professional activities and skills, through technical support, and through teaching NRM 483: Applications in Forest Management.

NRM 483: Applications in Forest Management

Forest Stewards staff assist with NRM 483: Applications in Forest Management. This course provides students with real world natural resource management experience in a structured educational format. In 2011, Forest Stewards utilized grant funding from the National Forest Foundation and partnership with the Land Trust for the Little Tennessee to train a cadre of prescribed burners. Students studied fire ecology and its role in restoration and completed training required to participate in prescribed burns in North Carolina.

Intern Spotlight

Mark Roloff, 2008-10 Intern

“Through my internship at Forest Stewards I was able to take an active role in each stage of the Waynesville Watershed project from planning to implementation. This experience allowed me to witness first-hand how various aspects of natural resource management work together to create the best possible plan for a landscape. It is often difficult to see this “bigger picture” in the classroom alone. As I developed and improved my skills, I was eventually able to begin writing forest management plans on my own. In my final year at Forest Stewards, I had the opportunity to work directly with dozens of private landowners throughout western North Carolina to develop management plans tailored specifically to their personal goals and forests – something very few undergraduate students have the opportunity to do.”

Ryan Sims, 2009-11 Intern

“Working with Forest Stewards was a pivotal point in my professional/academic career. I acquired necessary skills working with Geographic Information Systems (GIS), data collection and analyses, tree identification, field navigation, implementing controlled burns, chainsaw safety training, writing management plans for private landowners, assessing residual tree damage after a logging operation, tree grading techniques, as well as picking up a wealth of general field knowledge you simply cannot gain from the classroom. I believe it was a result of my experience with Forest Stewards and education from Western Carolina University that I was awarded a graduate research assistant position at the University of Missouri. For aspiring natural resource professionals, getting hands on knowledge as a Forest Stewards intern, working with an incredible staff in the most diverse landscape in the United States, makes you a competitive candidate for any position in the field of forestry or natural resources.”
Supporting Research

Forest Stewards collaborates with faculty on scholarly activities by providing them with access to data and project sites where such access is permitted by the landowner. If available Forest Stewards provides student interns to assist GNR faculty and graduate students with data collection, data entry, GIS services, and other tasks.

<table>
<thead>
<tr>
<th>Faculty/Students</th>
<th>Project location</th>
<th>Activities</th>
<th>FSI contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joni Bugden-Storie/2 students</td>
<td>Southern Highlands Reserve, Cashiers</td>
<td>GIS mapping of plants and infrastructure</td>
<td>$8,505 in awarded contracts.</td>
</tr>
<tr>
<td>Jerry Miller, Lionel Villarroel, and Mark Lord/5 students</td>
<td>Waynesville watershed</td>
<td>Collecting and processing water samples, data analysis</td>
<td>$27,000 in awarded contracts.</td>
</tr>
<tr>
<td>Ron Davis/3 students</td>
<td>Balsam Mountain Preserve</td>
<td>Radio telemetry tracking of rattlesnakes and box turtles; habitat characterization for roughed grouse</td>
<td>FSI-trained student interns.</td>
</tr>
<tr>
<td>Ron Davis/2 students</td>
<td>Smoky Mountain Center, Sylva</td>
<td>GIS analysis of Smoky Mountain Center service area</td>
<td>$3,900 in awarded contracts.</td>
</tr>
<tr>
<td>Brian Kloeppel/8 students</td>
<td>Coweeta Hydrologic Laboratory, Otto</td>
<td>Field work to measure forest vegetation in permanent plots.</td>
<td>FSI-trained student interns.</td>
</tr>
</tbody>
</table>

In 2009 Forest Stewards became part of the Southern Blue Ridge Fire Learning Network (SBRFLN). This organization, which includes The Nature Conservancy, USDA Forest Service, NC Forest Service, NC Wildlife Resources Commission, National Park Service, Land Trust for the Little Tennessee, North Carolina State Parks, and other natural resource management organizations was created to promote the use of prescribed burning to restore fire dependent plant communities in the southern Appalachians. The SBRFLN has identified shortleaf pine-oak forests, pine-oak/heath forests, dry-mesic oak-hickory forests and high elevation red oak forests as target communities in need of restoration. These systems cover about 60 percent of the area within our region. Working with the SBRFLN, Forest Stewards has established a network of fire monitoring sites in 13 burn units located from east Tennessee through western North Carolina and into North Georgia. At each site, permanent plots were established prior to burning taking place. These plots are remeasured periodically following the burns creating one of the most comprehensive fire effects databases in the southeast.
Appendix 7: Resources

7.1: GNR Department Facilities.................................................................................................................. 1
7.2: GNR Major Equipment and Software.................................................................................................... 2
7.3: Chemistry Department major equipment.............................................................................................. 11
Appendix 7.1: GNR Department Facilities

Department of Geosciences and Natural Resources
Stillwell 3rd Floor
Department of Geosciences and Natural Resources
Stillwell 3rd Floor, Wing I
Department of Geosciences and Natural Resources
Stillwell 3rd Floor, Wing II

322 Introductory Geology & NRCM Instructional Lab
322B Rock & Min. Storage
322A Map Storage

313 GNR Student Common & Research Room
312 Environmental Geochemistry Preparation Room

314 Environmental Geochemistry Instructional Lab
315 Analytical Analysis Lab (CNS, XRD)

304 Research: Whitmire Professor of Environmental Science
305 Research: Water quality & hydrology
306 Research: Soils, sediments, wetlands
309 Research: Paleoenvironments
308 Waters-Tormey
307 Tanner

303 Research: Petrography & Tectonics (microscopy)
302 Miller
Department of Geosciences and Natural Resources
Stillwell 1st Floor
GNR/Whitmire Spaces in NS ground floor

Whitmire Prof Research/grad student space, research assoc.

GNR Long Term Storage

Long-term Storage Space (Rocks) – shared with sciences (moving to G01B)
### Appendix 7.2: GNR Major Equipment and Software

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Location</th>
<th>Purchase Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue M Stabil-Therm Gravity oven (2)</td>
<td>152</td>
<td></td>
</tr>
<tr>
<td>Fisher Sci Isotemp Oven</td>
<td>152</td>
<td></td>
</tr>
<tr>
<td>New Brunswick Scientific C1 Platform Shaker</td>
<td>153</td>
<td></td>
</tr>
<tr>
<td>Soil augers, shovels</td>
<td>154</td>
<td></td>
</tr>
<tr>
<td>Armfield S 12 MCII-B Advanced Hydrology Study System (sand table)</td>
<td>155</td>
<td>2008</td>
</tr>
<tr>
<td>Envision groundwater model tanks (6)</td>
<td>155</td>
<td></td>
</tr>
<tr>
<td>Humboldt Constant/falling head permeameters (3)</td>
<td>155</td>
<td></td>
</tr>
<tr>
<td>Sieve Shaker Model RX-86</td>
<td>155</td>
<td></td>
</tr>
<tr>
<td>Buehler Petro-thin thin sectioning equipment</td>
<td>157</td>
<td>pre-1990</td>
</tr>
<tr>
<td>Covington 16 inch Slab Saw</td>
<td>157</td>
<td>2007</td>
</tr>
<tr>
<td>Covington 8 inch Trim Saw</td>
<td>157</td>
<td>2007</td>
</tr>
<tr>
<td>Felker DI-MET diamond abrasive tool</td>
<td>157</td>
<td></td>
</tr>
<tr>
<td>Frantz Isodynamic Magnetic Separator</td>
<td>157</td>
<td></td>
</tr>
<tr>
<td>R Campbell rock collection</td>
<td>157A</td>
<td>1983</td>
</tr>
<tr>
<td>RT Swanson rock collection</td>
<td>157A</td>
<td>1974</td>
</tr>
<tr>
<td>ASC Jaw Crusher TC JC300TC (small crusher)</td>
<td>157B</td>
<td></td>
</tr>
<tr>
<td>BICO Pulverizer Type UA</td>
<td>157B</td>
<td></td>
</tr>
<tr>
<td>Gilson Screen Co. Porta Splitter (large splitter)</td>
<td>157B</td>
<td></td>
</tr>
<tr>
<td>RoTap</td>
<td>157B</td>
<td>2006</td>
</tr>
<tr>
<td>SPEX Sample Prep ShatterBox 8530</td>
<td>157B</td>
<td>2011</td>
</tr>
<tr>
<td>Vibrilap polisher</td>
<td>157B</td>
<td>2007</td>
</tr>
<tr>
<td>Waders (various sizes and styles)</td>
<td>163</td>
<td></td>
</tr>
<tr>
<td>Wright-Livingstone Piston Coring Device</td>
<td>163</td>
<td>2001</td>
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<tr>
<td>Advanced Geosciences Sting R1 910000 Resistivity Meter</td>
<td>163 cage</td>
<td>2000</td>
</tr>
<tr>
<td>Geometrics Exploration S12 seismograph</td>
<td>163 cage</td>
<td>2000</td>
</tr>
<tr>
<td>Proton Magnetometer</td>
<td>163 cage</td>
<td>1999-2000</td>
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<tr>
<td>Geometrics Exploration Seismograph</td>
<td>163 cage</td>
<td>1999-2000</td>
</tr>
<tr>
<td>Geoeexploration Data Collection System</td>
<td>163 cage</td>
<td>1999-2000</td>
</tr>
<tr>
<td>Resistivity Meter, handheld</td>
<td>163 cage</td>
<td>1999-2000</td>
</tr>
<tr>
<td>RAMAC Ground Penetrating Radar System (GPR)</td>
<td>163 cage</td>
<td>1999-2000</td>
</tr>
<tr>
<td>Antennas (200, 100, 50, MHZ RAMAC GPR)</td>
<td>163 cage</td>
<td>1999-2000</td>
</tr>
<tr>
<td>Skid Box for GPR Antennas</td>
<td>163 cage</td>
<td>1999-2000</td>
</tr>
<tr>
<td>Laborlux microscope 12POL</td>
<td>303</td>
<td>1986</td>
</tr>
<tr>
<td>Leica MS5 Stereoscope (1)</td>
<td>303</td>
<td>2001</td>
</tr>
<tr>
<td>Leitz Laborlux 12 Pole Scope - Trinocular (1) (polarizing microscopes)</td>
<td>303</td>
<td>1988</td>
</tr>
<tr>
<td>Item</td>
<td>Page</td>
<td>Year</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Nikon DS-5m Digital Color Camera, software, and control unit (photomicrography)</td>
<td>303</td>
<td>2006</td>
</tr>
<tr>
<td>Nikon Eclipse 50i Pol Trinocular Head (1) (polarizing microscopes)</td>
<td>303</td>
<td>2006</td>
</tr>
<tr>
<td>Nikon Polarizing Microscope (large)</td>
<td>303</td>
<td>1989</td>
</tr>
<tr>
<td>Uni-slide microscope stage (photomicrography)</td>
<td>303</td>
<td>1984</td>
</tr>
<tr>
<td>Leica TC303 Total Station Surveying</td>
<td>304</td>
<td>2000</td>
</tr>
<tr>
<td>Leica Total Station, Tripod, and Prisms</td>
<td>304</td>
<td></td>
</tr>
<tr>
<td>Marsh-McBriney flo-mate flow meter</td>
<td>304</td>
<td></td>
</tr>
<tr>
<td>Zoom range finder (2)</td>
<td>304</td>
<td>2005</td>
</tr>
<tr>
<td>Soil Respiration System</td>
<td>305</td>
<td>2012</td>
</tr>
<tr>
<td>YSI Multi Parameter Sonde</td>
<td>305</td>
<td>2015</td>
</tr>
<tr>
<td>Constant well head permeameter (Amoozemeter)</td>
<td>306</td>
<td>2007</td>
</tr>
<tr>
<td>Decagon Mini-Disc Infiltrometers (3)</td>
<td>306</td>
<td>2007</td>
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<tr>
<td>Ech2o soil moisture sensors (3)</td>
<td>306</td>
<td>2007</td>
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<tr>
<td>Fisher Scientific Muffle Furnace (Fisher Isotemp Basic - 240V)</td>
<td>306</td>
<td>2007</td>
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<tr>
<td>Hobo Mini-weather station logger</td>
<td>306</td>
<td>2007</td>
</tr>
<tr>
<td>Hobo pressure sensors 0-30 ft of water (3) with base station</td>
<td>306</td>
<td>2007</td>
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<tr>
<td>RG-2 Hobo tipping bucket rain gages with loggers (7)</td>
<td>306</td>
<td>2007</td>
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<tr>
<td>RiverTools 3.0 Software</td>
<td>306</td>
<td>2007</td>
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<tr>
<td>YSI Multiprobe 556 (for pH and ORP)</td>
<td>306</td>
<td>2005</td>
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<tr>
<td>Eijkelkamp Dutch Coring Apparatus (2)</td>
<td>307</td>
<td>2006</td>
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<tr>
<td>Leica S6D microscope apparatus</td>
<td>309</td>
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<td>Leica Zoom 2000 microscope</td>
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<tr>
<td>Fisher Scientific Denver Instrument Balance (APX-1502) 0.01g - 1500g (2)</td>
<td>312</td>
<td>2005</td>
</tr>
<tr>
<td>FisherSci Isotemp Freezer (flammable storage) DEAD</td>
<td>312</td>
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<tr>
<td>FisherSci Isotemp Refrigerator (flammable storage)</td>
<td>312</td>
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<tr>
<td>SciMatCo blue corrosives storage cabinet</td>
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<tr>
<td>SciMatCo orangeflammables storage cabinet</td>
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<tr>
<td>SciMatCo white acid storages cabinet (2)</td>
<td>312</td>
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<tr>
<td>Barnstead / Thermodyne 1400 furnace</td>
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<tr>
<td>Fisher Scientific Centrifuge (Model 225)</td>
<td>314</td>
<td>2005</td>
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<td>Fisher Scientific Denver Instrument Balance (APX-1502) 0.01g - 1500g</td>
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<td>Fisher Scientific Low Pressure Liquid Chromatography Column (3)</td>
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<td>2005</td>
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<td>Fisher Scientific Salinity Refractometer</td>
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<td>Fisher Scientific Soxhlet Extraction Apparatus (Klilmax) (3)</td>
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<td>Year</td>
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<td>Fisher Scientific Vacuum Filtration Pump (KNF Laboport)</td>
<td>314</td>
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<td>FisherSci ultrasonic cleaner FS60H</td>
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<td>HACH DREL 2000 Direct Reading Spectrophotometer (portable) (2)</td>
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<td>IQ Scientific multi-parameter (pH mV temp)</td>
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<td>Lindberg / Blue M Box Furnace</td>
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<td>New Brunswick Scientific C1 Platform Shaker</td>
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<td>Ward's Lab Oven (VWR/Sci-Ed)</td>
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<td>Water Filtration Unit (Cole-Parmer) (2)</td>
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<td>Haskris water chiller</td>
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<td>Ludlum Measurements Model 14C Survey Meter</td>
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<td>Malvern Hydro 2000G Large Volume Auto Sampler Dispersion</td>
<td>315</td>
<td>2010</td>
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<tr>
<td>Malvern Mastersizer 2000 Optical Bench System (Particle Size Analyzer)</td>
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<td>2010</td>
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<td>Mettler MXS Electronic Micro Balance</td>
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<td>2007</td>
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<td>Rigaku MiniFlex XRD (X-ray diffraction)</td>
<td>315</td>
<td>2006</td>
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<tr>
<td>Vario EL Elementar CNS Analyzer</td>
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<td>2006</td>
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<tr>
<td>Brother Professional series Multi-function station</td>
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<tr>
<td>Cameras</td>
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<td>2005-2007</td>
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<tr>
<td>Canon ImagePrograf iPF8400 plotter</td>
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<td>HP Designjet 130 nr plotter</td>
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<td>HP Photosmart C6280 printer</td>
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<td>Campbell Gemstone Collection</td>
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<td>ASD FieldSpec 3 Spectroradiometer (350-2500 nm)</td>
<td>331B</td>
<td>2010</td>
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<td>Brunton compasses (15)</td>
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<td>Projector NEC MT1050</td>
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<tr>
<td>TruPulse 200 Professional Laser Rangefinder with Inclinometer &amp; Data Output</td>
<td>331B</td>
<td>2015</td>
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<td>Leica Zoom 2000 Stereoscope (1)</td>
<td>355</td>
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<td>Leitz Laborlux 11 Pol Scopes - Monocular (2)  <em>(polarizing microscopes)</em></td>
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<td>Nikon E200 Pol Binocular Heads (9)  <em>(polarizing microscopes)</em></td>
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<td>Nikon Labophot Pol Scopes - Binocular (1)  <em>(polarizing microscopes)</em></td>
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<td>Nikon Labophot Pol Scopes - Monocular (4)  <em>(polarizing microscopes)</em></td>
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<td>Unitron Stereoscopes (8)</td>
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<tr>
<td>Wild Pol Scopes - Monocular (2)  <em>(polarizing microscopes)</em></td>
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<td>Wilson Mineral Collection</td>
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<td>YSI 6600 Water Quality Logger</td>
<td>CC EFS</td>
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<td>RAMAC/GPR GEO system</td>
<td>NS 314</td>
<td>2000</td>
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<tr>
<td>Ground Penetrating Radar system</td>
<td>PSDS</td>
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<tr>
<td>Vibracoring Unit</td>
<td>PSDS</td>
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</table>

Program Computers: The university provides each faculty member an office computer and replaces those every fourth year. In addition faculty have computers earmarked for research and a few teaching labs have computers available.

<table>
<thead>
<tr>
<th>Software</th>
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<th>Purchase Date</th>
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<tr>
<td>Box Car Pro v. 4.3 Hobo software for data downloading</td>
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<td>Hoboware software for data downloading</td>
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<tr>
<td>Jade Software for XRD</td>
<td>315</td>
<td>2006</td>
</tr>
<tr>
<td>Malvern Mastersizer</td>
<td>315</td>
<td></td>
</tr>
<tr>
<td>Vario EL software for CNS analyzer</td>
<td>315</td>
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<tr>
<td>Adobe software suite (image analysis)</td>
<td></td>
<td>2007</td>
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<tr>
<td>AQTESOLV Pro software (groundwater)</td>
<td></td>
<td></td>
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<tr>
<td>ORIGIN software (statistics)</td>
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</table>
Appendix 7.3 Chemistry Department Major Equipment

The WCU Chemistry and Physics has facilities for the following analytical techniques. GNR and C&P partner to make these facilities available to researchers in both departments.

**Atomic Spectroscopy**
- X-Ray Fluorescence Spectroscopy (XRF) – Spectro Xepos XRF
- Inductively-coupled Plasma Optical Emission Spectroscopy (ICP-OES) – Perkin Elmer Optima 4100DV ICP-OES
- Atomic Absorption Spectroscope (AAS) – Perkin Elmer AAnalyst 300 AAS
- Flow Injection Mercury System (FIMS) – Perkin Elmer FIMS 100

**Molecular Spectroscopy**
- Nuclear Magnetic Resonance Spectroscopy (NMR) – JEOL 300 MHz Eclipse NMR; 60MHz Anasazi Instruments NMR
- Fourier Transform Infrared (FTIR) Spectroscopy and Microscopy – Perkin Elmer SpectrumONE FTIR; Thermo iS10 FTIR
- Roman Spectroscopy and Microscopy – Horiba LabRam HR
- Ultraviolet-Visible Spectroscopy (UV-vis) – Agilent 8453 UV-vis system
- Fluorescence and Phosphorescence Spectroscopy – Perkin Elmer LS-55 spectrofluorometer

**Chromatography and Mass Spectrometry**
- High performance Liquid Chromatography (HPLC) – Agilent 1220 infinity HPLC
- Liquid Chromatography-Mass Spectrometry (LC-MS) = Thermo Finnigan LTQ linear trap ion mass spectrometer; Dionex Ultimate3000 HPLC
- Ion Chromatography (IC) – Dionex DX-120 Ion Chromatograph
- Gas Chromatography-Mass Spectrometry (GC-MS) – Agilent 7890A Gas Chromatograph with 5975C Mass Spectrometer and G1888 headspace analyzer

**Materials Characterization**
- Rheometry – Anton Paar Physica MCR101 Rheometer
- Gravimetric and Differential Thermal Analysis (TG-DTA) – Perkin Elmer Diamond TG-DTA

**Miscellaneous**
- BAS CV-50W Voltammetric Analyzer
- Spectra Physics 2065-7S Argon ion Laser
- Beckman Coulter and Sorvall Centrifuges
- VAC Inert Atmosphere Glovebox