Appendices for Program Review
Mathematics Program

Department of Mathematics and Computer Science
College of Arts and Sciences
Western Carolina University

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Our Mission:

Western Carolina University is a public regional institution of higher education whose mission is to create learning opportunities that incorporate teaching, research, service, and engagement through on-campus, off-campus, online, and international experiences. The university focuses its undergraduate and graduate academic programs, educational outreach, research, creative, and cultural activities to sustain and improve individual lives and enhance economic and community development in Western North 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.
2020 Vision
Focusing Our Future
Western Carolina University
OUR MISSION
(WHO WE ARE)
To improve individual lives and enhance economic and community development in our region, state, and nation through engaged learning opportunities in our academic programs, educational outreach, research, and creative and cultural activities.

OUR CORE VALUES AND GUIDING PRINCIPLES
(WHAT GUIDES AND INSPIRES US)
- Excellence in 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 STATEMENT
(WHO WE WANT TO BE)
To be a national model for student learning and engagement that embraces its responsibilities as a regionally engaged university.
At the opening of the 2011 fall semester, I announced that development of a new strategic plan would be a top priority for the first year of my administration as chancellor of Western Carolina University. In the 10 months that followed, the 2020 Commission, with 36 representatives from across the campus and from the broader external community, guided the process of formulating a strategic plan that articulates a shared vision for the University, one that reaffirms our collective commitment to excellence, student success, and external focus and engagement.

The 2020 Commission solicited input at seven open community forums from Asheville to Murphy; during numerous campus conversations with faculty, staff, and students; and through an online form on the strategic planning website. With those campus and community ideas providing a solid foundation, the Commission drafted six overall strategic directions for the campus and oversaw the work of six subcommittees charged with proposing specific goals and initiatives for each direction.

After additional fine-tuning and further public input, the Commission distilled a core vision and a final set of strategic directions, goals, and initiatives into Western Carolina’s strategic plan, 2020 Vision: Focusing Our Future, which will serve as our road map for the coming years. This report includes a summary of that road map, as well as the plan in its entirety.

The course charted by our strategic plan is ambitious, but it is achievable. The plan, while built upon the institution’s strengths and traditions, is forward-looking. 2020 Vision: Focusing Our Future will guide the entire Western Carolina University community as, together, we define our future in pursuit of distinction.

David O. Belcher
Chancellor

2020 VISION. FOCUSING OUR FUTURE
Fulfill the Educational Needs of Our State and Region

2020 Plan Strategic Direction 1

Western Carolina University will provide each student a rigorous, relevant curriculum with learning experiences that emphasize knowledge and skills that are durable, flexible, and transferable. WCU will offer educational opportunities that result in graduates who are equipped with the skills necessary for success; who are ready to compete in a challenging, changing, and global environment; and who are prepared to contribute to the intellectual, cultural, and economic development of our region and state.

By 2020, WCU will be acknowledged as the regional educational leader in the creative arts, education of teachers and school personnel, environment and environmental policy, health professions, innovation and technology, and recreation and tourism. All WCU students, regardless of chosen academic program, will be able to integrate information from a variety of sources, solve complex problems, communicate effectively and responsibly, and be engaged citizens in their community and the world.

Recognizing the vital role higher education plays in the region’s economy, the University will increase its number of graduates by 25 percent by 2020. WCU will eliminate barriers to student access and success by improving cooperation with public school and community college partners and by securing significant private gifts for merit- and need-based scholarships and financial aid. The University will increase its first-year retention rate to 80 percent and its six-year graduation rate to 60 percent.

WCU’s Faculty, Staff, and Students Together Make the University’s Academic Mission Paramount
WCU is committed to the education of its students as citizens who are prepared to contribute to the welfare of our region and state. Our pursuit encompasses both curricular and co-curricular elements to prepare students to be active participants in a vibrant, intellectually, culturally, and economically thriving world.

The University will foster a student-centered campus culture where every academic support and student service unit embraces academic excellence as a point of emphasis. Formal mentoring programs will help students develop a sense of personal, intellectual, and professional identity, while expanded leadership and experiential learning opportunities at the local, regional, national, and international levels for all WCU students will result in graduates poised to become the next generation of leaders.

Western Carolina pledges to build and sustain a high-quality athletics program that excites and instills pride among students, faculty, staff, alumni, and friends of the University. Western Carolina will create and sustain campus traditions that strengthen students’ connections to their University and its surrounding communities, including its Cherokee neighbors.
ENHANCE OUR EXTERNAL PARTNERSHIPS

2020 PLAN STRATEGIC DIRECTION 3

WCU IS RECOGNIZED AS AN ACTIVE PARTNER WITH THE WESTERN NORTH CAROLINA REGION, ITS COMMUNITIES, ORGANIZATIONS, AND BUSINESSES.

Partnerships with regional businesses and industries, nonprofit and civic organizations, government agencies, communities, and municipalities represent an integral part of WCU’s core mission as a regionally engaged institution of higher education. The University’s commitment to enhancing external partnerships is demonstrated by its emphasis on integrated learning experiences, commitment to engaged scholarship, and embrace of its role as both a steward of the unique place that is Western North Carolina and as a catalyst for economic and community development.

To position itself as a leader in those efforts, the University will establish an annual leadership tour of the Western North Carolina region and will facilitate an annual conference for regional leaders from the public and private sectors to focus attention and action on strategies for economic and community development.

The University pledges to develop its West Campus, with its unique Millennial Initiative designation, as a national model for building public-private partnerships that are integrated into the academic enterprise and that support the community and the economy. Expansion of academic programs at Biltmore Park will position WCU as a key provider of graduate and professional programs in the Asheville-Hendersonville area. Closer to home, WCU will collaborate with external partners to help Cullowhee and Jackson County grow in ways that preserve their natural beauty and enhance their sense of community.
Excellent faculty and staff are a necessity for the fulfillment of Western Carolina University’s mission. In order for the University to succeed, it must take care of its most important resource – its people.

The University will make it an institutional priority to attract, reward, and retain the highest quality employees through measures that positively affect not only compensation, but also other issues that shape the campus work-life environment.

The University will advocate for competitive salary and total compensation packages for its employees and will facilitate professional development for faculty and staff. WCU will embrace leadership development, succession, and stability, and as appropriate, will rally support for issues related to quality of life, all of which will enhance the recruitment, development, and retention of qualified and satisfied faculty and staff.

Western Carolina will focus on developing an environment for faculty and staff members that enhances their personal and professional lives by encouraging opportunities for spousal or partner hiring by regional businesses and institutions; by seeking affordable child care, health care, and housing options; and by cultivating an inclusive and diverse campus community. In addition, the University will partner with appropriate civic leaders in the development and revitalization of Cullowhee and Jackson County to foster a community core around the campus aimed at improving the place that most WCU faculty, staff, and students call home.
It is critical that Western Carolina University have sufficient and constantly updated infrastructure to support its mission and vision. Infrastructure is more than bricks and mortar, wires and fiber, water and sewer, and streets and sidewalks. Infrastructure also includes sustainable fiscal practices and enhanced business processes and procedures necessary to ensure the fiscal stability of the University.

WCU will develop a new comprehensive master plan that incorporates anticipated growth in enrollment and that considers the impact that growth may have on our mountain environment and our community neighbors. Sustainability, energy efficiency, green space, and campus safety and security will be as important as location of new buildings, renovation of older facilities, solutions to transportation problems, and meeting the University’s backlog of information technology infrastructure needs.

The University will consistently pursue increased effectiveness and efficiency of its campus business processes and, where appropriate and in the best interests of the institution, will implement organizational realignment.
Western Carolina’s continued emergence as an ambitious institution dedicated to the economic and community development of the region depends on the availability of consistent and robust sources of funding. A critical element of that effort is an ongoing communications strategy designed to ensure that internal and external stakeholders alike are informed about the people, programs, priorities, and progress of the University.

The University will embark upon a comprehensive fundraising campaign with a special emphasis on securing the endowed merit- and need-based scholarships necessary for WCU to consistently recruit and retain strong academically qualified students and to support WCU’s commitment to both student access and student success. By 2020, the University will increase the number of research grant and contract applications by 100 percent, the number of grants and contracts received by 50 percent, and the total annual dollar figure awarded by 25 percent.

Enrollment growth also provides new resources for the University. Toward that end, WCU will develop and implement a comprehensive enrollment management program. The University will advocate for tuition policy flexibility for students in bordering states that surround Western Carolina’s regional service area, differential tuition rates for high-demand/high-expense programs, and modification or elimination of differential treatment of distance education in the UNC system’s funding formula.
2020 VISION:
FOCUSING OUR FUTURE

THE STRATEGIC PLAN

STRATEGIC DIRECTION #1
FULFILL THE EDUCATIONAL NEEDS OF OUR STATE AND REGION
WCU’s faculty, staff, and students together make the University’s academic mission paramount.

STRATEGIC DIRECTION #2
ENRICH THE TOTAL STUDENT EXPERIENCE
Every WCU student’s experience reinforces high standards and expectations, incorporates meaningful external engagement, and instills pride in the University.

STRATEGIC DIRECTION #3
ENHANCE OUR EXTERNAL PARTNERSHIPS
WCU is recognized as an active partner within the Western North Carolina region, its communities, organizations, and businesses.

STRATEGIC DIRECTION #4
INVEST IN OUR PEOPLE
WCU is recognized as one of the most highly competitive and desirable employers in the region.

STRATEGIC DIRECTION #5
INVEST IN OUR CORE RESOURCES
WCU’s core infrastructure is sustainable and positioned to support its strategic priorities.

STRATEGIC DIRECTION #6
GARNER SUPPORT FOR THE VISION
WCU develops the resources and markets the vision to ensure achievement of its strategic priorities.
Western Carolina University is committed, first and foremost, to fulfilling its academic mission of providing each student a rigorous and relevant curriculum with learning experiences that emphasize knowledge and skills that are durable, flexible, and transferable. WCU is committed to providing an education grounded in a strong set of foundational knowledge and skills combined with specific practical knowledge in content degree areas, the outcome of which is personal, intellectual, and economic enrichment for each student. WCU seeks to ensure educational opportunities that result in graduates who are prepared and ready to compete in a challenging, changing, and global environment; and who are committed to contributing to the intellectual, cultural, and economic development of our region and state.

GOAL 1.1: Deliver high-quality academic programs (undergraduate, graduate, and professional) designed to promote regional economic and community development.

INITIATIVE 1.1.1: Undertake a rigorous and inclusive process to prioritize and develop undergraduate and graduate programs based on universally applied criteria, including quality, regional need, demand, enrollment trends, retention and graduation rates, and alignment with the University mission and the following integrated curricular focus areas: creative arts, education, environment, health, innovation and technology, and recreation and tourism.

INITIATIVE 1.1.2: Develop visionary strategic plans for each of the curricular focus areas through inclusive processes to accomplish the following:
* Position and market WCU as the cultural heart of Western North Carolina in the creative arts
* Fulfill WCU’s historic and continuing commitment to be the regional leader in teacher education
* Assume regional leadership in the study of the environment and environmental policy
* Position WCU as the premier regional provider of baccalaureate and graduate education in the health professions with an emphasis on culturally sensitive, integrative, and inter-generational health care
* Establish WCU as a hub of innovation, facilitating interdisciplinary connections among academic programs in such disciplines as business, the sciences, engineering, technology, and entrepreneurship and external collaboration with industry, start-up companies, research institutes, nonprofit organizations, and government agencies
* Advance the recreation and tourism industries of Western North Carolina

INITIATIVE 1.1.3: Position WCU as a premier provider of undergraduate and professional programs in the greater Asheville-Hendersonville area in fulfillment of its historic commitment to this vital part of the Western North Carolina region.

INITIATIVE 1.1.4: Provide access to academic programs at off-campus sites in Western North Carolina within available resources and as dictated by data-based needs analyses.

INITIATIVE 1.1.5: Align departments, colleges, and divisions, as appropriate, to support the strategic vision of the University.

INITIATIVE 1.1.6: Identify and develop integrated, cross-disciplinary centers/institutes of study and outreach, where appropriate, based on the curricular focus areas.

INITIATIVE 1.1.7: Increase the total number of WCU graduates by 25 percent by 2020 to meet the regional need for an educated workforce.

GOAL 1.2: Fully integrate into the general education program and into each major and minor at both undergraduate and graduate levels an emphasis on those core abilities expected of all WCU students: to integrate information from a variety of contexts, to solve complex problems; to communicate effectively and responsibly; to practice civic engagement; and to clarify and act on purpose and values.

INITIATIVE 1.2.1: Hire faculty and staff who understand and will contribute to WCU’s core educational values, its holistic academic mission, its commitment to outreach and engagement, and the achievement of the institution’s strategic priorities.

INITIATIVE 1.2.2: Develop and implement effective, faculty-led monitoring programs for students, aided and reinforced by advising and course scheduling in the support units and designed to reinforce the University’s core values.

INITIATIVE 1.2.3: Incorporate writing and research into all levels of the curriculum.

INITIATIVE 1.2.4: Ensure that all academic programs incorporate the core abilities detailed in Goal 1.2.

INITIATIVE 1.2.5: Incorporate into the formal evaluation of faculty work a consideration of how curricula, pedagogies, and scholarship successfully advance the University learning outcomes.

GOAL 1.3: Ensure that all programs include cross-curricular, experiential, applied, and international/global awareness opportunities for all students.

INITIATIVE 1.3.1: Reduce, and when possible eliminate, bureaucratic and financial barriers to cross-curricular design and team-teaching.

INITIATIVE 1.3.2: Incorporate expectations for experiential and applied learning opportunities, including undergraduate research opportunities, in the curricular review process.

INITIATIVE 1.3.3: Ensure that meaningful international/global experience opportunities are available to every student, regardless of major, including options to study with international scholars on WCU’s faculty, to participate in faculty-led international travel courses, and to study abroad. (See Initiative 2.1.6)

GOAL 1.4: Eliminate barriers to student access through coordinated endeavors with Birth-12 (B-12) and community college partners.

INITIATIVE 1.4.1:1 Establish a network of regional advisory committees to enhance communication and collaboration among B-12, community colleges, and WCU faculty and community (in the areas of 11 curriculum goals and transferability); 2) the benefits of higher education and the best strategies for marketing and recruiting; and 3) admissions and financial aid.

INITIATIVE 1.4.2: Review, revise where appropriate, and electronically automate all articulation agreements between WCU and community colleges in the WCU service area with the goal of maintaining high academic standards and facilitating curricular transfer; develop a standard review protocol and timeline.

INITIATIVE 1.4.3: Expand opportunities for WCU staff, faculty, and students to visit with B-12 students and community college students (both on- and off-campus) to share information regarding the importance of higher education and the pathways, processes, and programs at WCU.

INITIATIVE 1.4.4: Expand coordinated communications and recruiting efforts among B-12, community colleges, and WCU regarding the value of education and affordable avenues for all individuals to access and benefit from it.

GOAL 1.5: Make WCU (the Cullowhee campus and the off-campus site at Biltmore Park in the Asheville-Hendersonville area) a destination for short-term, educationally based programs, activities, and events, including summer school, continuing education, camps, conferences, and personal enrichment opportunities.

INITIATIVE 1.5.1: Pursue a cohesive, consistent, and efficient organizational and policy structure to facilitate short-term, educationally based programs, activities, and events, including review of facilities use policies and development of revenue opportunity structures.

INITIATIVE 1.5.2: Expand the number of resident and distance summer school offerings for a wide variety of learners, including WCU students, guest students, senior citizens, B-12 students, and the general public; expand summer school enrollment by 25 percent by 2020.

INITIATIVE 1.5.3: Expand the number of camps and conferences that WCU offers by 50 percent by 2020.

INITIATIVE 1.5.4: Develop and implement a coordinated marketing plan to promote WCU’s Cullowhee campus and its programs in Asheville at Biltmore Park as conference destinations. (See Initiative 6.2.1)

GOAL 1.6: Attain a student population that balances the University’s commitment to access, its responsibility for student success, and ensures the sustainability of University funding. (See Initiative 6.3.2)

INITIATIVE 1.6.1: Develop data-driven admission strategies (for first-time freshmen, transfer, graduate, and distance students) that balance the University’s aim to increase the academic profile of entering students while continuing to serve the educational role of access as a regional comprehensive university.

INITIATIVE 1.6.2: Conduct ongoing program assessment and prioritization and allocate resources to positively affect enrollment.

INITIATIVE 1.6.3: Expand efforts to recruit students in programs associated with the curricular focus areas.

INITIATIVE 1.6.4: Make the securing of endowed merit and need-based financial aid an institutional fundraising priority. (See Initiative 6.3.6)

INITIATIVE 1.6.5: Enhance support for scholarships, graduate assistantships, and student research to attract and retain students who are prepared for the rigors of a Western Carolina educational experience.

INITIATIVE 1.6.6: Increase the diversity of the student body and ensure campus resources necessary to support a diverse student body in order to serve the needs of the changing demographics of the region and state and to enhance the educational experience of all students.

INITIATIVE 1.6.7: Increase WCU’s freshman-to-sophomore retention rate to 80 percent by 2020.

INITIATIVE 1.6.8: Increase WCU’s six-year graduation rate to 60 percent by 2020.
GOAL 2.1: Foster a student-centered campus culture that emphasizes academic excellence, personal growth, networking opportunities, and global and social awareness.

INITIATIVE 2.1.1: Ensure that the mission of every academic support and student services unit expresses academic excellence as a primary emphasis.

INITIATIVE 2.1.2: Revise, and where necessary modify, all student recruiting materials and promotional materials to include expectations related to academic rigor and standards.

INITIATIVE 2.1.3: Align, and where appropriate consolidate, academic support and experiential learning services to ensure consistent, interconnected, and efficiently provided assistance to students.

INITIATIVE 2.1.4: Develop and/or formalize mentoring programs that help students develop a sense of personal, intellectual, and professional identity.

INITIATIVE 2.1.5: Create leadership and experiential opportunities at the local, regional, national, and international levels, ensuring that all students participate in such opportunities and can document how these learning experiences are interconnected with their program of study. (See Initiative 2.2.4)

INITIATIVE 2.1.6: Expand international experiences for all Western Carolina University students through such strategies as increasing study abroad opportunities, developing exchange programs with international universities, recruiting a scalable international student population to WCU, and enhancing global awareness components of existing curricula. (See Initiative 1.3.3)

GOAL 2.2: Foster active citizenship among WCU students.

INITIATIVE 2.2.1: Integrate the elements of the Western Carolina University “Community Creed” into institutionally affiliated programs and services.

INITIATIVE 2.2.2: As appropriate, include students as full, voting members on campus decision-making committees.

INITIATIVE 2.2.3: Increase the number of academic living/learning communities that engage active, collaborative, and interdisciplinary learning experiences with curricular goals, ensuring necessary logistical and administrative support.

INITIATIVE 2.2.4: Provide every student with an opportunity to participate in student-led outreach projects that focus on civic engagement. (See Initiative 2.1.5)

INITIATIVE 2.2.5: Create a culture of participating in the democratic process as demonstrated by large percentages of students who are registered to vote and who vote.

INITIATIVE 2.2.6: Provide opportunities for students to explore all points of view on various issues and to understand the perspectives of others through civil and informed discourse and debate.

GOAL 2.3: Instill pride in the University through more visible recognition and celebration of institutional achievements and traditions.

INITIATIVE 2.3.1: Build and sustain a high-quality athletics program that excels and instills pride among students, faculty, staff, alumni, and friends of the University.

INITIATIVE 2.3.2: Create and sustain campus traditions that strengthen students’ connection to their University and its surrounding communities.

INITIATIVE 2.3.3: Build and sustain consistent celebrations of Cherokee history, culture, and traditions.

INITIATIVE 2.3.4: Include in the University’s comprehensive communications plan a focused strategy to celebrate with the institution’s internal and external audiences the accomplishments and achievements of students, faculty, and staff. (See Initiative 6.2.1)

INITIATIVE 2.3.5: Ensure that University events are consistently well-advertised to external audiences.

INITIATIVE 2.2.6: Facilitate collaborative research and development efforts between WCU and external partners.

GOAL 3.1: Strengthen relationships and communication between the University and its external partners.

INITIATIVE 3.1.1: Senior campus leadership will model the institution’s commitment to community outreach and involvement.

INITIATIVE 3.1.2: Establish an annual leadership tour of the Western North Carolina region designed to further WCU’s connection with its external constituents and to update University leadership consistently about regional and local priorities.

INITIATIVE 3.1.3: Establish the appropriate leadership and organizational structure at WCU to support, coordinate, and facilitate external partnerships and collaborations.

INITIATIVE 3.1.4: Create an institutional council with representatives from each division and college to enhance internal communication about external partnerships and engagement, including the sponsorship of an annual inventory of such activities.

INITIATIVE 3.1.5: Develop and implement a communications plan that informs Western Carolina University’s external community about University resources (invented annually), such as programs, services, facilities, and faculty/staff expertise that are available to the public. (See Initiative 6.2.1)

INITIATIVE 3.2.6: Facilitate collaborative research and development efforts between WCU and external partners.

GOAL 3.2: Position the University as a key leader in regional economic and community development efforts.

INITIATIVE 3.2.1: Facilitate an annual conference for regional government, nonprofit, community, education, and business leaders to focus attention and action on regional strategies for economic and community development.

INITIATIVE 3.2.2: Develop the West Campus, with its Millennial Initiative designation, as a national model for building, in a rural context, public-private partnerships that are integrated into the academic enterprise and which support community and economic development.

INITIATIVE 3.2.3: Develop the programs at Black Mountain College and Asheville-Buncombe Technical Community College in assisted living, adult education, and workforce development.

INITIATIVE 3.2.4: Work with external partners to facilitate economic and community development in Cullowhee and Jackson County, which form the gateway to the Great Smoky Mountains National Park.

INITIATIVE 3.2.5: Seek out and implement both formal and informal strategies to expand partnerships that are focused on economic and community development and consistent with the curricular focus areas identified by the 2020 Commission.
Excellent faculty and staff are prerequisites for the fulfillment of Western Carolina University’s mission. Western Carolina University must therefore advocate for competitive compensation for its employees and facilitate professional development, leadership development, succession, and stability, and, as appropriate, support for issues related to quality of life, all of which will enhance the recruitment, development, and retention of qualified and satisfied faculty and staff.

GOAL 4.1: Make salary and total compensation packages an institutional priority in order to attract, reward, and retain the highest quality employees.

INITIATIVE 4.1.1: Advocate for the financial resources necessary to offer competitive salaries and compensation packages.

INITIATIVE 4.1.2: Develop a regular and recurring process for employee salary reviews.

INITIATIVE 4.1.3: Develop and implement strategies for retaining high-performing employees with competitive salary adjustments and compensation packages within existing policies.

INITIATIVE 4.1.4: Develop and implement a program of competitive summer grants to support innovative faculty pursuits within the context of Western Carolina’s mission and values.

INITIATIVE 4.1.5: Advocate with other UNC system institutions for a competitive and attractive health benefits plan that is cost-effective for employees and their families.

GOAL 4.2: Ensure professional development opportunities for all employees.

INITIATIVE 4.2.1: Make support for professional development for all employees a fiscal priority at WCU.

INITIATIVE 4.2.2: Include in each supervisor’s performance evaluation an assessment of his/her support for and his/her unit’s progress in professional development.

INITIATIVE 4.2.3: Ensure appropriate orientation and annual rehiring updates for all staff and faculty, as appropriate.

INITIATIVE 4.2.4: Ensure that all faculty and staff understand performance evaluation processes and criteria.

INITIATIVE 4.2.5: Establish a campus leadership academy to cultivate faculty and staff leaders.

GOAL 4.3: Work to develop a work-life environment for Western Carolina University employees that enhances their personal and professional lives.

INITIATIVE 4.3.1: Develop a network within the University and with regional businesses and institutions to enhance employment opportunities for spouses and partner hiring.

INITIATIVE 4.3.2: Partner with appropriate civic leaders in the development and revitalization of Cullowhee and Jackson County, with specific emphasis on developing a community core around the campus aimed at improving the quality of life for faculty, staff, students, and the community. (See Initiative 3.2.4)

INITIATIVE 4.3.3: Accommodate flexible work arrangements for staff, where appropriate and possible.

INITIATIVE 4.3.4: Facilitate a network of opportunities, where possible, for affordable child care, health care, and housing options for faculty, staff, and students.

INITIATIVE 4.3.5: Increase diversity among faculty and staff.

GOAL 4.4: Adequately support scholarship and creative activities in support of Western Carolina University’s mission as a regional comprehensive university.

INITIATIVE 4.4.1: Establish an organizational structure to accommodate the research, Graduate School, and Millennial Initiative ambitions of the University.

INITIATIVE 4.4.2: Ensure appropriate institutional infrastructure to support scholarship and research.

INITIATIVE 4.4.3: Increase support for scholarship and creative activities, including funding for mission-aligned time for scholarship, library support, graduate research assistantships, summer research grants, seed funding, start-up support where appropriate, equipment replacement, and travel for conference presentations.

GOAL 4.5: Create an environment in which the primary role of faculty as teacher-scholars is recognized and valued.

INITIATIVE 4.5.1: Develop and implement integrated faculty workload expectations and policies that facilitate exemplary teaching, scholarly productivity, and public service in alignment with Western Carolina’s commitment to external engagement.

INITIATIVE 4.5.2: Provide department heads and deans flexibility within the parameters of fiscal realities in assigning workload to faculty to accommodate significant contributions for such out-of-classroom responsibilities as advising, undergraduate and graduate research supervision and mentoring, and student career development.

INITIATIVE 4.5.3: Eliminate redundant and ineffective service obligations and committees across campus.

GOAL 4.6: Foster an inclusive University community where the contributions of all employees are recognized and valued.

INITIATIVE 4.6.1: Establish opportunities that give University staff access to University administration in the governance process.

INITIATIVE 4.6.2: Develop a forum that facilitates collaboration among members of the Faculty Senate, Staff Senate, and the Student Government Association on university-wide issues and projects.

Western Carolina University will ensure a consistently updated infrastructure in support of its mission and vision. Infrastructure is interpreted broadly to include facilities, technology, fiscal practices, and business processes and procedures.

GOAL 5.1: Implement sustainable funding models to ensure fiscal stability.

INITIATIVE 5.1.1: Eliminate operational dependence on one-time funding for core functions and services.

INITIATIVE 5.1.2: Maintain a favorable bond rating.

INITIATIVE 5.1.3: Develop and implement processes to identify resources for reallocation and reallocate such resources to areas with demonstrated/potential growth, capacity for revenue generation, and critical strategic need.

GOAL 5.2: Develop a comprehensive University master plan.

INITIATIVE 5.2.1: Charge a task force consisting of representatives of internal and external constituencies and supported by an external consultant to develop a comprehensive campus master plan that takes into account such factors as anticipated enrollment growth, the environment, sustainability, energy efficiency, core infrastructure needs, building priority needs, departmental/unit consolidation, technology infrastructure, campus safety and security, green space, transportation, campus design standards, and the integration of the campus with the surrounding community. The comprehensive plan will include the following components:

- A comprehensive facility condition assessment for existing buildings
- A campus sustainability plan that aligns with the UNC Sustainability Policy
- An assessment and prioritization of core infrastructure needs in light of emerging technologies
- An assessment and prioritization of new building needs
- A prioritized plan for addressing repair and renovation needs
- Incorporation of green space throughout the campus
- A plan to consolidate like parts of individual units/colleges where possible
- A campus parking and transportation plan that facilitates access to education sites and includes investment in multimodal options such as bike lanes, greenways, etc.
- A process for allocating and budgeting space as a core resource to maximize space utilization
- A plan to ensure the integration of campus development with the community surrounding the University

GOAL 5.3: Improve the effectiveness and efficiency of campus business processes to ensure continuous improvement and to realize financial savings.

INITIATIVE 5.3.1: Revise the use of expensables, including printed documentation, and enhance reasonable, reduce such usage and transition to digital alternatives.

INITIATIVE 5.3.2: Conduct business-flow analyses of all key functions and revise or eliminate unnecessary or redundant business processes and leverage existing enterprise solutions (e.g., Banner, Blackboard, R2S, SharePoint, etc.).

INITIATIVE 5.3.3: Consolidate and centralize similar operations across campus.

GOAL 5.4: Sustain and increase information technology capabilities and capacity required to meet the goals of the University.

INITIATIVE 5.4.1: Establish and systematize a sustainable funding model for information technology that accommodates operational support, replacements and upgrades, University growth, and strategic initiatives.

INITIATIVE 5.4.2: Establish capacity planning, management, and implementation processes to ensure accommodation of mandatory and anticipated information technology needs, including both human resources and technologies (e.g., bandwidth, storage, servers, digital media, software licenses, wireless networking, wired networking, cloud services, etc.).

INITIATIVE 5.4.3: Establish a multiyear technology capability planning process that is revisited annually.

INITIATIVE 5.4.4: Assess periodically and revise, where necessary, the information technology disaster recovery plan.

GOAL 5.5: Maintain and improve campus safety systems, capabilities, and infrastructure in support of the University’s strategic priorities.

INITIATIVE 5.5.1: Complete and maintain updated emergency response plans and continuity plans for critical functions of the University.

INITIATIVE 5.5.2: Implement sustainable funding models in support of campus safety systems and infrastructure.

INITIATIVE 5.5.3: Enhance campus-wide emergency preparedness with ongoing communication and training.

INITIATIVE 5.5.4: Sustain and enhance partnerships (e.g., mutual aid agreements, EMS service provisions, etc.) with local governments, regional public safety agencies, and health organizations in support of campus and community safety priorities.

INITIATIVE 5.5.5: Systematically assess and upgrade technologies (e.g., radio systems, access controls, cameras, etc.) in support of campus safety objectives.
STRATEGIC DIRECTION #6
GARNER SUPPORT FOR THE VISION
WCU develops the resources and markets the vision to ensure achievement of its strategic priorities.

WCU’s continued emergence as an ambitious institution of higher education dedicated to the economic and community development of Western North Carolina depends on the development and cultivation of consistent and robust funding sources and an ongoing communications strategy designed to ensure that internal and external stakeholders are consistently informed about the University and its progress in achieving strategic goals.

GOAL 6.1: Facilitate a shared understanding of and commitment to the institution’s strategic vision among WCU faculty, staff, and students.

INITIATIVE 6.1.1: Create or modify existing orientation messages for new faculty, staff, and students to ensure early introduction to and understanding of the University’s strategic vision.

INITIATIVE 6.1.2: Align all internal budgeting and annual reporting processes to reflect and reinforce the strategic vision and priorities of the University.

INITIATIVE 6.1.3: Ensure consistency among vision messages from all internal sources.

GOAL 6.2: Facilitate a shared understanding of the institution’s strategic vision among the University’s external communities.

INITIATIVE 6.2.1: Develop and implement comprehensive and consistent communications and marketing plans designed to fulfill the University’s strategic priorities. (See Initiatives 1.5.4, 2.3.4, and 3.1.5)

INITIATIVE 6.2.2: Ensure the appropriate leadership and organizational structure necessary to develop and implement comprehensive communication and marketing plans designed to communicate Western Carolina University’s strategic vision effectively, concisely, and consistently to all external stakeholders.

INITIATIVE 6.2.3: Create a network for regional engagement and statewide advocacy through a mobilized and informed alumni base.

INITIATIVE 6.2.4: Develop a process to review periodically the University brand and tailor the marketing messages accordingly.

GOAL 6.3: Maximize and target a balanced and diverse mix of financial resources that will enable achievement of Western Carolina University’s strategic vision.

INITIATIVE 6.3.1: Develop and implement a comprehensive plan to increase significantly WCU’s advocacy efforts among elected officials on behalf of University and system priorities.

INITIATIVE 6.3.2: Develop and implement an advocacy plan for state/system action on three key market-based issues:
- Tuition policy flexibility (in-state or surcharge) for students in bordering states
- Differential tuition in high-demand/high-expense programs
- Modification/elimination of differential treatment of distance education in the UNC system’s funding formula

INITIATIVE 6.3.6: Pursue a comprehensive development campaign targeting (See Initiative 1.6.4):
- Gifts at all levels in support of WCU’s strategic goals and initiatives
- Particular philanthropic support for endowed merit- and need-based scholarships to enable WCU to recruit and retain the best academically qualified students and to support WCU’s commitments to student access and student success
- An increase in the participation and engagement of WCU alumni in University activities and in the number of alumni donors by 50 percent by 2020
- Adequate development and alumni staffing to ensure the campaign’s success

INITIATIVE 6.3.7: Develop infrastructure for research and sponsored programs, technology transfer, and commercialization consistent with strategic priorities to achieve the following by 2020:
- Increase in the number of research grant and contract applications by 100 percent
- Increase in the number of grants and contracts received by 50 percent
- Increase in the total annual amount of awards received by 25 percent

INITIATIVE 6.3.8: Pursue funding resources for development of the West Campus/MIssion Initiative.
THE STRATEGIC PLAN
ENDORSED BY THE WESTERN CAROLINA UNIVERSITY BOARD OF TRUSTEES
JUNE 8, 2012

OUR MISSION
(WHO WE ARE)
To improve individual lives and enhance economic and community development in our region, state, and nation through engaged learning opportunities in our academic programs, educational outreach, research, and creative and cultural activities.

OUR CORE VALUES AND GUIDING PRINCIPLES
(WHAT GUIDES AND INSPIRES US)
• Excellence in 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 STATEMENT
(WHO WE WANT TO BE)
To be a national model for student learning and engagement that embraces its responsibilities as a regionally engaged university.
At the opening of the 2011 fall semester, I announced that development of a new strategic plan would be a top priority for the first year of my administration as chancellor of Western Carolina University. In the 10 months that followed, the 2020 Commission, with 36 representatives from across the campus and from the broader external community, guided the process of formulating a strategic plan that articulates a shared vision for the University, one that reaffirms our collective commitment to excellence, student success, and external focus and engagement.

The 2020 Commission solicited input at seven open community forums from Asheville to Murphy; during numerous campus conversations with faculty, staff, and students; and through an online form on the strategic planning website. With those campus and community ideas providing a solid foundation, the Commission drafted six overall strategic directions for the campus and oversaw the work of six subcommittees charged with proposing specific goals and initiatives for each direction.

After additional fine-tuning and further public input, the Commission distilled a core vision and a final set of strategic directions, goals, and initiatives into Western Carolina’s strategic plan, 2020 Vision: Focusing Our Future, which will serve as our road map for the coming years. This report includes a summary of that road map, as well as the plan in its entirety.

The course charted by our strategic plan is ambitious, but it is achievable. The plan, while built upon the institution’s strengths and traditions, is forward-looking. 2020 Vision: Focusing Our Future will guide the entire Western Carolina University community as, together, we define our future in pursuit of distinction.

David O. Belcher
Chancellor
Western Carolina University will provide each student a rigorous, relevant curriculum with learning experiences that emphasize knowledge and skills that are durable, flexible, and transferable. WCU will offer educational opportunities that result in graduates who are equipped with the skills necessary for success; who are ready to compete in a challenging, changing, and global environment; and who are prepared to contribute to the intellectual, cultural, and economic development of our region and state.

By 2020, WCU will be acknowledged as the regional educational leader in the creative arts, education of teachers and school personnel, environment and environmental policy, health professions, innovation and technology, and recreation and tourism. All WCU students, regardless of chosen academic program, will be able to integrate information from a variety of sources, solve complex problems, communicate effectively and responsibly, and be engaged citizens in their community and the world.

Recognizing the vital role higher education plays in the region’s economy, the University will increase its number of graduates by 25 percent by 2020. WCU will eliminate barriers to student access and success by improving cooperation with public school and community college partners and by securing significant private gifts for merit- and need-based scholarships and financial aid. The University will increase its first-year retention rate to 80 percent and its six-year graduation rate to 60 percent.
WCU is committed to the education of its students as citizens who are prepared to contribute to the welfare of our region and state. Our pursuit encompasses both curricular and co-curricular elements to prepare students to be active participants in a vibrant, intellectually, culturally, and economically thriving world.

The University will foster a student-centered campus culture where every academic support and student service unit embraces academic excellence as a point of emphasis. Formal mentoring programs will help students develop a sense of personal, intellectual, and professional identity, while expanded leadership and experiential learning opportunities at the local, regional, national, and international levels for all WCU students will result in graduates poised to become the next generation of leaders.

Western Carolina pledges to build and sustain a high-quality athletics program that excites and instills pride among students, faculty, staff, alumni, and friends of the University. Western Carolina will create and sustain campus traditions that strengthen students’ connections to their University and its surrounding communities, including its Cherokee neighbors.
WCU IS RECOGNIZED AS AN ACTIVE PARTNER WITH THE WESTERN NORTH CAROLINA REGION, ITS COMMUNITIES, ORGANIZATIONS, AND BUSINESSES.

Partnerships with regional businesses and industries, nonprofit and civic organizations, government agencies, communities, and municipalities represent an integral part of WCU’s core mission as a regionally engaged institution of higher education. The University’s commitment to enhancing external partnerships is demonstrated by its emphasis on integrated learning experiences, commitment to engaged scholarship, and embrace of its role as both a steward of the unique place that is Western North Carolina and as a catalyst for economic and community development.

To position itself as a leader in those efforts, the University will establish an annual leadership tour of the Western North Carolina region and will facilitate an annual conference for regional leaders from the public and private sectors to focus attention and action on strategies for economic and community development.

The University pledges to develop its West Campus, with its unique Millennial Initiative designation, as a national model for building public-private partnerships that are integrated into the academic enterprise and that support the community and the economy. Expansion of academic programs at Biltmore Park will position WCU as a key provider of graduate and professional programs in the Asheville-Hendersonville area. Closer to home, WCU will collaborate with external partners to help Cullowhee and Jackson County grow in ways that preserve their natural beauty and enhance their sense of community.
Excellent faculty and staff are a necessity for the fulfillment of Western Carolina University’s mission. In order for the University to succeed, it must take care of its most important resource — its people.

The University will make it an institutional priority to attract, reward, and retain the highest quality employees through measures that positively affect not only compensation, but also other issues that shape the campus work-life environment.

The University will advocate for competitive salary and total compensation packages for its employees and will facilitate professional development for faculty and staff. WCU will embrace leadership development, succession, and stability, and as appropriate, will rally support for issues related to quality of life, all of which will enhance the recruitment, development, and retention of qualified and satisfied faculty and staff.

Western Carolina will focus on developing an environment for faculty and staff members that enhances their personal and professional lives by encouraging opportunities for spousal or partner hiring by regional businesses and institutions; by seeking affordable child care, health care, and housing options; and by cultivating an inclusive and diverse campus community. In addition, the University will partner with appropriate civic leaders in the development and revitalization of Cullowhee and Jackson County to foster a community core around the campus aimed at improving the place that most WCU faculty, staff, and students call home.
It is critical that Western Carolina University have sufficient and constantly updated infrastructure to support its mission and vision. Infrastructure is more than bricks and mortar, wires and fiber, water and sewer, and streets and sidewalks. Infrastructure also includes sustainable fiscal practices and enhanced business processes and procedures necessary to ensure the fiscal stability of the University.

WCU will develop a new comprehensive master plan that incorporates anticipated growth in enrollment and that considers the impact that growth may have on our mountain environment and our community neighbors. Sustainability, energy efficiency, green space, and campus safety and security will be as important as location of new buildings, renovation of older facilities, solutions to transportation problems, and meeting the University’s backlog of information technology infrastructure needs.

The University will consistently pursue increased effectiveness and efficiency of its campus business processes and, where appropriate and in the best interests of the institution, will implement organizational realignment.
Western Carolina’s continued emergence as an ambitious institution dedicated to the economic and community development of the region depends on the availability of consistent and robust sources of funding. A critical element of that effort is an ongoing communications strategy designed to ensure that internal and external stakeholders alike are informed about the people, programs, priorities, and progress of the University.

The University will embark upon a comprehensive fundraising campaign with a special emphasis on securing the endowed merit- and need-based scholarships necessary for WCU to consistently recruit and retain strong academically qualified students and to support WCU’s commitment to both student access and student success. By 2020, the University will increase the number of research grant and contract applications by 100 percent, the number of grants and contracts received by 50 percent, and the total annual dollar figure awarded by 25 percent.

Enrollment growth also provides new resources for the University. Toward that end, WCU will develop and implement a comprehensive enrollment management program. The University will advocate for tuition policy flexibility for students in bordering states that surround Western Carolina’s regional service area, differential tuition rates for high-demand/high-expense programs, and modification or elimination of differential treatment of distance education in the UNC system’s funding formula.
2020 VISION: FOCUSING OUR FUTURE

THE STRATEGIC PLAN

STRATEGIC DIRECTION #1
FULFILL THE EDUCATIONAL NEEDS OF OUR STATE AND REGION
WCU’s faculty, staff, and students together make the University’s academic mission paramount.

STRATEGIC DIRECTION #2
ENRICH THE TOTAL STUDENT EXPERIENCE
Every WCU student’s experience reinforces high standards and expectations, incorporates meaningful external engagement, and instills pride in the University.

STRATEGIC DIRECTION #3
ENHANCE OUR EXTERNAL PARTNERSHIPS
WCU is recognized as an active partner within the Western North Carolina region, its communities, organizations, and businesses.

STRATEGIC DIRECTION #4
INVEST IN OUR PEOPLE
WCU is recognized as one of the most highly competitive and desirable employers in the region.

STRATEGIC DIRECTION #5
INVEST IN OUR CORE RESOURCES
WCU’s core infrastructure is sustainable and positioned to support its strategic priorities.

STRATEGIC DIRECTION #6
GARNER SUPPORT FOR THE VISION
WCU develops the resources and markets the vision to ensure achievement of its strategic priorities.
Western Carolina University is committed, first and foremost, to fulfilling its academic mission of providing each student a rigorous and relevant curriculum with learning experiences that emphasize knowledge and skills that are durable, flexible, and transferable. WCU is committed to providing an education grounded in a strong set of foundational knowledge and skills combined with specific practical knowledge in content degree areas, the outcome of which is personal, intellectual, and economic enrichment for each student. WCU seeks to ensure educational opportunities that result in graduates who are prepared for success, are ready to compete in a challenging, changing, and global environment, and who are contributing to the intellectual, cultural, and economic development of our region and state.

**GOAL 1.1:** Deliberate high-quality academic programs (undergraduate, graduate, and professional) designed to promote regional economic and community development.

**INITIATIVE 1.1.1:** Undertake a rigorous and inclusive process to prioritize and advance undergraduate and graduate programs based on universally applied criteria, including quality, regional need, demand, enrollment trends, retention, and graduation rates, and align the University with regional and the following integrated curricular focus areas: creative arts, education, environment, health, innovation and technology, and recreation and tourism.

**INITIATIVE 1.1.2:** Develop visionary strategic plans for each of the curricular focus areas through inclusive processes to accomplish the following:
- Position and market WCU as the cultural heart of Western North Carolina in the creative arts
- Fulfill WCU’s historic and continuing commitment to be the regional leader in teacher education
- Assume regional leadership in the study of the environment and environmental policy
- Position WCU as the premier regional provider of baccalaureate and graduate education in the health professions with an emphasis on culturally sensitive, integrative, and inter-generational health care
- Establish WCU as a hub of innovation, facilitating interdisciplinary connections among academic programs in such disciplines as business, the sciences, engineering, technology, and entrepreneurship and external collaboration with industry, start-up companies, research institutes, nonprofit organizations, and government agencies
- Advance the recreation and tourism industries of Western North Carolina

**INITIATIVE 1.1.3:** Position WCU as a premier provider of graduate and professional programs in the greater Asheville-Hendersonville area in fulfillment of its historic commitment to this vital part of the Western North Carolina region.

**INITIATIVE 1.1.4:** Provide access to academic programs at off-campus sites in Western North Carolina within available resources and as dictated by data-based needs analyses.

**INITIATIVE 1.1.5:** Align departments, colleges, and divisions, as appropriate, to support the strategic vision of the University.

**INITIATIVE 1.1.6:** Identify and develop integrated, cross-disciplinary centers/institutes of study and outreach, where appropriate, based on the curricular focus areas.

**INITIATIVE 1.1.7:** Increase the total number of WCU graduates by 25 percent by 2020 to meet the regional need for an educated workforce.

**GOAL 1.2:** Fully integrate into the general education program and into each major and minor at both undergraduate and graduate levels an emphasis on those core abilities expected of all WCU students: to integrate information from a variety of contexts; to solve complex problems; to communicate effectively and responsibly; to practice civic engagement; and to clarify and act on purpose and values.

**INITIATIVE 1.2.1:** Hire faculty and staff who understand and will contribute to WCU’s core educational values, its holistic academic mission, its commitment to outreach and engagement, and the achievement of the institution’s strategic priorities.

**INITIATIVE 1.2.2:** Develop and implement effective, faculty-led mentoring programs for students, aided and reinforced by advising and course scheduling in the support units and designed to reinforce the University’s core values.

**INITIATIVE 1.2.3:** Incorporate writing and research into all levels of the curriculum.

**INITIATIVE 1.2.4:** Ensure that all academic programs incorporate the core abilities detailed in Goal 1.2.

**INITIATIVE 1.2.5:** Incorporate into the formal evaluation of faculty work a consideration of how curricula, pedagogies, and scholarship successfully advance the University learning outcomes.

**GOAL 1.3:** Ensure that all programs include cross-curricular, experiential, applied, and international/global awareness opportunities for all students.

**INITIATIVE 1.3.1:** Reduce, and where possible eliminate, bureaucratic and financial barriers to cross-curricular design and team-teaching.

**INITIATIVE 1.3.2:** Incorporate expectations for experiential and applied learning opportunities, including undergraduate research opportunities, in the curricular review process.

**INITIATIVE 1.3.3:** Ensure that meaningful international/global experience opportunities are available to every student, regardless of major, including options to study with international scholars on WCU’s faculty, to participate in faculty-led international travel courses, and to study abroad. (See Initiative 2.1.6)

**GOAL 1.4:** Eliminate barriers to student access through coordinated endeavors with Birth-12 (B-12) and community college partners.

**INITIATIVE 1.4.1:** Establish a network of regional advisory committees to enhance communication and collaboration among B-12, community colleges, and WCU faculty and students in the areas of 1) curriculum goals and transferability; 2) the benefits of higher education and the best strategies for marketing and recruiting; and 3) admissions and financial aid.

**INITIATIVE 1.4.2:** Review, revise where appropriate, and electronically automate articulation agreements between WCU and community colleges in the WCU service area with the goal of maintaining high academic standards and facilitating curricular transfer; develop a standard review protocol and timeline.

**INITIATIVE 1.4.3:** Expand opportunities for WCU staff, faculty, and students to visit with B-12 and community college students (both on- and off-campus) to share information regarding the importance of higher education and the pathways, processes, and programs at WCU.

**INITIATIVE 1.4.4:** Expand coordinated communications and recruiting efforts among B-12, community colleges, and WCU regarding the value of education and affordable avenues for all individuals to access and benefit from it.

**GOAL 1.5:** Make WCU (the Cullowhee campus and the off-campus site at Biltmore Park in the Asheville-Hendersonville area) a destination for short-term, educationally based programs, activities, and events, including summer school, continuing education, camps, conferences, and personal enrichment opportunities.

**INITIATIVE 1.5.1:** Pursue a cohesive, consistent, and efficient organizational and policy structure to facilitate short-term, educationally based programs, activities, and events, including review of facilities use policies, University space allocation processes, and virtual format possibilities.

**INITIATIVE 1.5.2:** Expand the number of resident and distance summer school offerings for a wide variety of learners, including WCU students, guest students, senior citizens, B-12 students, and the general public; expand summer school enrollment by 25 percent by 2020.

**INITIATIVE 1.5.3:** Expand the number of camps and conferences that WCU offers by 50 percent by 2020.

**INITIATIVE 1.5.4:** Develop and implement a coordinated marketing plan to promote WCU’s Cullowhee campus and its programs at Asheville at Biltmore Park as conference destinations. (See Initiative 6.2.1)

**GOAL 1.6:** Attain a student population that balances the University’s commitment to access, its responsibility for student success, and ensures the sustainability of University funding. (See Initiative 6.3.2)

**INITIATIVE 1.6.1:** Develop data-driven admission strategies (for first-time freshmen, transfer, graduate, and distance students) that balance the University’s aim to increase the academic profile of entering students while continuing to serve the educational role of access as a regional comprehensive university.

**INITIATIVE 1.6.2:** Conduct ongoing program assessment and prioritization and allocate resources to positively affect enrollment.

**INITIATIVE 1.6.3:** Expand efforts to recruit students in programs associated with the curricular focus areas.

**INITIATIVE 1.6.4:** Make the securing of endowed merit and need-based financial aid an institutional fundraising priority. (See Initiatives 6.3.6)

**INITIATIVE 1.6.5:** Enhance support for scholarships, graduate assistantships, and student research to attract and retain students who are prepared for the rigors of a Western Carolina educational experience.

**INITIATIVE 1.6.6:** Increase the diversity of the student body and ensure campus resources necessary to support a diverse student body in order to serve the needs of the changing demographics of the region and state and to enhance the educational experience of all students.

**INITIATIVE 1.6.7:** Increase WCU’s freshman-to-sophomore retention rate to 80 percent by 2020.

**INITIATIVE 1.6.8:** Increase WCU’s six-year graduation rate to 60 percent by 2020.
GOAL 2.1: Foster a student-centered campus culture that emphasizes academic excellence, personal growth, networking opportunities, and global and social awareness.

INITIATIVE 2.1.1: Ensure that the mission of every academic support and student services unit exposes academic excellence as a primary emphasis.

INITIATIVE 2.1.2: Revise, and where necessary modify, all student recruitment and enrollment marketing materials to include expectations related to academic rigor and standards.

INITIATIVE 2.1.3: Align, and where appropriate consolidate, academic support and experiential learning services to ensure consistent, interconnected, and efficiently provided assistance to students.

INITIATIVE 2.1.4: Develop and/or formalize mentoring programs that helps students develop a sense of personal, intellectual, and professional identity.

INITIATIVE 2.1.5: Create leadership and experiential opportunities at the local, regional, national, and international levels, ensuring that all students participate in such opportunities and can document how these learning experiences are interconnected with their program of study (See Initiative 2.2.4).

INITIATIVE 2.1.6: Expand international experiences for all Western Carolina University students through such strategies as increasing study abroad opportunities, developing exchange programs with international universities, recruiting a sizable international student population to WCU, and enhancing global awareness components of existing curricula. (See Initiative 1.3.3)

GOAL 2.2: Foster active citizenship among WCU students.

INITIATIVE 2.2.1: Integrate the elements of the Western Carolina University “Community Creed” into institutionally affiliated programs and services.

INITIATIVE 2.2.2: As appropriate, include students as full, voting members on campus decision-making committees.

INITIATIVE 2.2.3: Increase the number of academic living-learning communities that integrate active, collaborative, and interdisciplinary learning experiences with curricular goals, ensuring necessary logistical and administrative support.

INITIATIVE 2.2.4: Provide every student with an opportunity to participate in student-led outreach projects that focus on civic engagement. (See Initiative 2.1.5)

INITIATIVE 2.2.5: Create a culture of participating in the democratic process as demonstrated by large percentages of students who are registered to vote and who vote.

INITIATIVE 2.2.6: Provide opportunities for students to explore all points of view on various issues and to understand the perspectives of others through civil and informed discourse and debate.

GOAL 2.3: Instill pride in the University through more visible recognition and celebration of institutional achievements and traditions.

INITIATIVE 2.3.1: Build and sustain a high-quality athletics program that excels and instills pride among students, faculty, staff, alumni, and friends of the University.

INITIATIVE 2.3.2: Create and sustain campus traditions that strengthen students’ connection to their University and its surrounding communities.

INITIATIVE 2.3.3: Build and sustain consistent celebrations of Cherokee history, culture, and traditions.

INITIATIVE 2.3.4: Include in the University’s comprehensive communications plan a focused strategy to celebrate with the institution’s internal and external audiences the accomplishments and achievements of students, faculty, and staff. (See Initiative 6.2.1)

INITIATIVE 2.3.5: Ensure that University events are consistently well-advertised to external audiences.

INITIATIVE 3.1: Strengthen relationships and communication between the University and its external partners.

INITIATIVE 3.1.1: Senior campus leadership will model the institution’s commitment to community outreach and involvement.

INITIATIVE 3.1.2: Establish an annual leadership tour of the Western North Carolina region designed to enhance WCU’s connection with its external constituents and to update University leadership consistently about regional and local priorities.

INITIATIVE 3.1.3: Establish the appropriate leadership and organizational structure at WCU to support, coordinate, and facilitate external partnerships and collaborations.

INITIATIVE 3.1.4: Create an institutional council with representatives from each division and college to enhance internal communication about external partnerships and engagement, including the sponsorship of an annual inventory of such activities.

INITIATIVE 3.1.5: Develop and implement a communications plan that informs Western Carolina University’s external community about University resources (invented annually), such as programs, services, facilities, and faculty/staff expertise that are available to the public. (See Initiative 6.2.1)

GOAL 3.2: Position the University as a key leader in regional economic and community development efforts.

INITIATIVE 3.2.1: Facilitate an annual conference for regional government, nonprofit, community, education, and business leaders to focus attention and action on regional strategies for economic and community development.

INITIATIVE 3.2.2: Develop the West Campus, with its Millennium Initiative designation, as a national model for building, in a rural context, public-private partnerships that are integrated into the academic enterprise and which support community and economic development.

INITIATIVE 3.2.3: Develop the programs at Biltmore Park to position WCU as a key provider of graduate and professional programs in the greater Asheville and Hendersonville area along the I-26 growth corridor.

INITIATIVE 3.2.4: Work with external partners to facilitate economic and community development in Cullowhee and Jackson County, which form the University’s backyard, and participate in the formation of formalized community leadership for Cullowhee that can serve as the voice of the community as it anticipates growth and development. (See Initiative 4.3.2)

INITIATIVE 3.2.5: Seek-out and implement internal synergies among outreach efforts and potential partnerships that are focused on economic and community development and consistent with the curricular focus areas identified by the 2020 Commission.
Excellent faculty and staff are prerequisites for the fulfillment of Western Carolina University’s mission. Western Carolina University must therefore advocate for competitive compensation for its employees and facilitate professional development; leadership development, succession, and stability; and, as appropriate, support for issues related to quality of life, all of which will enhance the recruitment, development, and retention of qualified and satisfied faculty and staff.

4.1: Establish a campus leadership academy to cultivate leadership development, succession, and stability; and, as appropriate, support for issues related to quality of life.

4.1.1: Develop and implement a program of competitive compensation for its employees and facilitate professional development; leadership development, succession, and stability; and, as appropriate, support for issues related to quality of life.

4.1.2: Establish capacity planning, management, and implementation processes to ensure accommodation of mandatory and anticipated information technology needs, including both human resources and technologies (e.g., bandwidth, storage, servers, digital media, software, licenses, wireless networking, wired networking, cloud services, etc.).

4.1.3: Establish a multifaceted sustainability and capacity planning process that is revisited annually.

4.1.4: Assess periodically and revise, where necessary, the information technology disaster recovery plan.

4.1.5: Sustain and enhance partnerships (e.g., mutual agreements, joint continuous plans for critical functions of the University).

4.1.6: Sustain and implement funding models in support of campus safety systems and infrastructure.

4.1.7: Sustain and implement funding models in support of campus and community safety priorities.

4.1.8: Systematically assess and upgrade technologies (e.g., radio systems, access controls, cameras, etc.) in support of campus safety objectives.

4.2: Work to develop a work-life environment for Western Carolina University employees that enhances their personal and professional lives.

4.2.1: Develop a network of opportunities, where possible, for affordable child care, health care, and housing options for faculty, staff, and students.

4.2.2: Establish a comprehensive facility condition assessment for existing buildings.

4.2.3: Establish a comprehensive facility condition assessment for existing buildings.

4.2.4: Establish a comprehensive facility condition assessment for existing buildings.

4.2.5: Establish a comprehensive facility condition assessment for existing buildings.

4.3: Foster an inclusive University community whereby the contributions of all employees are recognized and valued.

4.3.1: Establish an organization to implement an integrated faculty recruitment and onboarding system in support of Western Carolina University’s mission as a comprehensive university.

4.3.2: Establish an organization to implement an integrated faculty recruitment and onboarding system in support of Western Carolina University’s mission as a comprehensive university.

4.3.3: Establish an organization to implement an integrated faculty recruitment and onboarding system in support of Western Carolina University’s mission as a comprehensive university.

4.3.4: Establish an organization to implement an integrated faculty recruitment and onboarding system in support of Western Carolina University’s mission as a comprehensive university.

4.3.5: Increase diversity among faculty and staff.

4.4: Adequately support for scholarship and creative activities in support of Western Carolina University’s mission as a regional comprehensive university.

4.4.1: Establish an organization to manage and support scholarship and creative activities in support of Western Carolina University’s mission as a regional comprehensive university.

4.4.2: Establish an organization to manage and support scholarship and creative activities in support of Western Carolina University’s mission as a regional comprehensive university.

4.4.3: Establish an organization to manage and support scholarship and creative activities in support of Western Carolina University’s mission as a regional comprehensive university.

4.4.4: Establish an organization to manage and support scholarship and creative activities in support of Western Carolina University’s mission as a regional comprehensive university.

4.5: Create an environment in which the primary role of faculty as teacher-scholars is recognized and valued.

4.5.1: Establish an organization to manage and support scholarship and creative activities in support of Western Carolina University’s mission as a regional comprehensive university.

4.5.2: Establish an organization to manage and support scholarship and creative activities in support of Western Carolina University’s mission as a regional comprehensive university.

4.5.3: Establish an organization to manage and support scholarship and creative activities in support of Western Carolina University’s mission as a regional comprehensive university.

4.5.4: Establish an organization to manage and support scholarship and creative activities in support of Western Carolina University’s mission as a regional comprehensive university.

4.6: Foster an inclusive University community whereby the contributions of all employees are recognized and valued.

4.6.1: Establish an organization to manage and support scholarship and creative activities in support of Western Carolina University’s mission as a regional comprehensive university.

4.6.2: Establish a forum that facilitates collaboration among members of the Faculty Senate, Staff Senate, and the Student Government Association on university-wide issues and projects.

5.1: Implement sustainable funding models to ensure fiscal stability.

5.1.1: Establish a comprehensive University master plan.

5.1.2: Establish a comprehensive University master plan.

5.1.3: Establish a comprehensive University master plan.

5.1.4: Establish a comprehensive University master plan.

5.2: Develop and implement a program of competitive compensation for its employees and facilitate professional development; leadership development, succession, and stability; and, as appropriate, support for issues related to quality of life.

5.3: Establish a comprehensive University master plan.

5.3.1: Establish a comprehensive University master plan.

5.3.2: Establish a comprehensive University master plan.

5.3.3: Establish a comprehensive University master plan.

5.3.4: Establish a comprehensive University master plan.

5.3.5: Establish a comprehensive University master plan.

5.4: Sustain and increase information technology capabilities and capacity required to meet the goals of the University.

5.4.1: Establish and maintain a comprehensive University master plan.

5.4.2: Establish and maintain a comprehensive University master plan.

5.4.3: Establish and maintain a comprehensive University master plan.

5.4.4: Establish and maintain a comprehensive University master plan.

5.4.5: Establish and maintain a comprehensive University master plan.

5.5: Improve the effectiveness and efficiency of campus business processes to ensure continuous improvement and to realize financial savings.

5.5.1: Improve the effectiveness and efficiency of campus business processes to ensure continuous improvement and to realize financial savings.

5.5.2: Improve the effectiveness and efficiency of campus business processes to ensure continuous improvement and to realize financial savings.

5.5.3: Improve the effectiveness and efficiency of campus business processes to ensure continuous improvement and to realize financial savings.

5.5.4: Improve the effectiveness and efficiency of campus business processes to ensure continuous improvement and to realize financial savings.

5.5.5: Improve the effectiveness and efficiency of campus business processes to ensure continuous improvement and to realize financial savings.
WCU develops the resources and markets the vision to ensure achievement of its strategic priorities.

GOAL 6.1: Facilitate a shared understanding of and commitment to the institution’s strategic vision among WCU faculty, staff, and students.

INITIATIVE 6.1.1: Develop and implement a comprehensive plan to increase significantly WCU’s advocacy efforts among elected officials on behalf of University and system priorities.

INITIATIVE 6.1.2: Develop and implement an advocacy plan for state/system action on three key market-based issues:
- Tuition policy flexibility (in-state or surcharge) for students in bordering states
- Differential tuition in high-demand/high-expense programs
- Modification/elimination of differential treatment of distance education in the UNC system’s funding formula

INITIATIVE 6.1.3: Pursue comprehensive development campaign targeting (See Initiative 1.6.4):
- Gifts at all levels in support of WCU’s strategic goals and initiatives
- Particular philanthropic support for endowed merit- and need-based scholarships to enable WCU to recruit and retain the best academically qualified students and to support WCU’s commitments to student access and student success
- An increase in the participation and engagement of WCU alumni in University activities and in the number of alumni donors by 50 percent by 2020
- Adequate development and alumni staffing to ensure the campaign’s success

INITIATIVE 6.2: Facilitate a shared understanding of the institution’s strategic vision among the University’s external communities.

INITIATIVE 6.2.1: Develop and implement comprehensive and consistent communications and marketing plans designed to fulfill the University’s strategic priorities. (See Initiatives 1.5.4, 2.3.4, and 3.1.5)

INITIATIVE 6.2.2: Ensure the appropriate leadership and organizational structure necessary to develop and implement comprehensive communication and marketing plans designed to communicate Western Carolina University’s strategic vision effectively, concisely, and consistently to all external stakeholders.

INITIATIVE 6.2.3: Facilitate a shared understanding of and commitment to the institution’s strategic vision among the University’s faculty, staff, and students.

INITIATIVE 6.2.4: Develop a process to review periodically the University board and take the marketing message accordingly.

INITIATIVE 6.3.4: Develop and implement a comprehensive plan to increase significantly WCU’s advocacy efforts among elected officials on behalf of University and system priorities.

INITIATIVE 6.3.5: Develop and implement an advocacy plan for state/system action on three key market-based issues:
- Tuition policy flexibility (in-state or surcharge) for students in bordering states
- Differential tuition in high-demand/high-expense programs
- Modification/elimination of differential treatment of distance education in the UNC system’s funding formula

INITIATIVE 6.3.6: Pursue comprehensive development campaign targeting (See Initiative 1.6.4):
- Gifts at all levels in support of WCU’s strategic goals and initiatives
- Particular philanthropic support for endowed merit- and need-based scholarships to enable WCU to recruit and retain the best academically qualified students and to support WCU’s commitments to student access and student success
- An increase in the participation and engagement of WCU alumni in University activities and in the number of alumni donors by 50 percent by 2020
- Adequate development and alumni staffing to ensure the campaign’s success

INITIATIVE 6.3.7: Develop infrastructure for research and sponsored programs, technology transfer, and commercialization consistent with strategic priorities to achieve the following by 2020:
- Increase in the number of research grant and contract applications by 100 percent
- Increase in the number of grants and contracts received by 50 percent
- Increase in the total annual amount of awards received by 25 percent

INITIATIVE 6.3.8: Pursue funding resources for development of the West Campus/Anniversary Initiative.
Western Carolina University  
College of Arts and Sciences  
Strategic Plan  
18 December 2013

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.

Core Values
The faculty, staff, and administration of the College of Arts and Sciences value:

- An intellectually stimulating environment
- Academic excellence
- Interdisciplinary collaboration
- Committed and effective teacher-scholars
- Diversity of ideas, perspectives, and cultures
- Engagement
- Our communities
- Sense of place
- Student success

Strategic Direction #1: Fulfill the Educational Needs of Our State and Region
Western Carolina University is committed, first and foremost, to fulfilling its academic mission of providing each student a rigorous and relevant curriculum with learning experiences that emphasize knowledge and skills that are durable, flexible, and transferable. WCU is committed to providing an education grounded in a strong set of foundational knowledge and skills combined with specific practical knowledge in content degree areas, the outcome of which is personal, intellectual, and economic enrichment for each student. WCU seeks to ensure educational opportunities that result in graduates who are prepared for success, who are ready to compete in a challenging, changing, and global environment, and who are committed to contributing to the intellectual, cultural, and economic development of our region and state.

The College of Arts and Sciences will support Strategic Direction #1 of the 2020 Vision through the following goals and initiatives:

Goal 1.1 By 2020, the College of Arts and Sciences will increase educational and research opportunities for faculty and students that will enhance our current programs and offer avenues
for exploration into new courses, programs, and degree offerings that are consistent with the needs of our state and region.

**Initiative 1.1.1** Seek outside funding opportunities for educational and research programs that support students, collaborative ventures between students and faculty, and multidisciplinary research opportunities for faculty and students across the College and University.

**Initiative 1.1.2** Increase the use of the Biltmore Park campus by providing additional courses in A&S disciplines at that location.

**Initiative 1.1.3** Increase internal funding of faculty research projects that include heavy involvement of students through the use of a portion of the indirect costs returned to A&S.

**Initiative 1.1.4** Encourage programs to integrate student research and inquiry into all levels of the curriculum.

**Initiative 1.1.5** Seek competitive grant funding for course improvement to improve student success, especially in major and gateway courses.

**Initiative 1.1.6** Recognize and reward faculty who excel in advising and mentoring students and seek ways to improve advising and mentoring in all departments.

**Initiative 1.1.7** Increase online program and course offerings, where appropriate, to meet the needs of the state and region.

**Initiative 1.1.8** Continue to foster the development of courses, curricula, and programming that explores the history, culture, socioeconomic conditions, and environment of southern Appalachia.

**Goal 1.2** Increase graduation and retention rates for students in all College undergraduate and graduate programs.

**Initiative 1.2.1**: Enhance and expand College efforts to develop effective and focused advising and mentorship opportunities.

**Initiative 1.2.2** By 2014, develop a strategic plan to enhance College recruiting and retention efforts.

**Initiative 1.2.3** Develop plans and initiatives to increase and enhance student access through coordinated endeavors with Birth-16 and community college partners.
Goal 1.3 Ensure that each WCU student receives a strong foundation in liberal studies by maintaining a strong general education program.

Initiative 1.3.1 The College will advocate for a liberal arts foundation for all WCU students and will remain at the core of the general education program.

Initiative 1.3.2 Encourage departments to regularly review general education course offerings and ensure that they are meeting the current needs of students in state, regional, and global communities.
**Strategic Direction #2: Enrich the Total Student Experience**

WCU is committed to working toward the best interests of all students by deliberately and consciously considering what it means to educate citizens, a pursuit that encompasses both curricular and co-curricular elements that serve to prepare students to participate in and help create a vibrant, intellectually, culturally, and economically thriving region, state, nation, and world.

The College of Arts and Sciences will support Strategic Direction #2 of the 2020 Vision through the following goals and initiatives:

**Goal 2.1** Provide all students a rigorous, well-rounded educational experience that emphasizes the liberal arts and sciences, essential skills, and disciplinary expertise.

- **Initiative 2.1.1** Because students learn in a variety of different ways, the College will provide a secure environment for faculty to explore pedagogies that foster student success.

- **Initiative 2.1.2** Encourage programs to integrate student research and inquiry into all levels of the curriculum.

- **Initiative 2.1.3** Appoint a liaison in each department to report to the College on current student involvement in undergraduate and graduate research and to meet with counterparts in other departments to develop best practices for encouraging meaningful student research and collaborative opportunities to be distributed college wide.

- **Initiative 2.1.4** Ensure that all programs include cross-curricular, experiential, applied, state, regional, and global learning opportunities.

**Goal 2.2** The College of Arts and Sciences will increase student engagement opportunities that prepare them more fully for their future endeavors.

- **Initiative 2.2.1** By 2020, College of Arts and Sciences students will increase participation in local, state, national, and international internships by 15% from 2013 levels.

- **Initiative 2.2.2** Working with campus partners in Academic Affairs and Student Affairs, develop and implement focused departmental professional development experiences for students to provide information on careers, the job search process, graduate and professional schools, and related topics by 2015.

- **Initiative 2.2.3** Integrate engagement, where appropriate, into each department’s QEP.
Goal 2.3 Foster active citizenship among students in the College of Arts and Sciences.

Initiative 2.3.1 By 2020, each department in the College will have an active, locally engaged student organization.

Initiative 2.3.2 In order to promote diversity and global citizenship, the College of Arts and Sciences will increase opportunities for study abroad and exchange programs.

Initiative 2.3.3 Increase opportunities to engage in meaningful service learning that extends beyond community service, is clearly connected to respective curricula, and assessed for its academic value.

Goal 2.4 Encourage the development of College and departmental identities and traditions.

Initiative 2.4.1 Review and expand avenues for recognition of academic achievement of A&S students

Initiative 2.4.2 Enhance and reinforce the intellectual climate for A&S students, faculty, and staff, as well as other members of the university and the local community, through lectures, symposia, and other academic programing.
Strategic Direction #3: Enhance Our External Partnerships
Partnerships with regional businesses and industries, nonprofits, civic organizations, government agencies, communities, and cities are an integral part of WCU’s core mission as a recognized, regionally engaged university. The University’s emphasis on integrated learning experiences, its commitment to engaged scholarship, and its embrace of the institution’s role as both a steward of this unique and special place and a catalyst for economic and community development all demonstrate and reinforce WCU’s commitment to enhancing engagement with external partners.

The College of Arts and Sciences will support Strategic Direction #3 of the 2020 Vision through the following goals and initiatives:

Goal 3.1 By 2020, the College of Arts and Sciences will increase our partnerships with local, state, national, and international entities that support our mission and values.

Initiative 3.1.1: By 2020, increase faculty and student exchange programs, especially in the international arena, by 20% over 2013 levels.

Initiative 3.1.2: The College of Arts and Sciences administration, faculty, and students will provide professional support for community organizations and businesses (e.g., offer professional development training or courses that are business specific or open community forums).

Initiative 3.1.3 Establish an administrative structure within the College to identify possible external partners, coordinate, and assess engagement activities.

Initiative 3.1.4 Encourage each department to develop an engagement strategy that includes current and potential community partners.

Initiative 3.1.5 Provide open house opportunities for regional partners and residents to show the work of our students, faculty, and staff, and to make the region more aware of our quality and capabilities.

Initiative 3.1.6 Increase ties with regional and national external entities by hosting more multidisciplinary, regional, and national events, such as conferences, meetings, professional development activities, and workshops.

Goal 3.2 Align internal processes and reward system to foster external engagement.

Initiative 3.2.1 Establish a mechanism by which members of the College of Arts and Sciences are rewarded for work with external partners.

Initiative 3.2.2 Establish a small competitive grant program to encourage faculty to develop coursework that includes interaction with the community.
Strategic Direction #4: Invest in Our People
Excellent faculty and staff are prerequisites for the fulfillment of Western Carolina University’s mission. Western Carolina University must therefore advocate for competitive compensation for its employees and facilitate professional development; leadership development, succession, and stability; and, as appropriate, support for issues related to quality of life, all of which will enhance the recruitment, development, and retention of qualified and satisfied faculty and staff.

The College of Arts and Sciences will support Strategic Direction #4 of the 2020 Vision through the following goals and initiatives:

Goal 4.1. The College of Arts and Sciences will value and reward those professors who are highly committed, and effective, in enhancing student success.

Initiative 4.1.1 Provide resources to professors to attend professional development opportunities aimed at enhancing effective teaching and learning opportunities.

Initiative 4.1.2 Identify new ways to recognize, reward, and encourage innovative and highly successful teaching.

Initiative 4.1.3 By the 2014-2015 academic year, develop and implement a grants program to support faculty research.

Initiative 4.1.4 Organize formal venues for teachers and scholars to discuss their best practices.

Goal 4.2 Recruit, retain, and develop outstanding faculty and staff who are committed to our mission.

Initiative 4.2.1 Develop and implement effective mechanisms for retaining high-performing employees with competitive salaries within existing policies and in accordance with national salary data.

Initiative 4.2.2 Assist faculty and staff in securing employment for spouses, and support efforts for WCU to offer cost effective child-care for employees.

Initiative 4.2.3 Promote diversity in hiring throughout the College.

Initiative 4.2.4 Examine ways to address salary inequity, compression, and inversion at the department and college levels.

Initiative 4.2.5 Support and appropriately compensate faculty for curriculum development, especially in the area of online courses and programs.

Initiative 4.2.6 Support a professional and expert faculty and advocate for tenured and tenure-track positions to match the growing enrollment at WCU and in the College.
**Initiative 4.2.7** Link program growth to tenure-track faculty requests, operating budget increases, and other budget request in the College budget process.

**Goal 4.3** Create an environment in which the primary role of faculty as teacher-scholar is recognized and valued.

- **Initiative 4.3.1** Create an environment in which teaching and scholarship can be balanced ensuring both can be effectively pursued and rewarded.

- **Initiative 4.3.2** Ensure that faculty receiving grant support can present evidence regarding the prestige of the funding in their Collegial Review Document.

- **Initiative 4.3.3** Encourage departments to review and clarify expectations for teaching, scholarship, and service in their Collegial Review Documents.

- **Initiative 4.3.4** Review committee commitments at the department and college levels to identify opportunities for consolidation and/or elimination.

- **Initiative 4.3.5** Ensure that all faculty members are aware of college-level committee openings to ensure full faculty representation and balanced workloads.

- **Initiative 4.3.6** By 2020, increase the number of sponsored research submissions by 25% and the number of successful awards by 15% through college incentive programs.

- **Initiative 4.3.7** Identify and implement a system of best practices for class size that is based on discipline-specific student learning concerns, resource limitations, and retention and graduation rates.

**Goal 4.4** Recognize and reward achievements by faculty and staff.

- **Initiative 4.4.1** Review and enhance non-monetary recognition, rewards, and incentives for outstanding teaching, research, and service for the faculty and for exceptional job performance for staff.

**Goal 4.5** Provide professional development, mentoring, and advocacy for staff members.

- **Initiative 4.5.1** Advocate for salary increases for college staff members to recognize and reward them for their contributions to student success.

- **Initiative 4.5.2** Support staff members taking courses through WCU’s tuition remission program.

- **Initiative 4.5.3** The Dean’s Office will develop and implement a program of regular professional development for College staff members and an orientation program for new staff members.
**Strategic Direction #5: Invest in Our Core Resources**

Western Carolina University will ensure a consistently updated infrastructure in support of its mission and vision. Infrastructure is interpreted broadly to include facilities, technology, fiscal practices, and business processes and procedures.

The College of Arts and Sciences will support Strategic Direction #5 of the 2020 Vision through the following goals and initiatives:

**Goal 5.1** Sustain and increase instruction and research technology capabilities and capacity required to meet the goals of the College of Arts and Sciences.

- **Initiative 5.1.1** Develop plans to invest in instrumentation, updating older existing equipment and acquiring new capabilities in order to meet the advancing technological and scientific demands of the 21st century.

- **Initiative 5.1.2** Continue to invest in outdoor labs and classrooms in order to take advantage of our unique geographic setting and provide engagement opportunities for students.

- **Initiative 5.1.3** Review service contract expenditures and develop a plan for cyclical replacement of some equipment where economically feasible, and reinvest the savings in equipment purchases, replacement, and sustainment.

**Goal 5.2** Develop a comprehensive College of Arts and Sciences master plan.

- **Initiative 5.2.1** Coordinate all science departments in the design of the new science building.

- **Initiative 5.2.2** Develop an interim plan to maximize effective space utilization for classrooms, labs, and offices in order to better accomplish our instructional mission.

- **Initiative 5.2.3** Advocate for space allocation and renovation to better accomplish our instructional and research missions.

- **Initiative 5.2.4** Identify classrooms and labs for renovation to better address issues of pedagogy and class size.
Strategic Direction # 6: Garner Support for the Vision
WCU’s continued emergence as an ambitious institution of higher education dedicated to the economic and community development of Western North Carolina depends on the development and cultivation of consistent and robust funding sources and an ongoing communications strategy designed to ensure that internal and external stakeholders are consistently informed about the University and its progress in achieving strategic goals.

The College of Arts and Sciences will support Strategic Direction #6 of the 2020 Vision through the following goals and initiatives:

**Goal 6.1** Promote and celebrate the accomplishments of its students, faculty, and staff.

- **Initiative 6.1.1** During the 2014-15 academic year, the College will develop and implement an effective communications strategy that will include traditional media and social media.

- **Initiative 6.1.2** The College will develop and publish a semi-annual media package to highlight the achievements of our students, faculty, and staff.

**Goal 6.2** Strengthen and expand connections with College alumni, friends, and community partners.

- **Initiative 6.2.1** Foster relationships with A&S alumni and encourage their continued involvement in the College through strategic communications that highlight each of the College’s departments and their accomplishments with students.

- **Initiative 6.2.2** By 2020, increase alumni annual donation rates by 25% from current 2013 levels.

**Goal 6.3** Strengthen and expand development initiatives within the College.

- **Initiative 6.3.1** By 2020, establish at least one endowed scholarship in all departments and programs.

- **Initiative 6.3.2** By 2020, increase the amount of departmental scholarship donations by 20% annually over 2013 levels.

- **Initiative 6.3.3** Establish an endowed fund to support student engagement activities.

- **Initiative 6.3.4** Establish an endowed scholarship to support student international experiences.

- **Initiative 6.3.5** Establish an endowed fund to support faculty scholarship.
Mission of the Mathematics Program

The Mission of the Mathematics Program in its teaching, scholarship, and service activities is to (1) foster an appreciation of mathematics and an awareness of the vital role it plays in society; (2) develop in our students critical thinking and problem solving skills within the context of mathematics; (3) guide our students to actively integrate, communicate, and utilize what they have learned into a variety of intellectual contexts; (4) prepare our majors for productive futures in education, industry, academia, and business as engaged members of society; and (5) contribute to the discipline and practice of mathematics by preparing motivated students for graduate studies, producing notable scholarship, and meaningfully engaging in institutional, regional, and professional communities.
Strategic Directions for the Mathematics Program

November 2014

Strategic Direction 1: Enhance the student experience in mathematics. The principal purpose of the program is to educate students so that they not only think critically and solve problems but also communicate mathematics well both orally and in writing.

- Maintain a robust and relevant curriculum that develops students’ critical thinking
- Provide liberal studies courses that build quantitative literacy
- Strengthen students’ mathematical communication skills
- Recruit and retain strong cohorts of mathematics majors and minors
- Improve student access to opportunities to study mathematics

Strategic Direction 2: Create engagement opportunities for students. Students should be immersed in the discipline as well as engaged in the larger academic community. Academic pursuits should thread with extramural activities and should support students as they make the bridge between the undergraduate experience and the workforce.

- Create research opportunities for students at a variety of levels
- Reinforce problem solving beyond the classroom
- Provide opportunities for service learning in courses and activities in service of the region
- Prepare students for careers in industry, government, and education, as well as for graduate and professional programs
- Engage the students in the discipline through conferences, professional organizations, and extramural activities
- Advise students effectively on their curricular plans and their career trajectories

Strategic Direction 3: Invest in the teacher-scholar model for faculty. Faculty have many responsibilities in both teaching and scholarship. By providing support and guidance, the program will nurture their pursuits so that they may excel in both areas and reinforce the connections between the two areas.

- Establish an atmosphere of inquiry in the department
- Recruit and retain high quality faculty who embrace the teacher-scholar model
- Provide resources for faculty to maintain currency and to disseminate results
- Incorporate undergraduate research components in our scholarly agendas
- Meet faculty needs for computing and teaching with technology
- Support diversity within the discipline and encourage interdisciplinary research

Strategic Direction 4: Reach out to the university and community. Both students and faculty should participate in outreach activities that connect us to other academic units, to K-12 students and faculty, to the region and state, and to the discipline of mathematics.

- Improve the quality of standards-based instruction in our service region
- Connect to K-12 students both on our campus and in the schools
- Connect to area community colleges and other four-year institutions
- Employ our expertises to support institutional, regional, and disciplinary constituencies
# Mathematics Program Strategic Planning

<table>
<thead>
<tr>
<th>Strategic Direction</th>
<th>Goals</th>
<th>Initiatives</th>
<th>WCU 2020 Strategic Directions</th>
<th>Actions to Date - November 2014</th>
<th>Strategic Planning</th>
<th>Planned Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Enhance the student experience in mathematics</td>
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<tr>
<td>Robust and relevant curriculum</td>
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<tr>
<td>Currency of content in upper division courses</td>
<td>1.2.4, 2.1.1</td>
<td></td>
<td>Update MATH 4xx/5xx content, frequency of offerings</td>
<td>2015-2016</td>
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<tr>
<td>Liberal studies</td>
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<tr>
<td>Service courses for other programs</td>
<td>1.2.4, 2.1.1</td>
<td>C2 (mathematics) liberal studies (MATH 101), First year seminars (MATH 19X), upper level perspective (MATH 301)</td>
<td>Consider faculty coordination of &quot;gateway&quot; courses</td>
<td>2015-2016</td>
<td></td>
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<tr>
<td>Math Placement</td>
<td>2.1.2</td>
<td>Presently using SAT/ACT/AP scores only. Investigated implementing a placement exam. Johnny Lail (OIPE) and John Wagaman designed a predictor model to incorporate other data 2014</td>
<td>Collect more data in 2014-2015, refine predictor model. Revisit math placement exam idea.</td>
<td>2016-2017?</td>
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<tr>
<td>Mathematical communication skills</td>
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<tr>
<td>Writing and oral presentations in coursework</td>
<td>1.2.3, 2.1.1</td>
<td>Implemented into syllabus for Intro to Scientific Computing (MATH 340) and Capstone Seminar (MATH 479)</td>
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<tr>
<td>Writing in a markup language</td>
<td>1.2.3, 2.1.1</td>
<td>LaTeX required in MATH 340</td>
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<tr>
<td>Recruitment and retention of majors and minors</td>
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<tr>
<td>Student participation in Math Club, CS Club, NCCTM Beta</td>
<td>2.2</td>
<td>Game nights, holiday party, Math T-shirt design contest, picnic</td>
<td>Increase activity and visibility. Pi month is being planned for March 2015</td>
<td>2014-2015</td>
<td></td>
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<tr>
<td>Awards Banquet</td>
<td>1.6.5, 2.1.2, 2.3.2</td>
<td>Held every Spring</td>
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<tr>
<td>Active peer tutoring/mentoring program in the department</td>
<td>2.1.3, 1.6.7</td>
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<tr>
<td>Completion of degrees in a timely manner</td>
<td>1.1.1, 1.6.8</td>
<td>Eight-semester plans, careful advising compliant with WCU Finish in Four</td>
<td>Assess 4-year and 6-year graduation rates</td>
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<tr>
<td>Freshman/transfer orientation program</td>
<td>6.1</td>
<td>At orientation, new students are presently advised individually by professional advisors and they have a one-hour group advising session with program faculty</td>
<td>Maintain strong communication with professional advisors, especially on math placement.</td>
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<tr>
<td>Opportunities to study mathematics</td>
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<tr>
<td>External scholarships</td>
<td>1.6.5</td>
<td>Risto Atanasov assigned as National Scholarship Mentor, Goldwater application in 2011</td>
<td>Identify and mentor potential nominees</td>
<td></td>
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<tr>
<td>WCU scholarships</td>
<td>1.6.5</td>
<td>Crum and Milton Scholarship as well as new CAS scholarship. Applications have been consolidated in ScholarCat</td>
<td>Enhance advancement efforts to build these funds</td>
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<tr>
<td>Community outreach</td>
<td>1.4.3</td>
<td>Visiting Speaker Program - faculty speak to classes in area schools.</td>
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<tr>
<td>Strategic Direction</td>
<td>Goals</td>
<td>Initiatives</td>
<td>WCU 2020 Strategic Directions</td>
<td>Actions to Date - November 2014</td>
<td>Strategic Planning</td>
<td>Planned Implementation</td>
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</tr>
<tr>
<td>Access to students at Biltmore Park</td>
<td>1.1.4</td>
<td>Taught graduate classes there until program was discontinued.</td>
<td>MOU prevents duplication of UNCA courses. Short of amending the MOU, we are considering a course in service of the ENGR cohort at BP</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Support for technology (ex: smart boards)</td>
<td>4.4.3, 5.4</td>
<td>Promethean board in use. Recent purchase of a new SmartBoard and iPad classroom set (with cart)</td>
<td>Resolve issues with logins for iPads. Identify apps for iPads. Get new SmartBoard online.</td>
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</tr>
</tbody>
</table>

2. Create engagement opportunities for students

<table>
<thead>
<tr>
<th>Research opportunities</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Promote summer REUs and mentor students applying for REUs.</td>
<td>1.3.2, 1.4</td>
<td>Four students (3 math, 1 CS) participated in REU's Summer 2014. Colloquium Fall 2014 improved student awareness</td>
</tr>
<tr>
<td>Encourage independent investigation in capstone</td>
<td>1.2.3, 1.3.2</td>
<td>Students often consult faculty for an independent research project (the third project) in capstone.</td>
</tr>
<tr>
<td>Student research</td>
<td>1.2.3, 2.1.4</td>
<td>With the graduate programs discontinued we will redouble our efforts in research with undergraduates.</td>
</tr>
<tr>
<td>REU at WCU</td>
<td>1.3.2</td>
<td></td>
</tr>
<tr>
<td>Internships</td>
<td>1.3.2</td>
<td></td>
</tr>
<tr>
<td>Summer programs</td>
<td>1.3.2, 1.5.2, 1.5.3</td>
<td>Partnering to offer MATH course to proposed ENGR summer learning community Summer 2014</td>
</tr>
<tr>
<td>Honors contracts (for Honors College)</td>
<td></td>
<td>Instructors individually offer honors contracts at all levels.</td>
</tr>
</tbody>
</table>

Problem solving

| Problem solving in coursework | 1.3.2 | Fall course developed for contest preparation, Fall 2014 - 12 students enrolled; |

Service learning and service activities

| Student involvement with Math Tutoring Center | 1.6.7 | Increasing number of undergraduate tutors responding to increasing demand -- Fall 2014 |
| Student workers, TA's, tutors | 2.1.1, 2.1.4 | |
| Increase service learning opportunities | 2.2.4, 3.2.4 | Individual instructors have added service learning components in a few courses |
| Inclusion of service learning in Capstone Seminar (MATH 479) | 2.2.4, 3.2.4 | Implemented in courses as a trial 2013 |

Career and graduate school preparation

<p>| Career preparation in Capstone Seminar (MATH 479) | 2.1.1 | Constructing resumes and cover letters, support from Career Services - added 2010 |
| Actuarial science | 1.6.3 | Theory of Interest for Actuarial Exam FM (MATH 373), Problem Solving for Actuarial Exam P (MATH 471) |
| Actuarial Science | | Option dropped in budget cut. Consider reinstating. |</p>
<table>
<thead>
<tr>
<th>Strategic Direction</th>
<th>Goals</th>
<th>Initiatives</th>
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<td>Actions to Date - November 2014</td>
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<td>Planned Implementation</td>
</tr>
<tr>
<td>Engagement in the discipline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Student participation in conferences</td>
<td>2.1.1, 2.2</td>
<td>NCCTM, MAA-SE, JMM, SMURCHOM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student chapters of mathematical societies</td>
<td></td>
<td>Institutional membership in MAA, NCCTM-Beta Chapter. Dues covered by department budget. Consider mathematics honor society.</td>
<td></td>
<td>Consider moving dues to a permanent line item.</td>
<td>2015-2016</td>
<td></td>
</tr>
<tr>
<td>Mathematics honor society</td>
<td></td>
<td>Desirable but no budget for initiation and dues</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Advising

- Mentoring majors and minors, pre-service teachers, honors contracts) 1.2.2, 1.2.3, 2.1.4
- Mentoring pre-service teachers, 1.2.2, 1.2.3, 2.1.4
- Advising Day activities 1.6.7, 1.6.8 Considering a group advising session, social event

3. Invest in the teacher-scholar model for faculty

Atmosphere of inquiry

- Colloquia and faculty seminars 4.2 Departmental colloquium held regularly. Faculty Research Seminar initiated 2009, inactive Increase student participation in colloquia
- Layout of dept conducive to student/faculty interactions 2.1.3 2015-2016

Faculty recruitment and retention

- Mentoring of junior faculty 1.2.2, 4.2.4 Each non-tenured faculty has tenured faculty mentor in department
- Flexibility in teaching, service, workload distribution 4.5.1, 4.5.2
- Student evaluations, more dept input on review of members teaching, scholarship, service 1.2.5, 4.2.4 We are currently reviewing our departmental Student Course Evaluations. WCU Student Assessment of Instruction is required. Peer observations each semester of tenure-track, fixed-term, part-time adjuncts and GTAs.
- Adjust workload distribution and formalizing process 3.3.1, 4.5.2

Resources for scholarship

- Professional presentations/international in scope (support from dept.) 4.2 Faculty have been awarded the Chancellor's Travel Fund and Coulter Faculty Center Professional Development Grants. Department budget can cover overage.
- Grants with educational agencies, NOAA, external agencies Clemson 1.1.2, 3.1.3

Undergraduate research components

Computation and technology
Department of Mathematics Computer Science

Strategic Direction Alignment with 2020 Vision

<table>
<thead>
<tr>
<th>Strategic Direction</th>
<th>Goals</th>
<th>Initiatives</th>
<th>WCU 2020 Strategic Directions</th>
<th>Actions to Date - November 2014</th>
<th>Strategic Planning</th>
<th>Planned Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server</td>
<td></td>
<td></td>
<td>4.4.3, 5.4</td>
<td>Blade server and auxiliary server presently maintained by a CS faculty member</td>
<td>Consider a model that would reduce the system administration burden on faculty</td>
<td></td>
</tr>
<tr>
<td><strong>Diversity and interdisciplinarity</strong></td>
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</tr>
<tr>
<td>Collaborative scholarship (within department and with students)</td>
<td></td>
<td></td>
<td>1.3.2</td>
<td>Co-authorships and joint presentations in algebra and teaching and learning,</td>
<td></td>
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</tr>
<tr>
<td>Collaborative research/scholarship</td>
<td></td>
<td></td>
<td>1.1.1, 1.1.2, 1.3.2</td>
<td>Interdisciplinary research with physics (Jeff Lawson), biology (Erin McNelis and Cory Howk), engineering and technology (Erin McNelis), Communication Sciences and Disorders (John Wagaman), College of Education (Kate Best, Nathan Borchelt, Axelle Faughn, Kathy Jaqua, John Wagaman), Program for the Study of Developed Shorelines (CS program faculty)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Reach out to the university and community

**Standards-based instruction in the region**

**Connection to K-12 students**

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Strategic Planning</th>
<th>Planned Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction with K-12 including contests</td>
<td>1.4.3</td>
<td>Mathematics &amp; CS Department continues to hold annual High School Mathematics Contest for Western Region, Spring</td>
</tr>
<tr>
<td>Speaker programs</td>
<td>3.1.3</td>
<td>Active Visiting Speakers Program provides outreach to schools</td>
</tr>
<tr>
<td>Regional leadership in teacher ed, secondary and community college</td>
<td>1.1.2</td>
<td>Nathan Borchelt’s work with WNC P-16 Education Consortium; Nathan Borchelt and Sloan Despeaux launch Smoky Mountain Math Teachers Circle</td>
</tr>
<tr>
<td>Sonya Kovalevsky Day</td>
<td>3.2.1</td>
<td>Held one in 2009 and 2010. Discontinued for lack of participation.</td>
</tr>
</tbody>
</table>

**Connection to other colleges in the region**

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Strategic Planning</th>
<th>Planned Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase work with 21st continuing scholars, visiting speakers to comm. Colleges</td>
<td>3.1.3</td>
<td></td>
</tr>
</tbody>
</table>

**Institutional, regional, and disciplinary partners**

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Strategic Planning</th>
<th>Planned Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host conferences at WCU</td>
<td>1.5</td>
<td>Zassenhaus Conference 2013, SERMON 2013, WeBWork Coding Camp 2014</td>
</tr>
<tr>
<td>Involvement in a variety of areas of campus life</td>
<td>2.3.2, 2.3.5</td>
<td></td>
</tr>
<tr>
<td>MAA Project NEXT</td>
<td></td>
<td>7 faculty are NExT alumni. Julie Barnes is one of three Associate Directors</td>
</tr>
<tr>
<td>Strategic Direction</td>
<td>Goals</td>
<td>Initiatives</td>
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<td>---------------------</td>
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</tr>
<tr>
<td>WeBWorK</td>
<td></td>
<td>1.4.1</td>
</tr>
<tr>
<td>Contributions to professional organizations</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Departmental Strategic Planning Table – from Retreat November 2012

**Department of Mathematics and Computer Science**

2020 Vision Link

<table>
<thead>
<tr>
<th>2020 Vision Link</th>
<th>Strategic Ends</th>
<th>Ways</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.5</td>
<td>Future Directions</td>
<td>• Earn ABET accreditation for our computer Science program</td>
<td>• An average of $5000 per year for accreditation</td>
</tr>
<tr>
<td>1.1.2</td>
<td></td>
<td>• Certificate in Digital Forensics</td>
<td>• Software $500 per year</td>
</tr>
<tr>
<td>1.6.3</td>
<td></td>
<td>• Reintroduce concentration in actuarial science</td>
<td>• We currently have all the needed courses on the books we will need to offer them more frequently</td>
</tr>
<tr>
<td>1.6.3</td>
<td></td>
<td>• 4+1 for MA Ed</td>
<td>• Assistantships to support the 4+1</td>
</tr>
<tr>
<td>4.4.3</td>
<td></td>
<td>• Increase grad students numbers and assistantships</td>
<td>• Increase number of grad students assistantships</td>
</tr>
<tr>
<td>4.4.2, 3.2.1</td>
<td></td>
<td>• K-12 Mathematics Day (e.g. Sonia Kovalevsky High School Mathematics Day)</td>
<td>• $1500 per year for associated expenses</td>
</tr>
<tr>
<td>1.6.3, 2.1.2</td>
<td></td>
<td>• More advertising and accessibility for 4+1 in Open House</td>
<td>• Printing a 4+1 brochure</td>
</tr>
<tr>
<td>4.4.2, 3.2.1</td>
<td></td>
<td>• Increase service learning opportunities</td>
<td>• Requires additional faculty supervisors</td>
</tr>
<tr>
<td>1.1.2</td>
<td></td>
<td>• Required 2 semester internship for Math Ed</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Contributions to university and external community</td>
<td>Faculty experiences</td>
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<td>--------------------------------------------------</td>
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<tr>
<td>1.4.3, 3.1.3, 1.1.2, 3.1.3</td>
<td>Contributions to university and external community</td>
<td>Faculty experiences</td>
<td></td>
</tr>
<tr>
<td>2.1.3, 3.2.6, 1.1.2</td>
<td>Contributions to university and external community</td>
<td>Faculty experiences</td>
<td></td>
</tr>
<tr>
<td>1.6.7</td>
<td>Student experiences</td>
<td></td>
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<tr>
<td>2.1.5</td>
<td>Student experiences</td>
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<tr>
<td>1.3.2, 2.1.5</td>
<td>Student experiences</td>
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<tr>
<td>2.1.1</td>
<td>Student experiences</td>
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<tr>
<td>2.2.4</td>
<td>Student experiences</td>
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<tr>
<td>1.6.5, 2.1.4</td>
<td>Student experiences</td>
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<tr>
<td>1.6.5, 2.1.2, 2.3.2</td>
<td>Student experiences</td>
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<tr>
<td>2.1.2</td>
<td>Student experiences</td>
<td></td>
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<tr>
<td>4.4.3, 5.4</td>
<td>Faculty experiences</td>
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<tr>
<td>1.6.7</td>
<td>Faculty experiences</td>
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<tr>
<td>1.6.5</td>
<td>Faculty experiences</td>
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<tr>
<td>4.4.2</td>
<td>Faculty experiences</td>
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<tr>
<td>1.6.5</td>
<td>Faculty experiences</td>
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</tbody>
</table>

- Interaction with K-12 including contests
- Speaker programs
- Grants with educational agencies, NOAA, external agencies and Clemson
- WebWork
- Regional leader in teacher ed, secondary and community college

- Mathematics Tutoring Center, CS assistants
- NCCTM conf, MAA conf, conferences, SMURCHOM
- Internships
- Putnam, VT, ACM, contest participation, Math Jeopardy, Actuarial exams, COMAP
- Capstone
- Math Club, CS Club and NCCTM chapter
- Graduate student orientation
- Awards Banquet

- Math Placement testing

- Departmental Server
- Pre-CS program
- Scholarships

- Graduate student orientation

- $20,000 per year for ALEKS Math placement test

- Direct interaction with undergraduate/graduate
<table>
<thead>
<tr>
<th>1.2.2, 4.2.4 4.4.2</th>
<th>students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4.3</td>
<td>• Mentoring in dept of new faculty</td>
</tr>
<tr>
<td>1.5.3</td>
<td>• Faculty seminars/colloquiums</td>
</tr>
<tr>
<td>4.4.2</td>
<td>• Community outreach/speaker program</td>
</tr>
<tr>
<td>1.2.5, 4.2.4</td>
<td>• Conferences at WCU</td>
</tr>
<tr>
<td>1.3.2</td>
<td>• Flexibility in teaching, service, workload distribution</td>
</tr>
<tr>
<td>4.5.1, 4.5.2</td>
<td>• Professional presentations/international in scope (support from dept.)</td>
</tr>
<tr>
<td>1.2.3</td>
<td>• Student evals, more dept input on review of members teaching, scholarship, service</td>
</tr>
<tr>
<td>1.3.2</td>
<td>• Collaborative scholarship (within department and with students)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.2.3, 1.3.2 2.1.3, 1.6.7</th>
<th>Student/Faculty Interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2.3</td>
<td>• Capstone</td>
</tr>
<tr>
<td>1.3.2</td>
<td>• Active tutoring program in the department</td>
</tr>
<tr>
<td>2.1.1</td>
<td>• Undergrad/grad research</td>
</tr>
<tr>
<td>2.2.4</td>
<td>• Student participation in contests</td>
</tr>
<tr>
<td>1.2.2, 1.2.3, 2.1.4</td>
<td>• Student attendance at conferences</td>
</tr>
<tr>
<td>2.1.1</td>
<td>• Clubs/groups</td>
</tr>
<tr>
<td>1.3.2</td>
<td>• Mentoring (esp. grad students, assistants, pre-service teachers, honors contracts)</td>
</tr>
<tr>
<td>1.1.1, 1.1.2</td>
<td>• Colloquia/seminars</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.3.2</th>
<th>Interdisciplinary/experiential opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.1, 1.1.2</td>
<td>• collaborative research/scholarship</td>
</tr>
<tr>
<td></td>
<td>• math education/CEAP; Math/Phys; Shorelines/CS;</td>
</tr>
<tr>
<td>2.1.1</td>
<td>2.1.5</td>
</tr>
<tr>
<td>-------</td>
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</tr>
<tr>
<td>2.1.2</td>
<td>Engineering</td>
</tr>
<tr>
<td></td>
<td>• Capstone</td>
</tr>
<tr>
<td></td>
<td>• REUs and internships</td>
</tr>
<tr>
<td></td>
<td>• 64% of courses are service courses for other programs</td>
</tr>
<tr>
<td></td>
<td>• Tutoring, assistantships, CS student workers</td>
</tr>
</tbody>
</table>
Proactive Plan
Department of Mathematics and Computer Science
15 March 2008

1. What do you look like now?

In the first statement, reflect on what your department (programs/students/faculty/etc.) look like now. Be sure to consider data showing important trends. We had discussed data reflecting students and SCH in undergraduate and graduate programs and offerings. Any other data may also be considered, including qualitative data.

We have a strong and dynamic faculty in all of the disciplines represented in the department. We show breadth not only in our areas of specialization but also in our variety of interests in teaching, scholarly development, and service. Our department consists of energetic faculty revitalized by the recent move back into a remodeled physical space, recent recruitment of fresh early-career faculty with great potential, and the prospect of hiring a vibrant individual to assume the position of department head.

Teaching: Relatively small size of classes and an emphasis on student-faculty interactions are signatures of both the university and our department. Despite small class sizes we are still able to generate a healthy number of student credit hours (SCH), justifying the current number of full-time equivalent (FTE) faculty.

In the area of service courses, we offer two first year seminars and a variety of C2 mathematics liberal studies courses, including one in the upper division. We provide strong support for science, technology, engineering, and mathematics (STEM) constituencies in the College of Arts and Sciences and the Kimmel School. New scheduling strategies, such as the incorporation of swing sections to accommodate fluctuations in enrollment, suspension of the engineering calculus sequence until enrollment supports reintroduction, and reduction in the number of evening classes, have reduced substantially the number of low-enrollment course sections. The gain in efficiency will help us to move toward a 3/3 teaching load for faculty active in scholarship and service.

We offer a breadth of courses necessary to run all of our undergraduate majors. We have had strong majors, including 26 past recipients of the Jessie Siler Sloan and George Neville Sloan Scholarship, but we also have seen a natural variation in the numbers of majors in each of our undergraduate programs. However, careful course planning has balanced the needs of the major programs with the enrollment strategies, and trends point toward growth in the number of math majors and in enrollments in math courses taken by STEM majors. This bodes well for future enrollment in 400-level math courses and the future number of math majors.

A thriving mathematics education program is central not only to the health of our department but also to our role in the university stewardship to its 16-county service region. Last year we restructured the mathematics major to allow teacher education as an option, and we are starting to see growth in the number of students in mathematics education. Fall 2007 saw a successful National Council for Accreditation of Teacher Education/State Department of Public Instruction re-accreditation, for which a departmental report/self study was compiled in 2006-7. As a consequence of re-accreditation self studies, the department included History of Mathematics in the B.S Ed. degree and changed Logic and Proof to reflect a stronger emphasis in number theory. Eight NC Teaching Fellows declared mathematics education as their academic major in 2006-7. Five did so in 2007-8. As of January 2007, 31 students have declared a B.S. Ed. In Mathematics and 29 students have declared a B.S. Mathematics with teacher education option. Eighteen of our mathematics education students have received the North Carolina Council of Teachers of Mathematics (NCCTM) Outstanding Education Student Award for the western division.

Computer Science recently has seen a small drop in the number of graduates and SCH generation. Addition of two liberal studies courses, involvement in the digital art initiative, involvement in the computer forensics initiative, recent curriculum changes, and recent hiring of a third tenure track faculty should resolve these problems.

We offer a variety of courses to support our graduate programs. Recent curriculum changes combined with anticipated growth in the 4+1 program for the M.S. Applied Mathematics should increase enrollments. We have had good numbers in the graduate programs, although our M.S. Applied Mathematics program enrollments were down in 2007-8. We view this as a fluke, perhaps the result of receiving a disproportionate number of strong applications from out-of-state students that year. With only one out-of-state waiver for all graduate programs, we were able to accept but not adequately financially support several strong applicants. Although many recruits expressed strong interest in our programs they accepted more lucrative offers from other universities. Our M.A.T. and M.A.Ed. programs have also maintained good numbers although we face a similar issue in the M.A.Ed. program with our inability to adequately financially support excellent applicants.
who, thusly, go elsewhere.

As a department we are committed to excellence in teaching. Among our faculty and faculty emeriti are two recipients of the Board of Governor’s Teaching Award, three recipients of the Chancellor’s Distinguished Teaching Award, and three recipients of the College of Arts and Sciences Teaching Award. We have seen a trend of an increasing number of majors eligible for the variety of departmental awards. Two students received the Senior Mathematics Award in 2006-7, whereas eight will receive it this year. The Crum and Milton Scholarships increased from five to eleven over this same time period.

Scholarly activities: Our department members are active in a variety of scholarly development areas including publishing in refereed disciplinary research journals, publishing in journals of the scholarship of teaching and learning, refereeing for journals and conference proceedings, reviewing and abstracting for review journals, contributing to databases, crafting encyclopedia entries, editing journals and conference proceedings, and assuming leadership roles in our scholarly communities.

We are active in student research, including masters’ projects and independent studies as well as undergraduate capstones projects, independent studies, honors projects, course projects, Smoky Mountain Undergraduate Research Conference on the History of Mathematics (SMURCHOM) talks and and other undergraduate conference posters.

Service: Our department is committed to service to Western. We are represented on university standing committees, including the Graduate Council, Teacher Education Council, Faculty Senate, TPR Committee, and the Board of Governors Award for Excellence in Teaching Committee. Memberships in college committees include Conditions of Faculty Employment, Dean’s Advisory Board, TPR, Curriculum, Strategic Planning, Student Recruitment, Teacher Education, Teaching Award, Committee on Committees, and an ad hoc committee to revise the college by-laws after the split creating the College of Fine and Performing Arts. We have one recipient of the Paul A. Reid Service Award for Faculty, one recipient of the Arts and Sciences Award for Distinguished Service, four recipients of the NCCTM Rankin Award and two recipients of the NCCTM Innovator Award.

We sponsor three disciplinary student organizations, the Association for Computing Machinery (ACM), a student chapter of the Mathematical Association of America (MAA), and a student chapter of NCCTM. The department has hosted twice the joint annual Southeast Atlantic Section of the Society for Industrial and Applied Mathematics.

We serve 87 middle and high schools in our 16-county service region, engaging in partnerships with schools (such as through the School University Teacher Education Partnership), supervising interns placed in schools in the region, and administering the regional mathematics and computer science contests for high school students.

Our department saw some success in raising funds for departmental awards and scholarships. Recent contributions in the last capital campaign increased the endowments for these awards, including a substantial contribution to the Proffitt Scholarship Endowment (Computer Science).

2. What do you want to look like 5 years from now?

In the second statement, reflect on a distinctive identity you would like to create for your department/programs over the next 5 years. This identity should set you apart from your peers in the state and perhaps elsewhere. It should emphasize unique features, specialties, opportunities, or connections. It should demonstrate responsiveness to important trends. The distinctive identity you develop is likely to extend from some of your current strengths. It will often take shape in curriculum. It will often emphasize engagement.

We often are led to believe that a departmental identity focuses only upon just a few specific teaching/scholarship/service areas that we aim to become “good at.” This has been accomplished in many mathematics, mathematics education, and computer science departments with PhD programs. We also have observed particular master's programs with singular foci in, for example, financial math, statistics, actuarial science, and biomathematics. Such a focus creates an environment in which the faculty research, budgetary allocations, new hires, etc., all must support the specialty area.

We argue that this model of disciplinary specificity is NOT appropriate for our department. Indeed, we have master's programs in mathematics education and applied mathematics, but we do not believe that they alone should drive our long term planning. In fact, the best models for programs in these two areas include both faculty whose strengths lie in more foundational aspects of our disciplines and those whose expertise is to connect the content of our discipline to other partner disciplines. No doubt, the best research in applied mathematics makes use of the cutting edges of more fundamental areas.
Two examples are mathematical cryptography and topological methods for numerical differential equations. Development of new pedagogies and standards-based curriculum is based not only on research in cognition and development but also in fundamental mathematics. Witness the movements in teacher preparation to produce teachers with "profound understanding of fundamental mathematics." [L. Ma, Knowing and Teaching Elementary Mathematics, Lawrence Erlbaum Associates, 1999]. Rather than adopt a narrow focus we envision our departmental "calling cards" to be threefold: inquiry, diversity, and excellence.

As an overarching goal, inquiry pervades all three major departmental areas of responsibility, teaching, scholarship, and service, and our inquisitive nature leads to investigations with overlaps in the three major areas. Our questions both stem from and lead to interdisciplinary work with other areas, such as actuarial questions in business, and modeling questions in biology. Another objective is improved student research.

Our diversity is enhanced by our interactions with our peers and students whose interests both connect with ours and diverge from ours. Such interactions expand our knowledge base and stimulate innovation in research and teaching. A look at our department now reveals a great deal of diversity. There is also a lot of one-on-one interaction. We wish to set departmental objectives to improve both of those.

Our final identifying characteristic is excellence. We seek to continue to excel in teaching, scholarly activities, and service.

Teaching: The relatively small size of classes and emphasis on student-faculty interactions should be maintained and should be viewed as tools to be used to meet our other goals and objectives.

Goals:
- To build quantitative literacy for all Western students
- To build critical reasoning skills for all Western students
- To improve the quality of all majors in the face of an increasing university size and pool of applicants
- To improve the quality of mathematics teachers (elementary, middle, secondary) in our 16-county service region
- To work with other departments to develop interdisciplinary content coursework
- To contribute to the development of online courses to meet the demands of our region and our state

Objectives:
- To recruit and retain faculty who are skilled in teaching to meet the above goals
- To recruit and retain faculty in mathematics education to provide quality instruction, advising, mentoring, and supervision of pre-service teachers
- To increase the number of faculty with responsibilities in mathematics education to match the projected increases in Teaching Licensure majors and to meet the increased demand for supervision and placement in the schools
- To recruit and retain more students in our undergraduate majors and our graduate programs
- To increase the size of the pool of qualified applicants for departmental, college, and university honors and awards
- To maintain our present proportion of NC Teaching Fellows as Mathematics Education majors as the number of Fellows increases university-wide
- To continue the trend of the last two years to increase the number of pre-service mathematics teachers completing a full year internship (rather than one semester of student teaching)
- To increase the number of double majors
- To support the initiative for more 2+2 partnership agreements with community colleges
- To increase funding for named scholarships

Scholarship: We wish to have as part of our triumvirate departmental identity the engagement of students in our research. However, research with students should not be the only part of our identity but is necessarily an important part. Overall we seek to build a community of scholarly inquiry and an atmosphere of investigation within the physical and psychic boundaries of our department.

Goals:
- To create an atmosphere of inquiry in the department
- To improve visibility of our scholarly work among our peers in the university, our discipline, our peer institutions, and the UNC system
- To improve awareness and impact of our scholarship in the community and region
- To encourage involvement of undergraduate students in research projects
- To continue to improve the quality and depth of graduate research projects
- To seek opportunities for interdisciplinary scholarly investigations
Objectives:
- To improve the quality of capstone senior projects
- To encourage students to present at the WCU Undergraduate Expo, National Council for Undergraduate Research, the NCCTM conference, and the Southeastern MAA, other regular conferences (either in the student paper sessions or as co-authors with faculty members in the regular paper sessions)
- To encourage students to submit work to student research journals
- To encourage student-faculty co-authorship in journals and publications
- To expand the depth of masters’ projects and theses
- To emphasize the connections between the research the graduate students are doing and the research the faculty members are doing on their own.
- To increase the number of opportunities to discuss scholarly activities with our students, our departmental peers, our university colleagues, and the scholars in our academic community at large.
- To improve our physical space to facilitate more peer-to-peer and faculty-student engagement in research questions and investigations. One possibility is to have a coffee/tea lounge area.
- To involve the department in recent interdisciplinary initiatives, such as forensics and digital art
- To promote faculty and student research by means of in-house publication such as an online repository
- To expose students and faculty to new ideas by increasing the number of visiting scholars, planning a special thematic year, or hosting a regional conference or workshop that connects to departmental interests (such as regional SIAM and MAA conferences or additional undergraduate meetings)
- To integrate more research presentations into classroom experiences
- To encourage student participation in undergraduate research programs, such as Research Experiences for Undergraduates (REUs) and summer training programs
- To enhance funding of student research and student travel to professional meetings
- To increase the number of speakers in our departmental colloquium series

Service:

Goals:
- To refresh and improve mathematical understanding and familiarity with NCSCOS and with the NCTM standards for regional in-service teachers
- To encourage student participation in disciplinary activities and programs
- To advise majors effectively
- To increase funding of endowments for scholarships and awards
- To increase the number of “real-world” educational opportunities for students

Objectives:
- To mentor junior faculty formally and informally
- To investigate ways to advise more effectively
- To publicize scholarships and funded programs for students and to encourage qualified students to apply
- To increase the number of interactions (partnerships, collaborations, mentoring relationships, visits) between departmental faculty and in-service teachers in the region
- To work more closely with the College of Education and Allied Professions to align courses in the professional education sequence that leads to licensure
- To work more closely with the Center for Mathematics and Science Education to address the shortage of teachers in mathematics
- To enhance funding of departmental service projects
- To consider re-activating a visiting speakers program for area schools
- To provide leadership for regional and state programs for school students such as contests and summer programs
- To connect supervision of student interns placed in area schools with professional relationships with the schools.
- To increase the number of students competing in the Virginia Tech exam, the Putnam Exam, and the Mathematical Contest in Modeling, and perhaps to field a team in the ACM International Collegiate Programming Contest
- To encourage student involvement in the Mathematics and Computer Science Club and the Mathematical Modeling Working Group
- To identify both past donors and potential donors for contributions to the awards and scholarships endowments
- To re-activate advisory boards for all disciplines
- To increase the number of connections with industry and government for student co-operative education,
internships, and career placement and to encourage students to seek such opportunities

- To connect to our alumni
- To connect with federal, state and regional resources for education, such as NCCAT to enhance in-service training
- To provide leadership for college and university committees and professional organizations

3. What can you do now to make progress toward your 5-year vision?

In a third statement, identify efforts you can make, perhaps are now making, to move toward a vision of distinction. These efforts could be manifested in hiring, curriculum revisioning, focused grant writing, strategic partnership building, or a variety of other possible initiatives.

We are presently searching for a new department head to provide leadership in all three areas.

Teaching:
- We are presently investigating a new double major in mathematics and education.
- We recently completed successful hiring of the third tenure-track computer science faculty member.
- We added two liberal studies courses in computer science.
- We continue to recruit, matriculate, and graduate “4+1” candidates.
- History of Mathematics was implemented as our first online course.
- We have introduced more number theory into the curriculum for pre-service teachers.

Research:
- The most important step we are taking now is the switch to a 3/3 teaching load for tenured math faculty who are active in scholarship and service. This reduction in teaching load (justified by the FTEs and SCHs) should increase our productivity in scholarship and give those faculty time to take the steps needed to develop our distinctive identity.
- Starting in 2005, we have significantly revised and improved the expectations for masters’ projects and theses and have provided graduate students with specific guidelines and assistance for successful research projects. The projects continue to improve.
- We have been promoting summer REUs to students. Some students have applied for this summer.
- We continue to host SMURCHOM.
- We have had several visiting scholars.

Service:
- The Graduate Committee has connected to the community via an advisory board. The board has advised us on revising our curriculum to meet the changing needs of industry and through our board we have established better name recognition for Western to improve student placement into internships, co-ops, and permanent positions.
- We continue to support Summer Ventures in Science and Mathematics.
- We continue to support the Annual High School Contests in Mathematics and in Computer Science, the Statewide Network of Mathematics Contests, and the Statewide Network of Mathematics Fairs.
Math and Computer Science Steering Committee
Summary of Meeting 27 Aug 2014

1. Dean Richard Starnes has offered to visit with each department this year. We decided to postpone inviting him until the Spring.

2. Department strategic planning and objectives*
   
   (a) Short term: 2014–2015
   - Supporting present student groups
   - Organizing student-focused colloquia or special events
   - Improve budgeting
     - Quarterly reports and forecasting of spending
     - Prioritizing small, medium, large expenditures
     - Assuring adequate support for travel
   
   (b) Long term: 2015–2016 or 2016–2017
   - Improving academic and social culture of department
   - Department weekly coffees and other opportunities for student/faculty interactions
   - Improving department physical space, both use and aesthetics, especially common areas.
   - Recruiting and retaining majors and minors
   - MATH: Longer term research projects in math capstone as an option
   - Revisiting content in MATH curriculum and frequency of offering 400/500 level courses
   - Establishing course coordination for lower division courses in CS and MATH
   - Implementing internal assessments: curriculum, student learning, etc. (MATH program review and ABET consultancy could help identify needs for assessments)
Mathematics, B.S.

Add to Portfolio

Liberal Studies Hours: 42

Liberal Studies Program Requirements

Major Requirements

The major requires 38-50 hours as follows. Only grades of C (2.0) or higher in required mathematics core courses will satisfy requirements in the major.

The following courses are required:

Core, 24 hours:

- MATH 153 - Calculus I Credits: (4)
- MATH 250 - Introduction to Logic and Proof Credits: (3)
- MATH 255 - Calculus II Credits: (4)
- MATH 256 - Calculus III Credits: (4)
- MATH 270 - Statistical Methods I Credits: (3)
- MATH 310 - Discrete Structures Credits: (3)
- MATH 362 - Linear Algebra I Credits: (3)

Additional Required Course:

- MATH 479 - Capstone: Seminar Credits: (2)

Math Electives Categories

Algebra/Discrete:

- MATH 361 - Abstract Algebra I Credits: (3)
- MATH 461 - Abstract Algebra II Credits: (3)
- MATH 462 - Linear Algebra II Credits: (3)

Analysis:

- MATH 422 - Real Analysis I Credits: (3)
- MATH 423 - Real Analysis II Credits: (3)
- MATH 424 - Complex Variable Theory Credits: (3)

Computer/Modeling:

- MATH 320 - Ordinary Differential Equations Credits: (3)
- MATH 430 - Mathematical Modeling Credits: (3)
• MATH 441 - Introduction to Numerical Analysis Credits: (3)
• MATH 450 - Linear Optimization Credits: (3)

Statistics:
• MATH 370 - Probability and Statistics I Credits: (3)
• MATH 373 - Theory of Interest for Actuarial Exam FM Credits: (3)
• MATH 375 - Statistical Methods II Credits: (3)
• MATH 470 - Probability and Statistics II Credits: (3)
• MATH 471 - Problem Solving for Actuarial Exam P Credits: (3)

Applied Option:

Required 12 hours:
Two additional courses from the math electives with at least one of these courses in the Computing/Modeling category and:

• MATH 320 - Ordinary Differential Equations Credits: (3)
• MATH 340 - Introduction to Scientific Computing Credits: (3)

To complete the program:
48 hours are required, including a second major or a minor in one of the following areas of application: biology, chemistry, computer science, economics, finance, geology, physics, or a program approved by the mathematics and computer science department head.

Traditional Mathematics Option:

Required 18 hours:
Twelve additional hours: one course from each of the three non-Algebra/Discrete math electives categories, and one additional course from any of the four math elective categories, MATH 400 History of Mathematics, or other math courses approved by the mathematics and computer science department head and:

• MATH 361 - Abstract Algebra I Credits: (3)
• MATH 340 - Introduction to Scientific Computing Credits: (3)

To complete the program:
42 hours are required, including a second major, a minor, or a program approved by the mathematics and computer science department head.

Mathematic Education Option:

Admission to the Mathematics Education Program
Students seeking admission to the Mathematics Education Program must declare their major and meet the requirements for admission to the Teacher Education Program Teacher Education Program.

Admission to the Professional Education Sequence
Students in Professional Education must be admitted to the Teacher Education Program and are subject to all of the teacher education requirements. EDCI 201 is the only course in the professional education sequence that may be taken prior to admission to teacher education.

Continuation in the Mathematics Education Program
To continue in the program, students must meet the continuation requirements of the Teacher Education Program Teacher Education Program. In addition to these requirements, a student enrolled in the B.S.Ed. in Mathematics must also be enrolled in the B.S. Mathematics with Education Option. If hours taken in the major also meet Liberal Studies requirements...
need to be completed in order to meet the 120 total hours needed.

Required 18 hours:

- MATH 300 - Problem Solving Credits: (3)
- MATH 340 - Introduction to Scientific Computing Credits: (3)
- MATH 361 - Abstract Algebra I Credits: (3)
- MATH 414 - Introduction to Secondary Mathematics Teaching Methods Credits: (3)
- MATH 400 - History of Mathematics Credits: (3)
- MATH 411 - Foundations in Geometry Credits: (3)

Math Electives (6 hours) selected from:

- MATH 320 - Ordinary Differential Equations Credits: (3)
- MATH 370 - Probability and Statistics I Credits: (3)
- MATH 412 - Modern Geometries Credits: (3)
- MATH 422 - Real Analysis I Credits: (3)
- MATH 423 - Real Analysis II Credits: (3)
- MATH 424 - Complex Variable Theory Credits: (3)
- MATH 441 - Introduction to Numerical Analysis Credits: (3)
- MATH 450 - Linear Optimization Credits: (3)
- MATH 461 - Abstract Algebra II Credits: (3)
- MATH 462 - Linear Algebra II Credits: (3)
- MATH 470 - Probability and Statistics II Credits: (3)

Additional Requirements:

To complete the program, 36 hours are required, including the professional education sequence (24 hours - see below) for secondary and special subject teaching and 12 hours of general electives. At least 32 hours taken at WCU must be at the junior-senior level to meet one of the general university degree requirements.

Professional Education Sequence (24 hours)

- EDCI 201 - Teacher Leadership in a Diverse Society Credits: (3)
- EDSE 490 - Supervised Student Teaching Credits: (6)
  or EDSE 485 - Internship II Credits: (6)
- EDSE 495 - Seminar Credits: (3)
- MATH 415 - Methods and Materials for Teaching Mathematics in the Secondary School Credits: (3)
- MATH 491 - Supervised Student Teaching in Mathematics, 9-12 Credits: (3)
- PSY 323 - Psychology Applied to Learning and Teaching Credits: (3)
- SPED 339 - Designing Classrooms as Responsive Learning Communities Credits: (3)

General Electives (12 hours)

Additional Information all Options:

At least 30 hours taken at WCU must be at the junior-senior level to meet one of the general university degree requirements.

Visit the department’s website at http://www.wcu.edu/academics/departments-schools-colleges/cas/casdepts/mathcsdept/index.asp to view the 8 semester curriculum guide.
Mathematics, B.S.ED.

Total number of hours for the Program: 120.

Admissions to the Mathematics Education Program

Students seeking admission to the Mathematics Education Program must declare their major and meet the requirements for admission to the Teacher Education Program (Teacher Education Program).

Admission to the Professional Education Sequence

Students in Professional Education must be admitted to the Teacher Education Program and are subject to all of the teacher education requirements. EDCI 201 is the only course in the professional education sequence that may be taken prior to admission to teacher education.

Continuation in the Mathematics Education Program

To continue in the program, students must meet the continuation requirements of the Teacher Education Program (Teacher Education Program). In addition to these requirements, a student enrolled in the B.S.Ed. in Mathematics must also be enrolled in the B.S. Mathematics with the Mathematics Education Option. If hours taken in the major also meet Liberal Studies requirements more hours may need to be completed in order to meet the 120 total hours needed.

Liberal Studies Hours: 42

Liberal Studies Program Requirements

Major Requirements

The major requires 50 hours as follows. Only grades of C (2.0) or higher in required mathematics core courses will satisfy requirements in the major. The following courses are required:

Mathematics Core (24 hours)

- MATH 153 - Calculus I Credits: (4)
- MATH 250 - Introduction to Logic and Proof Credits: (3)
- MATH 255 - Calculus II Credits: (4)
- MATH 256 - Calculus III Credits: (4)
- MATH 270 - Statistical Methods I Credits: (3)
- MATH 310 - Discrete Structures Credits: (3)
- MATH 362 - Linear Algebra I Credits: (3)

Additional Required Course (2 hours)

- MATH 479 - Capstone: Seminar Credits: (2)
Other required courses (18 hours)

- MATH 300 - Problem Solving Credits: (3)
- MATH 340 - Introduction to Scientific Computing Credits: (3)
- MATH 361 - Abstract Algebra I Credits: (3)
- MATH 400 - History of Mathematics Credits: (3)
- MATH 411 - Foundations in Geometry Credits: (3)
- MATH 414 - Introduction to Secondary Mathematics Teaching Methods Credits: (3)

Electives-Math electives (6 hours) selected from:

- MATH 320 - Ordinary Differential Equations Credits: (3)
- MATH 370 - Probability and Statistics I Credits: (3)
- MATH 375 - Statistical Methods II Credits: (3)
- MATH 412 - Modern Geometries Credits: (3)
- MATH 422 - Real Analysis I Credits: (3)
- MATH 423 - Real Analysis II Credits: (3)
- MATH 424 - Complex Variable Theory Credits: (3)
- MATH 430 - Mathematical Modeling Credits: (3)
- MATH 441 - Introduction to Numerical Analysis Credits: (3)
- MATH 450 - Linear Optimization Credits: (3)
- MATH 461 - Abstract Algebra II Credits: (3)
- MATH 462 - Linear Algebra II Credits: (3)
- MATH 470 - Probability and Statistics II Credits: (3)

Professional Education Sequence (24 hours)

To complete the program, 28 hours are required, including the professional education sequence (24 hours-see below) for secondary and special subject teaching and 4 hours of general electives.

- EDCI 201 - Teacher Leadership in a Diverse Society Credits: (3)
- EDSE 495 - Seminar Credits: (3)
- MATH 415 - Methods and Materials for Teaching Mathematics in the Secondary School Credits: (3)
- MATH 491 - Supervised Student Teaching in Mathematics, 9-12 Credits: (3)
- PSY 323 - Psychology Applied to Learning and Teaching Credits: (3)
- SPED 339 - Designing Classrooms as Responsive Learning Communities Credits: (3)

and

- EDSE 485 - Internship II Credits: (6)
  or
- EDSE 490 - Supervised Student Teaching Credits: (6)

General Electives - 4 hours

Visit the department's website at http://math.wcu.edu/ to view the 8 semester curriculum guide.
Mathematics, Minor

Total number of hours for the program: 20.

Minor Requirements

The minor requires 20 semester hours, including two semesters of calculus:

- MATH 153 - Calculus I Credits: (4)
- MATH 255 - Calculus II Credits: (4)

Additional Requirements

Additional hours selected from any mathematics courses numbered 250 or higher excepting MATH 301, 311, 321, and 322.
MAJOR IN MATHEMATICS,  
B.S. DEGREE, APPLIED OPTION  
August, 2008

Student Name: ___________________  
Term/Year Entered: ___________________

A. Liberal Studies (42 Hours): See Liberal Studies Requirement Completion Record.

B. Core Courses: (24 Hours)

<table>
<thead>
<tr>
<th>Course/Number</th>
<th>Semester Taken</th>
<th>Grade</th>
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<tbody>
<tr>
<td>Math 153, Calc I (4)</td>
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<tr>
<td>Math 255, Calc II (4)</td>
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<td>Math 256, Calc III (4)</td>
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<tr>
<td>Math 250, Intro to Logic &amp; Pf (3)</td>
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<td>Math 270, Stat Methods I (3)</td>
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<td>Math 310, Discrete Structures (3)</td>
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<td>Math 362, Linear Alg I (3)</td>
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Note: a grade of C or better is required in all core courses

C. Additional Required Courses (8 hours)

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<tr>
<th>Course/Number</th>
<th>Semester Taken</th>
<th>Grade</th>
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<tbody>
<tr>
<td>MATH 320, ODE (3)</td>
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<td>MATH 479, Capstone (2)</td>
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<tr>
<td>MATH 340, Intro to Sci. Comp. (3)</td>
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D. Math Electives (6 hours):
Choose ONE from the Computing/Modeling category: 430 (Modeling), 441(Intro Num Anal), 450 (Linear Op)

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<th>Course/Number</th>
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Choose ONE from: Math 361 (Abs. Alg. I), 461 (Abs. Alg. II), 462 (Linear Alg. II), 422 (Real Analysis I), 423 (Real Analysis II), 424 (Complex), 430 (Modeling), 441(Intro Num Anal), 450 (Linear Op), 370 (Prob & Stat I), 373 (Th. of Int Act Ex.), 375 (Stat Methods II), 470 (Prob & Stat II), 471 (Prob. Solv. Act. Ex.) or other math courses approved by the Math and CS department head.

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<th>Course/Number</th>
<th>Semester Taken</th>
<th>Grade</th>
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E. A second major or a minor, or a program in one of the following areas of application: biology, chemistry, computer science, economics, finance, geology, physics, or a program approved by the mathematics and computer science department head.

<table>
<thead>
<tr>
<th>Major or minor: (If major, attach checksheet; if minor, complete below)</th>
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<tbody>
<tr>
<td>Course/Number</td>
<td>Semester Taken</td>
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E. Electives: Enough hours to reach 128 total hours for the degree

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Numbers of hours completed after:

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<tr>
<th>Semester</th>
<th>#Hours</th>
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Note: For all programs, a minimum of 32 credit hours must be earned at WCU at the Junior/Senior level.
A. Liberal Studies (42 Hours): See Liberal Studies Requirement Completion Record.

B. Required Courses: 24 Hours (Core Math Courses (25 hours)+ CS 340)

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Note: a grade of C or better is required in all core courses.

C. Additional Required Courses (8 hours)

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<tr>
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D. Math Electives (12 hours):


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<th>Course/Number</th>
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Choose ONE from the Computing/Modeling category: Math 320 (ODE), 430 (Modeling), 441(Intro Num Anal), 450 (Linear Op)

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E. A Second major or a minor, or a program approved by the Math and CS department head.

<table>
<thead>
<tr>
<th>Major or minor: (If major, attach checksheet; if minor, complete below)</th>
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</thead>
</table>

F. Electives: Enough hours to reach 128 total hours for the degree

<table>
<thead>
<tr>
<th>Course/Number</th>
<th>Semester Taken</th>
<th>Grade</th>
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</table>

Numbers of hours completed after:

<table>
<thead>
<tr>
<th>Semester</th>
<th>#Hours</th>
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<tbody>
<tr>
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</tbody>
</table>
### A. Liberal Studies (42 Hours): See Liberal Studies Requirement Completion Record.

### B. Core Courses (24 Hours):

<table>
<thead>
<tr>
<th>Course/Number</th>
<th>Semester Taken</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 153, Calc I (4)</td>
<td></td>
<td></td>
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<tr>
<td>MATH 255, Calc II (4)</td>
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<td></td>
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<tr>
<td>MATH 256, Calc III (4)</td>
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<tr>
<td>MATH 250, Intro to Logic &amp; Proof (3)</td>
<td></td>
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<tr>
<td>MATH 270, Stat Methods I (3)</td>
<td></td>
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<tr>
<td>MATH 310, Discrete Structures (3)</td>
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<tr>
<td>MATH 362, Linear Algebra I (3)</td>
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</tbody>
</table>

**Note:** a grade of C or better is required in all core courses.

### C. Additional Required Mathematics/Computer Science Courses (17 Hours):

<table>
<thead>
<tr>
<th>Course/Number</th>
<th>Semester Taken</th>
<th>Grade</th>
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</thead>
<tbody>
<tr>
<td>MATH 300, Problem Solving (3)</td>
<td></td>
<td></td>
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<tr>
<td>MATH 361, Abstract Algebra I (3)</td>
<td></td>
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<tr>
<td>MATH 340, Intro to Sci. Computing (3)</td>
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<tr>
<td>MATH 400, History of Math (3)</td>
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<tr>
<td>MATH 411, Foundations in Geometry (3)</td>
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<tr>
<td>MATH 479 Capstone (2)</td>
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</tbody>
</table>

### D. Math Electives (6 hours):

Choose **TWO** from 320 (ODE), 350 (Op Res), 370 (Prob & Stat I), 373 (Th. of Int Act Ex.), 375 (Stat Mtds II), 412 (Modern Geom), 422 (Real Analysis I), 423 (Real Analysis II), 424 (Complex Anal), 430 (Modeling), 441 (Intro Num Anal), 450 (Linear Op), 461 (Abstract Algebra II), 462 (Linear Alg II), 470 (Prob & Stat II), 471 (Prob. Solv. Act. Ex.) or other mathematics courses approved by the Mathematics and Computer Science department head.

<table>
<thead>
<tr>
<th>Course/Number</th>
<th>Semester Taken</th>
<th>Grade</th>
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</table>

### E. Professional Math Ed Sequence, courses (15 hours)

<table>
<thead>
<tr>
<th>Course/Number</th>
<th>Semester Taken</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 201 (3) Teacher Leadership in a Diverse Society</td>
<td></td>
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<tr>
<td>PSY 323 (3) Understanding Development, Learning &amp; Assessment for Responsive Instruction</td>
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<tr>
<td>SPED 339 (3) Designing Classrooms as Responsive Learning Communities</td>
<td></td>
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<tr>
<td>MATH 414 Intro to Sec. Math Teaching Methods (3)</td>
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<tr>
<td>MATH 415 Methods &amp; Materials in Sec. Math (3)</td>
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</tbody>
</table>

### F. Professional Math Ed Sequence, Student Teaching:

**Option I: Internship Program SUTEP (12-15 hours):**

<table>
<thead>
<tr>
<th>Course/Number</th>
<th>Semester Taken</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDSE 484 Internship I (0-3)</td>
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<tr>
<td>EDSE 485 Internship II (6)</td>
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<td></td>
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<tr>
<td>EDSE 495 Seminar (3)</td>
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<tr>
<td>MATH 491 Supervised Student Teaching Math (3)</td>
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</table>

**Option II: One Semester of Student Teaching (12 hours):**

<table>
<thead>
<tr>
<th>Course/Number</th>
<th>Semester Taken</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 491 Supervised Student Teaching Math (3)</td>
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<tr>
<td>EDSE 490 Supervised Student Teaching (6)</td>
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<td></td>
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<tr>
<td>EDSE 495 Seminar (3)</td>
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</table>

### G. Electives: Enough hours to reach 120 total hours for the degree

<table>
<thead>
<tr>
<th>Course/Number</th>
<th>Semester Taken</th>
<th>Grade</th>
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</table>

**Numbers of hours completed after:**

<table>
<thead>
<tr>
<th>Semester</th>
<th># Hours</th>
<th>Cum GPA</th>
<th>Major GPA*</th>
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</thead>
</table>

* Major GPA is calculated from the courses listed in parts B, C, and D.

**Note:** For all programs, a minimum of 32 credit hours must be earned at WCU at the Junior/Senior level.
MATH 101 Syllabus
Mathematical Concepts
Revised: September 2014

Course Description

Introduction to applications of mathematics to daily experience. Topics to include statistical analysis and interpretation, applications to business, measurement methods, and selected topics of interest. (C2) Three semester hours.

Student Learning Objectives

MATH 101 is a C2 (Mathematics) Liberal Studies Course. The learning goals for C2 Courses are that:

• Student learning will be focused on the development of conceptual understanding rather than computational drill.
• An assignment in which students display an application of mathematics and/or analytical problem solving will be required.

Course Objectives Specific to Math 101

By the end of the semester, students will be able to:

• Understand descriptive statistical concepts found in daily life;
• Describe mathematics behind a variety of topics that students may not have seen before; and
• Write clearly and critically about mathematics in their own lives and in our world.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.
Course Outline

As a terminal course in mathematics, and in accordance with the Liberal Studies philosophy of trusting faculty to use their expertise and creativity in providing an excellent learning experience, broad discretion is given to each faculty member in the particular content to be covered in the individual course sections, subject to the following guiding principles:

1. The course should consist of an in-depth exploration of a few (three or four) topics, as opposed to a broad but shallow coverage of numerous topics. The instructor should NOT attempt to cover all (or even most) of the topics in the text, but should divide the course into three or four modules, each module focusing on a particular topic.

2. The one content area which should be common to all sections of Math 101 is statistical literacy. Thus, one module of the course should be devoted to selected material from chapter eight of the text (or related material, as selected by the instructor).

3. The instructor is not restricted to the topics included in the text. Following the principle that faculty should be encouraged to use their creativity to provide the best possible learning experience, the instructor may (but is not required to) devote a module to a topic outside of the textbook, provided that the instructor provides suitable resource materials (handouts, homework problems, etc.) for the class.

One component of the course grade should be a student project. Beyond the fact that the project must involve mathematical analysis, instructors are given broad leeway in determining the project constraints for each individual course section. (For example, the instructor may designate whether the project is an individual assignment or a group activity, and whether the final product is a written paper, an oral presentation, or both.)
MATH 130 Syllabus
College Algebra
Revised: September 2014

Course Description
Real number properties, solving equations, functions, graphs, systems of equations. Three semester hours.

Student Learning Objectives

MATH 130 is a C2 (Mathematics) Liberal Studies Course. The learning goals for C2 Courses are that:

- Student learning will be focused on the development of conceptual understanding rather than computational drill.
- An assignment in which students display an application of mathematics and/or analytical problem solving will be required.

Course Objectives Specific to Math 130

By the end of the course, students will be able to:

- Graph simple equations on a rectangular coordinate system;
- Solve simple equations algebraically and graphically, including the use of a graphing utility;
- Solve simple verbally stated problems, including variation, by transforming the problem to an appropriate algebraic equation;
- Graph key basic equations by analyzing intercepts, symmetry and behavior;
- Transition between algebraic and graphical form of linear and quadratic equations;
- Transition between x-y notation and function notation, when appropriate;
- Use properties and transformations of basic functions;
- Apply knowledge of functions to develop mathematical models of simple data sets;
- Understand exponential and logarithmic functions, their properties, behavior and applications; and
- Solve simple systems of linear equations by appropriate methods.

Text

Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

1. Review (2 weeks)
   - Real Numbers
   - Algebra Essentials
   - Polynomials
   - Factoring Polynomials
   - nth Roots; Rational Exponents

2. Graphs, Equations, and Inequalities (2 weeks)
   - Rectangular Coordinates; Graphing Utilities; Introduction to Graphing Equations
   - Solving Equations Using Graphing Utility; Linear and Rational Equations
   - Quadratic Equations
   - Problem Solving: Interest, Mixture, Uniform Motion, Constant Rate Jobs

3. Graphs (1.5 weeks)
   - Intercepts and Symmetry; Graphing Key Equations
   - Lines
   - Variation

4. Systems of Equations and Inequalities (0.5 week)
   - Systems of Linear Equations: Substitution and Elimination

5. Functions and Graphs (1.5 weeks)
   - Functions
   - The Graph of a Function
   - Properties of Functions
   - Library of Functions; Piecewise-Defined Functions

6. Linear and Quadratic Functions (1 week)
   - Linear Functions, Their Properties, and Linear Models
   - Building Linear Models from Data
   - Quadratic Functions and Their Properties
   - Building Quadratic Models from Verbal Descriptions and from Data

7. Exponential and Logarithmic Functions (2.5 weeks)
   - Exponential Functions
   - Logarithmic Functions
   - Properties of Logarithms
   - Logarithmic and Exponential Equations
   - Financial Models

8. Miscellaneous Topics (remaining time)  As time allows, the instruction may
cover:
8.3 Systems of Linear Equations: Determinants
8.7 Systems of Inequalities
8.8 Linear Programming
3.5 Graphing Techniques: Transformations
3.6 Mathematical Models: Building Functions topics from Chapter 5
   (Polynomial and Rational Functions)
MATH 146 Syllabus
Precalculus
Revised: September, 2014

Course Description
Functions using equations, graphs, and numerical data; linear, exponential, logarithmic, trigonometric, polynomial, and rational functions; transformations, compositions, inverses, and combinations of functions; trigonometry with identities. Prerequisite: MATH 130. Four semester hours

Student Learning Objectives
By the end of this course, students will be able to:

• Interpret functions as mathematical models in numerical, graphical, and algebraic forms;
• Recognize basic properties and graphs of elementary functions and will use transformations to graph functions;
• Identify characteristics of graphs of linear, exponential, logarithmic, polynomial, rational, and trigonometric functions;
• Solve exponential, logarithmic, polynomial, rational, and trigonometric equations;
• Describe the concept of inverse functions and perform inverse operations with some elementary functions, as well as exponential, logarithmic, and trigonometric functions;
• Apply trigonometric functions in terms of both the right triangle definition and the circular definition;
• Manipulate trigonometric expressions in order to verify trigonometric identities and solve trigonometric equations; and
• Use technology appropriately in the evaluation, analysis and synthesis of information in problem-solving situations.

Text

Grading Procedure
Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.
Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• **Chapter 1 Linear Functions And Change**
  All Sections. (1 week)
• **Chapter 2 Functions**
  All Sections (1 week)
• **Chapter 3 Quadratic Functions**
  All Sections (1/2 week)
• **Chapter 4 Exponential Functions**
  All Sections (1 1/2 weeks)
• **Chapter 5 Logarithmic Functions**
  Sections 5.1 - 5.3 (3/4 week)
• **Chapter 11 Polynomial and Rational Functions**
  Sections 11.1 - 11.5 (1 1/2 weeks)
• **Chapter 7 Trigonometry in Circles and Triangles**
  All Sections (and if time permits 7.3) (2 weeks)
• **Chapter 8 The Trigonometric Functions**
  Sections 8.1 - 8.4 (1 week)
• **Chapter 10 Compositions, Inverses, and Combinations of Functions**
  Section 10.1 - 10.2 (1/2 week)

Other topics as time permits, such as parametric equations and polar functions.
MATH 153 Syllabus
Calculus I
Revised: September 2014

Course Description

Limits, continuity, derivative, and integrals of algebraic and trigonometric functions with applications. Prerequisite: MATH 146. Four semester hours.

Student Learning Objectives

By the end of the course, the student will be able to:
• Use limit rules to calculate various limits
• Calculate the derivative of several basic functions using the definition
• Understand the geometrical meaning of the derivative of a function
• Solve acceleration/velocity/position problems
• Use derivative rules to differentiate functions
• Calculate derivatives of functions defined implicitly
• Determine relative and absolute maximum and minimum values of a function
• Calculate higher derivatives and use them to determine intervals where a function is increasing/decreasing and concave-up/concave-down
• Solve optimization problems
• Determine simple antiderivatives using the basic rules of differentiation
• Evaluate Riemann sums in order to evaluate definite integrals
• Describe and apply the Fundamental Theorem of Calculus
• Evaluate definite integrals to find areas under and between curves
• Use technology appropriately in the evaluation, analysis and synthesis of information in problem-solving situations.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.
Course Outline

1. CHAPTER 1 – Functions and Models (4 days)
   Selected precalculus topics/summary of chapter (approximately a week) chosen at the instructor's discretion.

2. CHAPTER 2 — Limits and Derivatives (9 days)
   Sections 1 - 3, 5 - 8. Section 4 is optional. Limits, continuity, the derivative function, interpretations of the derivative, rates of change, the second derivative, and differentiability.

3. CHAPTER 3 — Differentiation Rules (14 days)
   Sections 1 - 6, 9 - 10. Sections 7, 8 and 11 optional. Differentiation rules, product rule, quotient rule, chain rule, implicit differentiation, the linear approximation of a function, and related rates.

4. CHAPTER 4 — Applications of Differentiation (9 days)
   Sections 1 - 5, 7, 9. Sections 6 and 8 optional. Using first and second derivatives, optimization, the mean value theorem, L'Hopital's rule, curve sketching, and antiderivatives.

5. CHAPTER 5 — Integrals (5 days)
   All sections are to be covered. Definition, interpretations, theorems of the definite integral, the Fundamental Theorem of Calculus, and the substitution rule.

6. CHAPTER 6 — Applications of Integration (2 days)
   Section 1. Area between two curves.
MATH 170 Syllabus
Applied Statistics
Revised: September 2014

Course Description

Descriptive statistics, exploratory data analysis, probability distributions, correlation, regression, estimation, and hypothesis testing. Three semester hours.

Student Learning Objectives

By the end of the course, students will be able to:

- Describe the concepts of population and sample, and some of the basic descriptive measures associated with them;
- Explain graphical methods for data presentation;
- Connect the concepts of probability, random variables, and distributions;
- Assess the properties of common distributions, especially the normal and binomial;
- Synthesize the ideas of correlation and regression; and
- Interpret estimation and hypothesis testing procedures applied to population means and proportions.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

- **Chapter 1: The Role Of Statistics. (1 class days)**
- **Chapter 2: The Data Analysis Process And Collecting Data Sensibly. (2 days)**

• **Chapter 3: Graphical Methods For Describing Data. (2 days)**
  Displaying Categorical Data: Comparative Bar Charts and Pie Charts. Displaying Numerical Data: Stem-and-Leaf Displays. Displaying Numerical Data: Frequency Distributions and Histograms. Displaying Bivariate Numerical Data. Communicating and Interpreting the Results of Statistical Analyses. Note: Section 3.1 is optional and section 3.4 may be taught concurrently with Section 5.1. The topic of density histograms in Section 3.3 is optional

• **Chapter 4: Numerical Methods For Describing Data. (4 days)**

• **Chapter 5: Summarizing Bivariate Data. (4 days)**
  Correlation. Linear Regression: Fitting a Line to Bivariate Data. Assessing the Fit of a Line. Communicating and Interpreting the Results of Statistical Analyses. Note: Sections 5.4 and 5.5 are optional.

• **Chapter 6: Probability. (5 days)**

• **Chapter 7: Random Variables and Probability Distributions. (6 days)**

• **Chapter 8: Sampling Variability And Sampling Distributions. (3 days)**
  Statistics and Sampling Variability. The Sampling Distribution of a Sample Mean. The Sampling Distribution of a Sample Proportion.

• **Chapter 9: Estimation Using A Single Sample. (3 days)**

• **Chapter 10: Hypothesis Testing Using A Single Sample. (6 days)**

• **Chapter 11: Comparing Two Populations or Treatments. (3 days)**
  Inferences Concerning the Difference Between Two Populations or Treatments Means using Independent Samples. Inferences Concerning
the Difference Between Two Population or Treatment Means using Paired Samples. Large-scale Inferences Concerning the Difference Between Two Populations or Treatments Proportions. Interpreting the Results of Statistical Analyses.

* Note: Most instructors for this course require the use of statistical calculators.
MATH 192 Syllabus
Fractals: The Geometry of Nature
Revised: September 2014

Course Description

Investigate basic mathematical principles behind fractals with connections to literature, art, science, and the general world. Three semester hours.

Student Learning Objectives

By the end of the course students will be able to:
• Describe the mathematics behind a fascinating topic most students have never studied—fractals;
• Apply mathematical concepts to the fractals around them in literature, art, science, and nature; and
• Write clearly and critically about fractals in their own lives and in our world.

Text N/A

Supplemental Text

Electronic Resources through Blackboard.

Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• Unit I: The Fundamentals of Fractals & Iterated Function Systems (15 Days) We look at the basic concepts of geometric iteration, self-similarity, fractal dimension, multiple reduction copy machines, the chaos game, fractals in nature, and decoding fractals. Students do hands-on group activities, experiment with applets on the web, and discuss assigned readings. Students also learn how to design fractals using basic geometric transformations. We see how fractals can model images with an amazing degree of accuracy, and the information compressed to a simple set of numbers.
• **Unit II: Connections with Arts & Humanities (12 Days)** We discuss Stoppard's highly entertaining play Arcadia and the mathematical themes therein. In the play, we see a 13-year-old math prodigy, Thomasina, discard classical Euclidean geometry to discover the principles of fractal geometry (in 1809!), while almost two centuries later, in the very same room, we find a mathematical biologist using some of the same ideas to study fluctuating game bird populations. We also discuss some other examples of fractals found in the arts and humanities. These examples could include but not be limited to: Wallace Stevens' poem, The Sail of Ulysses, Ray Bradbury's A Sound of Thunder, paintings of Jackson Pollock, short animations by Francesca Talenti that provide stunning visual interpretations of fractals and chaos, clips of fractal music, and examples of fractals in popular movies like Jurassic Park. Students discuss assigned reading in class and write about how the topics in this section are related to fractals.

• **Unit III: Cellular Automata and Scientific Applications of Fractal Geometry (7 Days)** John Conway's Game of Life (popularized by Martin Gardner in his Scientific American column) describes simple rules that determine the "life" or "death" of the next generation of cells, based on interaction with neighboring cells. They are based on simple rules but show surprisingly complex behavior. Far more than a game with pretty pictures, they are related to exciting new ideas such as artificial life and the edge of chaos. We study examples and patterns and some applications. Students do hands-on activities, use applets on the web to better understand the Game of Life, and participate in group discussions. Then they write a short paper on how fractals relate to science and our natural world.

• **Unit IV: A Tour of the Mandelbrot Set. (6 Days)** We study the fascinating structure of the Mandelbrot set, one of today's most ubiquitous and geometrically intricate figures, exploring some of its geometric and number theoretic properties. Students will experiment with applets on the web, and participate in group discussions.
MATH 200 Syllabus

Problem Solving
Revised: November 2014

Course Description

Introduction to methods of problem solving suitable for K-12 mathematics teaching and learning. Prerequisite: MATH 146 or higher.

Objectives

By the end of this course, students will be able to

1. demonstrate a variety of methods and techniques that are helpful in solving mathematical problems.
2. use a variety of problem solving strategies and communicate their solutions.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• Engaging in Problem Solving Investigations
  Students will work in cooperative groups and individually to solve a variety of mathematical problems, which will be presented in written form and as oral presentations. Solutions will include delineation of each stage of problem solving including understanding the problem, devising a plan, carrying out the plan, and examining the solution.

• Strategies for Solving Non-Traditional Problems
  Students will complete a problem-solving notebook that delineates problem-solving techniques studied along with examples of problems solved using each technique.
MATH 250 Syllabus
Introduction to Logic and Proof
Revised: September, 2014

Course Description
An introduction to the principles of logic and the methods of proof necessary for the successful study of mathematics. Prerequisites: MATH 140 or MATH 153. Three credit hours.

Student Learning Objectives
By the end of the course, student will be able to:

• Use the principles of logic, mathematical reasoning, and methods of proof writing to develop proofs for never-before-seen theorems and lemmas;

• Identify the most appropriate proof-writing technique for a given theorem or lemma based on mathematical setting;

• Demonstrate development in their mathematical writing through practice in communicating mathematical ideas and arguments, both verbally and orally.

Text

Grading Procedure
Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy
Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• Mathematical Reasoning
  Statements / Compound Statements / Implications / Contrapositive and Converse

• Sets
  Sets and Subsets / Combing Sets / Collections of sets

• Functions
Definitions and Basic Properties / Surjective and Injective Functions
Composition and Invertible Functions
• Binary operations and Relations
  Binary Operations / Equivalence Relations
• The Integers
  Induction / The Division Algorithm and Greatest Common Divisors / Prime
  and Unique Factorization / Congruences
MATH 255 Syllabus
Calculus II
Revised: September 2014

Course Description

Derivatives and integrals of transcendental functions, techniques of integration, indeterminant forms, improper integrals, infinite series. Prerequisite: Math 153. Four semester hours.

Student Learning Objectives

By the end of the course, the student will be able to:
• Calculate areas between curves;
• Compute volumes of solids by disks, washers, and cylindrical shells;
• Compute arc-length of a curve and surface area;
• Solve applied problems involving force and work;
• Evaluate anti-derivatives and definite integrals using u-substitution, integration by parts, trigonometric substitution, partial fractions, completing the square, and appropriate use of technology;
• Use simple approximation techniques for definite integrals, check the error bounds for each technique, and compare the strengths and weaknesses of each.
• Evaluate improper integrals;
• Compute areas of planar regions and arc-lengths of curves using polar coordinates;
• Determine whether a sequence converges or diverges;
• Determine whether a series converges conditionally, converges absolutely, or diverges using the appropriate methods, such as geometric series test, p-series test, the comparison test, the limit comparison test, the integral test, the ratio test, the root test, and the alternating series test;
• Determine the radius of convergence and the interval of convergence of a power series; and
• Compute the Taylor and Maclaurin series of a function.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.
Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• Review of Chapter 5 (1-2 days)
• CHAPTER 6 - Integrals (5 days)
  Sections 6.2-6.5; Applications of the definite integral including volumes, work and average values of functions.
• CHAPTER 7 - Techniques of Integration (11 days)
  Sections 7.1-7.5, 7.7, 7.8 essential, 7.6 optional. Methods of integration, approximate integration, and improper integrals.
• CHAPTER 8 - Further Applications of Integration (4 days)
  Sections 8.1 and 8.2 essential, with selected topics from 8.3-8.5 (at instructor's discretion). Arc length, areas of surfaces of revolution, and selected applications from the sciences.
• CHAPTER 10 - Parametric Equations and Polar Coordinates (6 days)
  Sections 10.1-10.4 essential. Derivatives, arc length, and areas in the parametric and polar settings.
• CHAPTER 11 – Infinite Sequences and Series (16 days)

Additional sections may be covered, if time permits, at the instructors discretion.
MATH 256 Syllabus
Calculus III
Revised: September 2014

Course Description

Plane curves, polar coordinates, vectors and solid analytic geometry, vector-valued functions, partial differentiation, multiple integrals. Prerequisite: MATH 255. Four semester hours.

Student Learning Objectives

By the end of the course students will be able to:

• Work with and visualize graphs of functions of several variables;
• Geometrically and algebraically describe vectors and vector operations;
• Differentiate and integrate vector valued functions, and using these operations appropriately in applications;
• Differentiate multivariate functions and determine when partial differentiation or ordinary differentiation is needed;
• Use differentiation, directional derivatives, and the gradient in solving applied problems;
• Solve constrained and unconstrained optimization problems with several independent variables;
• Setup and evaluate double and triple integrals in Cartesian, polar, cylindrical, and spherical coordinates; and
• Work with parametric curves, equations, and vector fields.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• CHAPTER 12 - Vectors and Geometry of Space (8 days)
  All sections are to be covered Functions: Three-dimensional
coordinate systems, vectors, the dot product, the cross product, equations of lines and planes, cylinders and quadric surfaces.

• **CHAPTER 13 - Vector Functions (6 days)**
  All sections are to be covered: vector functions and space curves, derivatives and integrals of vector functions, arc length and curvature, motion in space with velocity and acceleration.

• **CHAPTER 14 - Partial Derivatives (10 days)**
  All sections are to be covered: functions of several variables, limits and continuity, partial derivatives, tangent planes and linear approximations, the chain rule, directional derivatives and the gradient vector, maximum and minimum values, lagrange multipliers.

• **CHAPTER 15 - Multiple Integrals (11 days)**
  All sections are to be covered: double integrals over rectangles, iterated integrals, double integrals over general regions, double integrals in polar coordinates, applications of double integrals, triple integrals, triple integrals in cylindrical coordinates, triple integrals in spherical coordinates, change of variables in multiple integrals

• **CHAPTER 16 - Vector Calculus (as time allows)**
  As time allows: vector fields, line integrals, the fundamental theorem for line integrals, Green’s Theorem, curl and divergence, parametric surfaces and their areas, surface integrals, Stokes’ Theorem

Plus selected topics from Chapter 17 and Chapter 18 as time allows.
MATH 270 Syllabus
Statistical Methods I
Revised: September, 2014

Course Description

Descriptive statistics, correlation, least squares regression, basic probability models, probability distributions, central limit theorem, confidence intervals, hypothesis testing. Prerequisite: MATH 140 or above. Three semester hours.

Student Learning Objectives

By the end of the course students will be able to:

- Describe the concepts of population and sample, and some of the basic descriptive measures associated with them;
- Explain graphical methods for data presentation;
- Connect the concepts of probability, random variables, and distributions;
- Assess the properties of common distributions, especially the normal and binomial;
- Synthesize the ideas of correlation and regression;
- Interpret estimation and hypothesis testing procedures applied to population means and proportions;
- Compare multiple means and proportions using appropriate statistical analyses; and
- Model univariate and multivariate data using linear models.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.
Course Outline

- **Chapter 1: The Role Of Statistics. (1 day)**

- **Chapter 2: The Data Analysis Process And Collecting Data Sensibly. (4 days)**

- **Chapter 3: Graphical Methods For Describing Data. (4 days)**
  Displaying Categorical Data: Frequency Distributions, Bar Charts and Pie Charts. Displaying Numerical Data: Dotplots and Stem-and-Leaf Displays. Displaying Numerical Data: Frequency Distributions and Histograms. Interpreting the Results of Statistical Analyses. Note: Section 3.1 is optional and Section 3.4 may be taught concurrently with Section 5.1. The topic of density histograms in Section 3.3 is optional.

- **Chapter 4: Numerical Methods For Describing Data. (3 days)**
  Describing the Center of a Data Set. Describing Variability in a Data Set. Summarizing a Data Set: Boxplots. Interpreting Center and Spread: Chebyshev's Rule, The Empirical Rule, and z-Scores. Interpreting the Results of Statistical Analyses. Note: The topic of trimmed means in Section 4.1 is optional.

- **Chapter 5: Summarizing Bivariate Data. (2 days)**
  Scatter Plots. Correlation. Fitting a Line to Bivariate Data. Assessing the Fit of a Line. Nonlinear Relationships and Transformations. Interpreting the Results of Statistical Analyses. First steps, design of experiments, sampling design, toward statistical inference. Note: Sections 5.4 and 5.5 are optional. Consider having Exam 1 after Chapter 5.

- **Chapter 6: Probability. (3 days)**

- **Chapter 7: Population Distributions. (4 days)**

- **Chapter 8: Sampling Variability And Sampling Distributions. (3 days)**
  Statistics and Sampling Variability. The Sampling Distribution of a Sample Mean. The Sampling Distribution of a Sample Proportion.
• **Chapter 9: Estimation Using A Single Sample.** (3 days)

• **Chapter 10: Hypothesis Testing Using A Single Sample.** (6 days)

• **Chapter 11: Comparing Two Populations or Treatments.** (4 days)
  Inferences Concerning the Difference Between Two Populations or Treatment Means Using Independent Samples. Inferences Concerning the Difference Between Two Population or Treatment Means Using Paired Samples. Large-Sample Inferences Concerning the Difference Between Two Populations or Treatment Proportions. Interpreting the Results of Statistical Analyses.

• **Chapter 12 The Analysis Of Categorical Data And Goodness-Of-Fit Tests.** (2 days)
  Chi-square Tests for Univariate Data. Tests for Homogeneity and Independence in a Two-way Table. Interpreting the Results of Statistical Analyses.

• **Chapter 13: Simple Linear Regression and Correlation: Inferential Methods.** (2 days)

• **Chapter 14: Multiple Regression Analysis.** (2 days)

• **Chapter 15: Analysis of Variance.** (2 days)
  Single-Factor ANOVA and the $F$ Test. Multiple Comparisons. The $F$ Test for a Randomized Block Experiment. Two-Factor ANOVA. Interpreting the Results of Statistical Analyses.

Most instructors for this course require the use of statistical calculators.
MATH 300 Syllabus

Problem Solving
Revised: November 2014

Course Description
Methods and Techniques for problem solving in mathematics. Prerequisite: Junior standing or permission of department head

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

1. demonstrate methods and techniques that are helpful in solving problems.
2. communicate mathematical understanding through writing and oral presentations.

Text

Grading Procedure
Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy
Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

- **Engaging in Problem Solving Investigations**
  Opportunities for future mathematics educators to explore various techniques and approaches to solving problems and to use them in problem-solving investigations.

- **Strategies for Solving Non-Traditional Problems**
  Opportunities for communicating, gathering information, organizing information, and implementing a plan to solve non-traditional problems. Problems to be solved will arise from a variety of contexts developing problem solving capacity and improving communication to deepen mathematical understanding
Course Description

A study of the role of science in Western culture from classical antiquity to the seventeenth century. (P3) Three semester hours.

Student Learning Objectives

By the end of the course students will be able to:

• Investigate how science develops in particular social and historical contexts;
• Analyze and interpret primary sources; and
• Craft and defend a historical argument in the context of a research project.

Text


Supplementary Texts (required):


Internet Readings and Electronic Reserve Readings containing primary source materials from Plato, Aristotle, Galen, Harvey, Paracelsus, Boyle, Copernicus, Kepler, Bacon, and Newton.

Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

Science in Classical Antiquity

Roman Science
READING #8: Lindberg, pp. 111-159 READING #9: Primary Source Reading: Galen (from Hunter Library Electronic Reserve)

From Islam to the Latin West

The Study of Man and Nature in the Renaissance

Chemistry and Alchemy
READING #15: Debus, pp. 16-33 and 121-130 READING #16: Primary Source Reading: Paracelsus (from Hunter Library Electronic Reserve) READING #17: Primary Source Reading: Boyle (from Hunter Library Electronic Reserve)

Astronomy
READING #18: Debus, pp. 74-100. READING #19: Primary Source Reading: Copernicus (from Hunter Library Electronic Reserve) READING #20: Primary Source Reading: Kepler (from Hunter Library Electronic Reserve) READING #21: Galileo, Sidereus Nuncius READING #22: Primary Source Reading: Galileo (from Hunter Library Electronic Reserve)

Scientific Method
READING #23: Debus, pp. 101-121 READING #24: Primary Source Reading: Bacon's New Atlantis (from Hunter Library Electronic Reserve) READING #25: Primary Source Reading: Francis Bacon, Novum Organum (1620) (from internet readings) READING #26: Descartes, Discourse on Method, pp. 5-54. READING #27: Conclusion of Descartes

Mathematics and Physics
READING #28: Primary Source Reading: Galileo (from Hunter Library Electronic Reserve) READING #29: Primary Source Reading: Newton Principia Mathematica (from internet readings) READING #30: Primary Source Reading: Newton Opticks (from internet readings)
MATH 310 Syllabus
Discrete Structures
Revised: November 2014

Course Description

Graph Theory: planarity, eulerian, hamiltonian, colorings, and trees. Enumeration: permutations, combinations, generating functions, recurrence relations, and inclusion-exclusion. Prerequisites: MATH 250. Three credit hours.

Student Learning Objectives

By the end of the course, students will be able to:

• Use graphs to model and solve a variety of problems;
• Identify and prove structural properties possessed by a given graph; and
• Use combinatorial modeling to solve problems in discrete mathematics.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• Chapter 1: Elements of Graph Theory (6 days)
  All sections: Graph models, graph isomorphisms, edge counting, and planarity.
• Chapter 2: Covering Circuits and Graph Coloring (6 days)
  All sections: Euler circuits, Hamiltonian cycles, graph coloring, and coloring theorems.
• Chapter 3: Trees and searching (5 days)
  Sections 1 - 2: Properties of trees, depth-first and breadth-first searching, and spanning trees. Remaining topics may be covered at the instructor's discretion.
• Chapter 4: Network Algorithms (Optional, at the instructor's discretion as time allows)
• **Chapter 5: Counting Methods for Selections and Arrangements (10 days)**
  Sections 1 - 4, and highlights of section 5: Basic counting principles, arrangements and selections, arrangements and selections with repetition, distributions, and binomial coefficients.

• **Chapter 6: Generating Functions (4 days)**
  Sections 1 and 2: Generating function models, and calculating coefficients of generating functions.

• **Chapter 7: Recurrence Relations (4 days)**
  Sections 1 - 3: Recurrence Relation models, divide-and-conquer relations, and solutions of linear recurrence relations.

• **Chapter 8: Inclusion-Exclusion (4 days)**
  Sections 1 - 3: Counting with Venn diagrams, the inclusion-exclusion formula, and rook polynomials (if time allows).
MATH 311 Syllabus

Informal Geometry
Revised: September, 2014

Course Description

Points, lines, planes, constructions; axiomatic structure of geometry and the nature of proof. Prerequisite: Math 321. Three semester hours

Objectives

As a result of this course students will be able to:

1. Utilize information methods such as dot paper constructions, folding, and tracing to determine facts and relationships;

2. Apply concepts from Euclidean geometry based on measurement, parallelness and congruence;

3. Perform basic Euclidean constructions using traditional tool, MiraTM, and Geometer’s Sketchpad;

4. Apply a system of facts and relationships concerning triangles, quadrilaterals, and other polygons to compare and relate polygons;

5. Formulate a system of facts and relationships concerning circles and circle parts;

6. Apply a system of facts and relationships concerning the measurement of length, area, surface area, volume, and the Pythagorean Theorem;

7. Connect and apply geometry to scenarios involving problem solving and/or modeling;

8. Synthesize proportional reasoning appropriately and apply to scenarios involving geometry;

9. Use formal deductive reasoning through pattern description, inductive reasoning, and the formulation of conjectures;

10. Identify geometric transformations, symmetries, and magnifications and apply them to problems;

11. Select and use appropriate manipulatives related to geometry and measurement topics such as geoboards, blocks, solids, nets, MIRAS, compass and protractor, straightedge, measurement tools, etc.;

12. Hypothesize about certain nets and views of 3-D objects based on spatial visualization skills.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.
Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• **Chapter 1: A panoramic View of Geometry**
  Introduction; Geometry in the physical world, as a mathematical system, as a formal axiomatic structure, and as a recreation

• **Chapter 2: Basic Ideas of Geometry**
  Sets of points; The straight line; The plane; The angle; Simple closed curves and regions in the plane; Parallel, skew and intersecting lines; Triangles and Quadrilaterals

• **Chapter 3: Discovering Polygon Relationships**
  Defining polygons; Symmetry in polygons; Constructions of polygons; Theorems about polygons

• **Chapter 5: Geometry in Three Dimensions**
  Regular polyhedra; Symmetry in Space; Semiregular polyhedra

• **Chapter 6: Measurement-Length, Area, Volume**
  Standard units of measurement; Metric units; English units; Length; Area; Volume and Capacity; Mass and Weight

• **Chapter 7 & 8: Motions in Geometry**
  Translations; Rotations; Reflections; Combining transformations; Magnification

• **Supplement: Constructions**
  Basic constructions; Properties of the triangle; General constructions; GeoSketchpad
MATH 320 Syllabus
Ordinary Differential Equations
Revised: September 2014

Course Description
Modeling, first order differential equations, existence and uniqueness of solutions, mathematical models and numerical methods, linear equations of higher order, systems of differential equations, and Laplace transforms. Prerequisite: MATH 255. Three semester hours.

Student Learning Objectives
By the end of the course students will be able to

• Formulate differential equations via modeling;
• Use geometric, numeric, and analytic techniques to solve and/or examine differential equations;
• Work with systems of differential equations in terms of matrices and find their solutions using eigenvalues;
• Interpret the solutions to differential equations; and
• Use mathematical software to solve and/or examine differential equations.

Text

Grading Procedure
Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy
Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline
• Chapter 1: First-Order Differential Equations. (9 class days)
  Modeling, Analytic Techniques, Qualitative Techniques (Slope Fields), Numerical Techniques, Existence and Uniqueness, Linear First-Order Equations, and Integrating Factors.
• Chapter 2: Mathematical Models and Numerical Method (7 class days)
• **Chapter 3: Linear Equations of Higher Order. (9 class days)**
  Second-Order Linear Equations, General Solutions of Linear Equations, Homogeneous Equations with Constant Coefficients, Mechanical Vibrations, Method of Undetermined Coefficients.

• **Chapter 4: Systems of Differential Equations. (4 class days)**

• **Chapter 5: Linear Systems of Differential Equations. (6 class days)**
  Matrices and Linear Systems, Eigenvalue Method for Homogeneous Systems, Multiple Eigenvalue Solutions.

• **Chapter 7: Laplace Transform Methods. (7 class days)**
  Laplace Transforms and Inverse Transforms, Transformation of Initial Value Problems, Translation and Partial Fractions, with Additional Topics as Time Allows.
MATH 321 Syllabus

Elementary Theory of Arithmetic I
Revised: September, 2014

Course Description

A study of mathematical topics including algebra, measurement, probability, and statistics necessary for teaching elementary and middle grades students. Three semester hours.

Student Learning Goals and Objectives

*MATH 321 is a C2 (Mathematics) Liberal Studies Course. The learning goals for C2 Courses are that:
- Students will be introduced to applications of mathematics in daily experience.
- Student learning will be focused on the development of conceptual understanding rather than computational drill.
- Students will complete a project requiring a mathematical analysis of observations, such that a significant portion of the student project will be statistically based.

Objectives

As a result of this course, students will be able to:

1. Apply concepts and techniques from algebra, measurement, probability and statistics to mathematical situations;
2. Identify contributions of mathematics to human's social, economic, philosophic, and artistic heritage;
3. Appropriately apply words, symbols, and techniques of mathematics with precision so as to communicate concepts and ideas correctly and clearly;
4. Utilize curiosity, initiative, confidence, and interest in mathematics;
5. Employ patterns of reasoning which enable one to investigate unfamiliar situations including problem solving and modeling scenarios;
6. Organize and design mathematical experiences as a means of discovery rather than presentations of a fixed set of facts and procedures;
7. Select and use appropriate manipulatives related to algebra, measurement, probability, and statistics topics such as geoboards, blocks, solids, measurement tools, dice, cards, spinners, etc.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.
Course Outline

- Algebra
  - Chapter 12: What is Algebra? (6 days)
    Sections 1-7: Symbolic Language; Generalized arithmetic; Numerical patterns; Functions; Reasoning.
  - Chapter 13: A Quantitative Approach to Algebra and Graphing (3 days)
    Sections 1-3: Graphing; Understanding slope; Linear functions.

- Measurement
  - Chapter 23: Measurement Basics (3 days)
    Sections 1-4: Units; measurement of lengths; measurement of angles.
  - Chapter 24: Area, Surface Area, Volume (3 days)
    Section 1-4: Area; Surface area; Volume.
  - Chapter 25: Measurement Formulas (3 days)
    Formula for circumference, area, surface area, and volume.

- Probability and Statistics
  - Chapter 27: Quantifying Uncertainty (5 days)
    Sections 1-5: Chance events; Assigning Probabilities; Simulating Probabilistic Situations; Large scale tests.
  - Chapter 28: Determining more complicated Probabilities (3 days)
    Sections 1-3: Tree Diagrams and lists; Or statements; And statements.
  - Chapter 29: Introduction to Statistics and Sampling (6 days)
    Sections 1-7: What are statistics?; sampling; simulating random sampling; types of data, surveys
  - Chapter 30: Representing and Interpreting Data with One Variable (8 days)
    Sections 1-8: Categorical data; Measurement data; Spread of data; Measures of Center; Deviations from the Mean; Examining distributions.
  - Chapter 31: Dealing with Multiple Data Sets or with Multiple Variables (3 days)
    Sections 1-4: Comparing data sets; Lines of best fit; Correlation; Multiple variables.
MATH 322 Syllabus

Elementary Theory of Arithmetic II
Revised: September, 2014

Course Description

A study of mathematical topics including number theory, operations, fractions, and proportional reasoning necessary for teaching elementary and middle grades students. Three semester hours.
Prerequisite: Math 321.

Student Learning Goals and Objectives

MATH 322 is a C2 (Mathematics) Liberal Studies Course. The learning goals for C2 Courses are that:
• Students will be introduced to applications of mathematics in daily experience.
• Student learning will be focused on the development of conceptual understanding rather than computational drill.
• Students will complete a project requiring a mathematical analysis of observations, such that a significant portion of the student project will be statistically based.

Objectives

As a result of MATH 322 students will be able to:

1. Apply concepts and techniques from the structure of the number system, elementary number theory, and proportional reasoning to mathematical situations;
2. Identify contributions of mathematics to human's social, economic, philosophic, and artistic heritage;
3. Appropriately apply words, symbols, and techniques of mathematics with precision so as to communicate concepts and ideas correctly and clearly;
4. Utilize curiosity, initiative, confidence, and interest in mathematics;
5. Employ patterns of reasoning which enable one to investigate unfamiliar situations including problem solving and modeling scenarios;
6. Organize and design mathematical experiences as a means of discovery rather than presentations of a fixed set of facts and procedures;
7. Select and use appropriate manipulatives related to number systems, number theory, and proportional reasoning topics such base blocks, decimal squares, fraction bars, Cuisenaire rods, etc..

Text


Grading Procedure
Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

**Attendance Policy**

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

**Course Outline**

- **Quantitative Reasoning**
  - **Chapter 1: Reasoning about Quantities**
    Sections 1-5: What is a Quantity; Quantitative Analysis; Quantitative Values.
  - **Chapter 3: Understanding Whole Numbers Operations**
    Sections 1-8: Addition and Subtraction of Whole Numbers; Multiplication and Division of Whole Numbers; Developing Number Sense.
  - **Chapter 2: Topics (as appropriate)**
  - **Chapter 4: Some Conventional Ways of Computing**
    Sections 1-3 and some material from Chapter 2: Operating on Whole Numbers and Decimal Numbers; Bases other than 10; Algorithms

- **Fractions, Ratios, and Proportions**
  - **Chapter 6: Meaning for Fractions**
    Sections 1-6: Meaning of a/b; Equivalent Fractions; Relating Fractions, Decimals, and Percents; Estimating Fractional Values.
  - **Chapter 7: Computing with Fractions**
    Sections 1-6: Adding, Subtracting, Multiplying, and Dividing Fractions.
  - **Chapter 8: Computing with Fractions**
    Sections 1-4: Multiplicative Situations; Fractions in Multiplicative Comparisons.
  - **Chapter 9: Ratios, Rates, Proportions, and Percents**
    Sections 1-5: Ratios; Percents; Proportions, and Proportional Reasoning.

- **Number Theory**
  - **Chapter 10: Expanding Our Number System**
    Sections 1-6: Signed Numbers; Addition and Subtraction; Multiplication and Division; Other Number Systems.
  - **Chapter 11: Number Theory**
    Sections 1-6: Factors; Multiples; Primes; Composites; Prime Factorization; GCF and LCM.
MATH 340 Syllabus
Introduction to Scientific Computing

Revised: September 2014

Course Description

This introduction to the field of scientific computing will focus on using mathematical software and programming as tools in mathematical modeling and problem solving. Motivated by various types of mathematical models (discrete, continuous, deterministic, stochastic, etc.), we will investigate software options that are best suited for implementing our models and simulations. Prerequisite: MATH 255. Three credit hours.

Student Learning Objectives

By the end of the course students will be able to

• Model problems mathematically and use mathematical software to solve or simulate these problems;
• Develop algorithms and implement them in the appropriate software or programming language;
• Draw pertinent examples from mathematical models, particularly from other disciplines (e.g. ecology, biology, chemistry, finance);
• Present professional documents, presentation materials, algorithms and solutions to problems in a mathematically sophisticated manner using a scientific documentation environment; and
• Know the benefits and drawbacks of each of the computational tools used during the semester.

Text

Though there is no formal text for the breadth of topics discussed in this class, the following supplementary text has been selected:


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.
Course Outline

• **Using LaTeX. (9 class days)**
  - Introduction to LaTeX, Implementing Lists, Tables, and Graphics in LaTeX, Mathematics in LaTeX, Referencing in LaTeX, Bibliographies, Beamer Presentations, and Posters with LaTeX.

• **Modeling with Difference Equations in Excel (5 class days)**
  - Introduction to Difference Equations, Basic Excel, SIR and Predator-Prey Models, Special Features in Excel, and Stochastic Models.

• **Modeling with Calculus, Differential Equations, and Probabilistic Models in Mathematica (7 class days)**
  - Introduction to Mathematica, Calculus in Mathematica, Modeling with Differential Equations in Mathematica, and Probabilistic Simulations in Mathematica.

• **Modeling with Matrices and MATLAB (4 class days)**
  - Introduction to MATLAB, Age and Stage-Based Models, Markov Chains in MATLAB.

• **Introduction to Programming in MATLAB (10 class days)**
  - Algorithm Development, Conditional Statements, Looping, Looping with Arrays, Mathematical Investigations with Programming, Coding Simulations with MATLAB.

**Additional Topics and/or Student Presentations (10 days)**

Additional topics include modeling with dynamic systems tools (e.g. Vensim, Stella, Berkeley Madonna), agent-based modeling (with NetLogo), statistical modeling (with R and Fathom). If long-term projects are given to the students over the semester, 3 - 6 days may be used for student presentations.
MATH 361 Syllabus
Introduction to Abstract Algebra
Revised: November 2014

Course Description

Groups, rings, and fields. Prerequisite: Math 250. Three semester hours.

Student Learning Objectives:

By the end of the course students will be able to:
• Know all relevant definitions and correct statements of major theorems;
• Explain the defining structures of quotient groups and rings, rings of polynomials and field extensions;
• Create examples or counter-examples and apply them appropriately to prove or disprove statements about algebraic structures;
• Prove statements and solve problems about the structure, size, and nature of groups, subgroups, factor groups, normal groups, rings, ideals, and field using definitions and theorems learned in the course;
• Incorporate equivalence relations into group theoretic structures, particularly factor groups; create factor groups using normal subgroups or the Isomorphism Theorems and interpret elements of factor groups accurately; and
• Understand permutations and symmetries in a group theoretic context—particularly the significance of Cayley's Theorem.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• Chapter 1: Things Familiar and Less Familiar (Set Theory, Mappings, The Integers, Mathematical Induction)
• Chapter 2: Groups (Definition and Examples of Groups, Subgroups,
Lagrange's Theorem, Homomorphisms and Normal Subgroups, Factor Groups, The Homomorphism Theorems, Cauchy's Theorem, Direct Products

• Chapter 3: Symmetric Group (Cycle Decomposition, Odd and even Permutations)
• Chapter 4: Ring Theory (Definitions and Examples, Ideals, Homomorphisms, Maximal Ideals, Polynomial Rings)
• Chapter 5: Fields (Examples of Fields)
MATH 362 Syllabus
Linear Algebra I
Revised: September 2014

Course Description
Systems of equations, matrices, vector spaces, and linear transformations.
Prerequisites: Math 153 and Math 250. Three semester hours.

Student Learning Objectives
By the end of the course students will be able to

• Demonstrate their knowledge of the use of matrices in solving systems of linear equations;
• Use, explain, and verify properties of vector spaces and subspaces;
• Explain and make use of linear independence of vectors, particularly with respect to columns or rows of matrices;
• Explain the meaning and significance of linear transformations;
• Identify eigenvalues and eigenvectors of matrices and interpret their significance;
• Identify innate connections/relations between key topics (properties, theorems, and definitions) from the semester;
• Demonstrate analytical skills in proving theorems and corollaries of linear algebra;
• Apply theorems to solve problems; and
• Master algorithmic aspects of linear algebra.

Text

Grading Procedure
Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy
Attendance policy is left to the discretion of individual instructors, subject to general university policy.
Course Outline

• Chapter 1: Matrices, Vectors, and Systems of Linear Equations (11 days)
  Sections 1 - 4, 6 & 7, with selected applications in section 5 as time allows. Matrix operations and their properties, Linear combinations, Systems of linear equations, Gaussian elimination, Span of a set of vectors, Linear independence and dependence, and selected applications (time allowing). Note: Inclusion of Gaussian elimination (Section 9.1) is also appropriate at this time.

• Chapter 2: Matrices and Linear Transformations (10 days)
  Sections 1, 3, 4, 7 and 8, with selected applications from sections 2, 5 and 6 as time allows. Matrix multiplication, Matrix inverses, Elementary matrices, Linear transformations of matrices, and applications (as time allows)

• Chapter 3: Determinants (3 days)
  Sections 1 and 2. Introduction to determinants, Cofactor expansion, and Properties of determinants.

• Chapter 4: Subspaces and Their Properties (8 days)
  Sections 1-5; Subspaces, Basis and dimension, Coordinate systems, and Matrix representation of linear operators. Note: Material from Chapter 7 can be incorporated with this discussion, as desired.

• Chapter 7: Vector Spaces (3 days added to Chapter 4 material)
  Sections 1-4 General vector spaces, Subspaces, Linear transformation, Basis and dimension, and Matrix representation of linear operators.

• Chapter 5: Eigenvalues, Eigenvectors, and Diagonalization (4 days)
  Section 1, with optional coverage of other sections (section 3 recommended if time allows) Eigenvalues and eigenvectors. Diagonalization of matrices and/or other applications as time allows.
Course Description

Classical probability models, distributions of discrete and continuous random variables, joint probability distributions, mathematical expectation. Prerequisite: Math 255. Three semester hours.

Student Learning Objectives

By the end of the semester, students will be able to

• Model events occurring in nature in mathematical notation for future study;
• Describe populations and predict events when only samples are available;
• Interpret how industry uses statistical models in the design and production of goods and services;
• Develop an appreciation for the use of mathematical concepts such as calculus in the development of statistics; and
• Understand the rather short history of statistics, its recent growth in applications, and current development.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• Chapter 1: What Is Statistics? (2 class days)
• **Chapter 2: Probability (7 days)**

• **Chapter 3: Discrete Random Variables and Their Probability Distributions (7 days)**

• **Chapter 4: Continuous Variables and Their Probability Distributions (7 days)**

• **Chapter 5: Multivariate Probability Distributions (10 days)**

• **Chapter 6: Functions of Random Variables (5 days)**

• **Chapter 7: Sampling Distributions and the Central Limit Theorem (4 days)**
MATH 373 Syllabus
Theory of Interest for Actuarial Exam FM
Revised: September, 2014

Course Description

Topics in financial mathematics on the second exam of the Actuarial Societies: interest rates, annuities, accumulation functions, amortization schedules, present values, future values, and bonds. Prerequisite: Math 255. Three semester hours.

Student Learning Objectives

By the end of the course, students will be able to:

• Given any two of interest rate, present value, or future value, calculate the third based on simple or compound interest;
• Write the equation of value given a set of cash flows and an interest rate;
• Given an annuity with level or non-level payments, immediate (or due); payable m-thly, (or payable continuously), and any three of present value, future value, interest rate, payment, and term calculate the remaining two items;
• Given any four of term of loan, interest rate, payment amount, payment period, principal, calculate the remaining items;
• Given any four of price, redemption value, yield rate, coupon rate, and term of bond, calculate the remaining item;
• Calculate the current value of a set of cash flows; and
• Construct an investment portfolio to fully immunize a set of liability cash flows.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• Chapter 1: The Measurement of Interest (5 class days) The accumulation and amount function. The effective rate of interest. Simple interest. Compound
interest. Present value. The effective rate of discount. Nominal rates of interest and discount. Forces of interest and discount. Varying interest.

• **Chapter 2: Solutions of Problems in Interest (2 days)** Equations of value. Unknown time. Unknown rate of interest. Determining time periods.


• **Chapter 4: More General Annuities (4 days)** Differing payment and interest conversion periods. Annuities payable less frequently than interest is convertible. Annuities payable more frequently than interest is convertible. Continuous annuities. Payments varying in arithmetic progression. Payments varying in geometric progression. More general varying annuities. Continuous varying annuities.

• **Chapter 5: Amortization Schedules and Sinking Funds (4 days)** Finding the outstanding loan balance. Amortization schedules. Sinking funds. Differing payment periods and interest conversion periods. Varying series of payments.


• **Chapter 7: Yield Rates (4 days)** Discounted cash flow analysis. Uniqueness of the yield rate. Reinvestment rates. Interest measurement of a fund. Time-weighted rates of interest. Portfolio methods and investment year methods.

• **Chapter 9: More Advanced Financial Analysis (1 day)** Recognition of inflation.

• **Chapter 10: The Term Structure of Interest Rates (3 days)** Yield curves. Spot rates. Relationship with bond yields. Forward rates.

MATH 375 Syllabus
Statistical Methods II
Revised: September, 2014

Course Description

Analysis of variance, regression, and correlation; analysis of categorical data; distribution free procedures. Prerequisite: Math 270. Three semester hours.

Student Learning Objectives

By the end of the course students will be able to

• Test models used for nominal and ordinal data scales;
• Fit data to linear and non-linear regression curves and test the appropriateness of the model;
• Compare means from several populations simultaneously and examine ways to describe variation in the data when fitted to the various models; and
• Interpret the results of statistical analyses.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• Since Chapters 1 through 10 are covered in Math 270, they should be briefly reviewed as needed.
  Chapter 1: The Role Of Statistics.
  Chapter 2: The Data Analysis Process And Collecting Data Sensibly.
  Chapter 3: Graphical Methods For Describing Data.
  Chapter 4: Numerical Methods For Describing Data.
  Chapter 5: Summarizing Bivariate Data.
  Chapter 6: Probability.
  Chapter 7: Population Distributions.
Chapter 8: Sampling Variability And Sampling Distributions.
Chapter 9: Estimation Using A Single Sample.
Chapter 10: Hypothesis Testing Using A Single Sample.

- **Chapter 11: Comparing Two Populations or Treatments. (6 days)**
  Inferences Concerning the Difference Between Two Populations or Treatment Means Using Independent Samples. Inferences Concerning the Difference Between Two Population or Treatment Means Using Paired Samples. Large-Sample Inferences Concerning the Difference Between Two Populations or Treatment Proportions. Interpreting the Results of Statistical Analyses.

- **Chapter 12 The Analysis Of Categorical Data And Goodness-Of-Fit Tests. (6 days)**
  Chi-square Tests for Univariate Data. Tests for Homogeneity and Independence in a Two-way Table. Interpreting the Results of Statistical Analyses.

- **Chapter 13: Simple Linear Regression and Correlation: Inferential Methods. (8 days)**

- **Chapter 14: Multiple Regression Analysis. (6 days)**

- **Chapter 15: Analysis of Variance. (6 days)**
  Single-Factor ANOVA and the $F$ Test. Multiple Comparisons. The $F$ Test for a Randomized Block Experiment. Two-Factor ANOVA. Interpreting the Results of Statistical Analyses.

- **Chapter 16: Nonparametric (Distribution-Free) Statistical Methods (8 days)**
  Distribution-Free Procedures for Inferences About a Difference Between Two Population or Treatment Means Using Independent Samples (Optional). Distribution-Free Procedures for Inferences About a Difference Between Two Population or Treatment Means Using Paired Samples. Distribution-Free ANOVA.

Most instructors for this course require the use of statistical calculators.
Course Description

Topics include the development of mathematics from ancient to modern times in many cultures with emphasis on methods, techniques, and algorithms of particular times and cultures. Additional topics include connecting the mathematics of a time and place with other types of academic/artistic thought. Prerequisite MATH 153 or MATH 140. Three semester hours.

Student Learning Objectives

By the end of the course students will be able to:
- Investigate how mathematics develops in particular social and historical contexts;
- Recognize the historical origins of the mathematics you study in your other courses;
- Analyze and interpret primary source mathematical texts; and
- Craft and defend a historical argument in the context of a research project.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

This course covers the development of mathematics from ancient times through the present day. Emphasis is on the mathematics of the time period and culture in relation to other forms of intellectual thought.
MATH 411 Syllabus
Foundations in Geometry
Revised: November 2014

Course Description

Axiomatic approach to the study and development of Euclidean and non-Euclidean geometry. Prerequisite: Junior standing or permission of Department Head.

Objectives

At the conclusion of this course, the successful student will be able to
1. use synthetic, investigative, and deductive approaches to solve problems in Euclidean plane geometry.
2. demonstrate knowledge of the historical and mathematical significance of the parallel postulate.
3. demonstrate proficiency in the basic concepts of mathematical logic and their use in proofs.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• Mathematical Argument and Geometric Proof
  Fundamental ideas of geometric proof including basic terms and standard notation
• Geometry of Lines, Triangles, Circles, Polygons
  Properties and theorems related to parallel lines, perpendicular lines, angles formed by intersecting lines, congruent triangles, similar triangles, special triangles, circles, perimeter, area, and volume of two and three dimensional geometric figures
• Transformational Geometry
  Fundamental ideas of geometry explored through transformations
• Constructions
  Exploration of geometric figures through formal constructions using ruler and compass, computer software, reflective manipulatives, and physical models
Modern Geometries

Course Description

Finite geometries, transformations, motions of the Euclidean plane and 3-space, similarity transformations, convexity, and other topics. Prerequisite: Junior standing or permission of department head.

Objectives

At the conclusion of this course, the successful student will

1. demonstrate knowledge of constructions, concepts, and theorems from a variety of Non-Euclidean geometries.
2. demonstrate knowledge of the historical and mathematical significance of the parallel postulate and other distinguishing postulates.
3. demonstrate proficiency in the basic concepts of mathematical logic and their use in proofs.

Texts


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

- **Introduction to Non-Euclidean Geometry using Taxicab Geometry**
  Fundamental properties of taxicab geometry: taxi distance, taxi conic sections, taxi polygons, applied taxi problems, and metric space properties;

- **Explorations in Spherical Geometry**
  Properties of lines, angles, triangles, parallelism, area, and metrics on spheres

- **Explorations in Hyperbolic Geometry**
  Properties of lines, angles, triangles, parallelism, area, and metrics in a hyperbolic plane

- **Historical Strands of Geometry**
  Investigation of historical uses of geometry that lead to a variety of geometries including Euclidean and Non-Euclidean geometries.
MATH 414 Syllabus

Introduction to Secondary Mathematics Teaching Methods

Course Description

An examination of secondary mathematics curriculum and methods, strategies, and techniques of using technology to support mathematics teaching and learning. 
Prerequisite: Admission to Professional Education Sequence AND Junior standing or permission of the instructor.

Objectives

Upon successful completion of MATH 414, students will be able to:

• demonstrate appropriate mathematical knowledge through problem solving, communication of mathematical ideas, and various forms of mathematical reasoning.
• identify mathematical connections among various topics and can apply content, processes, and reasoning to real world situations.
• understand and be familiar with the NCSCOS and Common Core Standards for secondary mathematics.
• identify mathematics curricular goals and plan instruction to meet these goals.
• identify appropriate uses of technology, plan instruction that uses technology to enhance teaching and learning, and use technology to assess learning.

Text

*Focus in High School Mathematics – Reasoning and Sense Making*, a publication by the National Council of Teacher of Mathematics.

Required Technology

A TI 83/84 graphing calculator is required in MATH 414.
Students are required to use the Blackboard learning management system to access course materials, important messages about the class, and communication tools that may be posted by your instructor.

Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

Students are expected to complete the following activities for this course:

• Review of a mathematical discovery or exploration oriented piece of software
• Review of a mathematical discovery or exploration online manipulative
• Review of journal articles related to designated topics within mathematics education
• Construct lesson plans using designated formats
MATH 415 Syllabus

Methods and Materials for Teaching Mathematics in the Secondary Schools
Revised: November, 2014

Course Description

A survey of contemporary trends and issues in teaching mathematics at the secondary level. Methods, materials, curriculum, and other current practices are included.

Text


Objectives

At the conclusion of this course, the successful student will be able to
1. demonstrate a knowledge of the curriculum and contemporary issues in teaching mathematics at the high school level.
2. identify mathematics curricular goals,
3. plan instruction to meet these goals,
4. implement lesson plans,
5. assess students’ mathematical learning,

Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• Planning, Goals and Objectives
  Teaching functions and practices, planning, writing objectives, teacher performance appraisal instruments;
• Secondary mathematics curriculum
  Review of curriculum guidelines, analysis of secondary text materials, designing plans to address curriculum goals.
• Delivery of instruction
  Factors related to classroom environment, implementing instruction in a classroom setting - student motivation, teacher demonstration, questioning, and practice; cultural diversity, utilization of alternative instructional techniques; evaluation of instruction and student performance;
• Instructional materials
  Analyze and use materials such as kits, classroom models, audio-visual packages, calculators, computer software and hardware packages;
• **Non-instructional duties**
  Demonstrate knowledge and skills related to such professional activities as classroom records, teacher licensure, parent conferences, and the school job setting.
MATH 422 Syllabus
Real Analysis I
Revised: September, 2014

Course Description

Sequences of real numbers, continuous functions, and differentiation.
Prerequisite: MATH 250 and MATH 255. Three Semester Hours.

Student Learning Objectives

By the end of the course students will be able to:

• Use the definitions of convergence as they apply to sequences, series, and functions;
• Determine the continuity, differentiability, and integrability of functions defined on subsets of the real line;
• Produce rigorous proofs of results that arise in the context of real analysis; and
• Write proofs of theorems that meet rigorous standards based on content, precision, and style.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• Chapter 1: Real Numbers (6 days)
  Completeness; countable and uncountable sets; real valued functions
• Chapter 2: Sequences (10 days)
  Convergent monotone and Cauchy sequences; subsequences; Bolzano-Weierstrass
• Chapter 3: Limits and Continuity (14 days)
  Limit theorems; one-sided and infinite limits; continuous functions; intermediate and extreme values; uniform continuity; monotone functions
• Chapter 4: Differentiation (10 days)
The definition and rules of differentiation; mean value and L'Hopital

- **Chapter 5: Integration (5 days, if time allows)**
  Riemann Integral; conditions for Riemann integrability
Math 424 Syllabus
Complex Variable Theory
Revised: September, 2014

Course Description

The complex number system, limits, continuity, derivatives, transcendental and multiple valued functions, integration. Prerequisite: MATH 256. Three semester hours.

Student Learning Objectives

By the end of the course students will be able to:
• Represent complex numbers algebraically and geometrically;
• Analyze complex functions both algebraically and geometrically;
• Define and analyze limits and continuity for complex functions as well as consequences of continuity;
• Use the Cauchy-Riemann equations to analyze analytic functions;
• Analyze sequences and series of analytic functions and types of convergence;
• Evaluate complex contour integrals directly and by the fundamental theorem, apply the Cauchy integral theorem in its various versions, and the Cauchy integral formula; and
• Represent functions as Taylor, power and Laurent series, classify singularities and poles, find residues and evaluate complex integrals using the residue theorem.

Text

Zill and Shanahan, A First Course in Complex Analysis with Applications, Jones and Bartlett, 2003.

Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• Chapter 1: Complex Numbers and the Complex Plane (8 days) Complex numbers and their properties; complex plane; polar form of complex numbers; powers and roots; sets of points in the complex plane.
• **Chapter 2: Complex Functions and Mappings (8 days)** Complex functions; complex functions as mappings; linear mappings; special power functions; reciprocal function; limits and continuity.

1. **Chapter 3: Analytic Functions (4 days)** Differentiability and analyticity; Cauchy-Riemann equations; harmonic functions.

• **Chapter 4: Elementary Functions (4 days)** Exponential and logarithmic functions; complex powers; trigonometric and hyperbolic functions.

• **Chapter 5: Integration in the Complex Plane (7 days)** Real integrals; complex integrals; Cauchy-Goursat Theorem; Independence of Path; Cauchy’s Integral Formulas and Their Consequences.

• **Chapter 6: Series and Residues (7 days)** Sequences and series; Taylor series; Laurent Series; Zeros and Poles; Residues and Residue Theorem.
Course Description

Mathematical modeling is the process of describing physical phenomena through the use of mathematical concepts and language, and then analyzing the mathematical system to learn more about the physical system. Topics for this course are chosen based on student and instructor interest, and may include: differential equation models, analysis of stability and sensitivity, difference equations, Markov processes, or optimization. Prerequisites: MATH 320, MATH 362, and MATH 340.

Student Learning Objectives

By the end of the course students will be able to read the literature in mathematical modeling, understanding why the investigators used specific methods of analysis and how they give information about the physical process under consideration. Students will be able to:

• Identify a proper modeling technique to apply to specific problems from the life, physical, or social sciences;
• Formulate a model in mathematical language, using methods from both discrete and continuous mathematics;
• Analyze mathematical models;
• Use computer applications to aid in the design of models for simulation, forecasting, and explication; and
• Interpret the mathematical results in the context of the original physical problem.

Text

Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.
Course Outline

• **Chapter 1: Simple Dynamic Models**
  Design of models with Newton’s Laws, conservation of mass, law of mass action, equilibrium analysis I, stability.

• **Chapter 2: Ordinary Differential Equations**
  Linear systems, eigenvalue analysis, phase portraits.

• **Chapter 3: Stability of Dynamic Models**
  Systems of differential equations, linearization, equilibrium analysis II, competition models, SIR models, Lyapunov functions, feedback control.

• **Chapter 6: Cycles and Bifurcation**
  Limit cycles, Poincare-Bendixson Theorem.

• **Chapter 7: Bifurcation and Catastrophe**
  Parameter dependence, bifurcations.

• **Additional Topics as Time Allows.**
Course Description

This first semester introduction to the field of numerical analysis will investigate numerical techniques in: solving equations in one variable (a.k.a. root finding) interpolation and polynomial approximation, numerical differentiation and integration, and solving ordinary differential equations and the errors associated with each of these techniques. A significant component of the class comes from implementing or using these methods to complete projects. Prequisites: MATH 255, CS 150 or MATH 340. Three semester hours.

Student Learning Objectives

By the end of the course, students will be able to:

• Explain the significance of floating point arithmetic and a computer's representation of floating point numbers to the accuracy of numerical computations as well as provide examples;
• Explain the difference between, and calculate, absolute error and relative error for an approximation technique;
• Explain, implement, apply, geometrically represent, compare and contrast the following:
  - root-finding methods such as Bisecion Method, Fixed Point Method, Secant Method, Newton's Method, Method of False Position, and Muller's Method;
  - interpolation methods such as the nth order Lagrange polynomial, piecewise polynomials, and cubic splines;
  - numerical differentiation methods such as Forward Difference, Backward Difference, and Centered Difference;
  - numerical integration (quadrature) methods such as Midpoint Method, Simpson's Method, Trapezoid Method, Open Newton-Cotes Methods, Closed Newton-Cotes Methods -- either as single interval or composite methods -- and Adaptive Quadrature Methods;
  - numerical initial value problem methods such as Euler's Method, Higher Order Taylor Methods, Runge-Kutta Methods, and Adaptive Runge-Kutta Methods;
• Explain the derivation of error terms associated with any of the above methods as well as the significance of the error term for use in an application;
• Interpret the purpose and actions of an algorithm given code for an unspecified numerical method;
• Recognize the type of applied problem at hand and justify which numerical method is most appropriate for solving a particular instance of the
problem; and
• Extend methods discussed in class to apply them to a new but relevant problem.

Required Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• **Preliminaries (Chapter 1) [4 days]**
  Round-off Errors
  Floating Point Arithmetic
• **Solutions of Equations in One Variable (Chapter 2) [10 days]**
  Bisection Method
  Fixed-Point Iteration
  Newton's Method
  Müller's Method
• **Polynomial Interpolation (Chapter 3) [6 days]**
  Lagrange Polynomial
  Divided Differences
  Cubic Spline Interpolation
• **Numerical Differentiation and Integration (Chapter 4) [11 days]**
  Numerical Differentiation
  Simple Quadrature Methods
  Composite Methods
  Adaptive Quadrature Methods
• **Initial Value Problems for Ordinary Differential Equations (Chapter 5) [14 days]**
  Euler's Method
  Higher-Order Taylor Methods
  Runge-Kutta Methods
  Multistep Methods
  Higher Order Equations and Systems
MATH 450 Syllabus

Linear Optimization
Revised: September 2014

Course Description

Formulation and solution of linear programming models; development of simplex method; duality theory; sensitivity analysis; software; and applications.
Prerequisites: MATH 255 and MATH 362. Three semester hours.

Student Learning Objectives

By the end of the course students will be able to

• Formulate a linear optimization problem for a given application;
• Solve the optimization problem using the simplex method (both by hand and through the use of mathematical software);
• Provide geometric interpretation of linear programming;
• Explain the significance of sensitivity analysis and its role in linear programming; and
• Apply their understanding of theory to real life applications that warrant linear programming techniques.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

• Chapter 1: Introduction. (6 class days)
  The Linear Programming Problem, Linear Programming Modeling and Examples, Geometric Solutions, Requirement Space.
• Chapter 2: Linear Algebra, Convex Analysis, and Polyhedral Sets. (6 class days)
  Properties of Vectors and Matrices, Simultaneous Linear Equations, Convex Sets and Convex Functions, Polyhedral Sets and Polyhedral Cones, Geometric Insights.
• **Chapter 3: The Simplex Method. (10 class days)**
  Extreme Points and Optimality, Basic Feasible Solutions, Simplex Method, Geometric Motivation of Simplex Method, Algebra of Simplex Method, Optimality and Unboundedness, Tableau Form of Simplex Method.

• **Chapter 5: Special Simplex Implementations and Optimality Conditions. (6 class days)**
  Revised Simplex Method, Simplex Method of Bounded Variables, Farkas' Lemma, Karush-Kuhn-Tucker Optimality Conditions.

• **Chapter 6: Duality and Sensitivity Analysis. (14 class days)**
  Formulation of the Dual Problem, Primal-Dual Relationships, Economic Interpretation of the Dual, Dual Simplex Method, Primal-Dual Method, Artificial Constraint Technique, Sensitivity Analysis, Parametric Analysis.

**Additional Topics (dependent upon time)**
Recommended additional topics include Minimal-Cost Network Flows.
MATH 461 Syllabus
Abstract Algebra II
Revised: September, 2014

Course Description

This course introduces rings including integral domains, ideals, ring homomorphisms and fields including extension fields, finite fields, culminating in the Galois Theory. Prerequisite: Math 361. Three semester hours.

Student Learning Objectives

By the end of the course students will be able to:
• Know all relevant definitions and correct statements of major theorem;
• Compute Aut(G) for a given group G;
• Use the Sylow Theorems to characterize certain finite groups;
• Compute direct product of groups;
• State and apply the Fundamental Theorem of Finite Abelian Groups;
• Understand the structure of quotient groups and rings, rings of polynomials and field extensions;
• Use the Isomorphism Theorems to deduce structure and properties of rings and groups;
• Use modern algebra in solving problems such as the impossibility of certain ruler and compass constructions, and the impossibility of a general formula for roots of polynomials;
• Applying theory of quotient rings to create extension fields which contain roots of polynomials which were not present in the base field; and
• Understand the Fundamental Theorem of Galois Theory and its relation to solubility of polynomial equations.

Text

Topics in Algebra by I.N. Herstein, Second Edition

Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.
Course Outline

• Chapter 1: Homomorphisms, Automorphisms, Group Theory (Sylow's Theorem, Direct Products, Finite Abelian Groups)
• Chapter 2: Rings (Definition and Examples, Homomorphisms, Ideals and Quotient Rings, Integral Domain, Euclidean Rings, Polynomial Rings)
• Chapter 5: Fields (Extension Fields, Roots of Polynomials, Construction with Ruler and Compass, Elements of Galois Theory, Solvability by Radicals, Galois Groups over the Rationals)
• Chapter 7: Selected Topics (Finite Fields)
Course Description

Topics from linear algebra including vector spaces, basis and dimension, linear transformations, orthogonality, eigenvalues, matrix similarity, diagonalization, and selected applications. Prerequisite: Math 362. Three semester hours.

Student Learning Objectives

By the end of the course, students should be able to:

• Demonstrate understanding of the relationship between matrices, linear systems, and linear transformations;

• Explain the significance of eigenvalues and matrix decomposition in applications;

• Know, understand, and utilize definitions and statements of theorems in computations and deriving proofs;

• Demonstrate analytical skills to prove theorems and corollaries of linear algebra;

• Apply theorems to solve problems;

• Master algorithmic aspects of linear algebra; and

• Be able to present proofs and problem solutions to their peers in a clear and accurate manner.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.
Course Outline

- **Chapter 1: Matrix Algebra (3 days)**
  Matrices, Operations with Matrices, and Matrices over Rings and Fields.

- **Chapter 2: Systems of Linear Equations (5 days)**
  Gaussian Elimination, Elementary Row Operations, and Elementary Matrices with emphasis on theoretical development.

- **Chapter 3: Determinants (3 days)**
  Permutations and Definition of Determinant, Basic Properties of Determinants, and Determinants and Inverses of Matrices with emphasis on theoretical development.

- **Chapter 4: Introduction to Vector Spaces (5 days)**
  Vector Spaces and Subspaces, Linear Independence in Vector Spaces with emphasis on theoretical development.

- **Chapter 5: Basis and Dimension (5 days)**
  Existence of a Basis, Row and Column Spaces of a Matrix, and Operations with Subspaces with emphasis on theoretical development.

- **Chapter 6: Linear Transformations (7 days)**
  Functions Defined on Sets, Linear Transformations and Matrices, and Kernel, Image and Isomorphism with emphasis on theoretical development.

- **Chapter 7: Orthogonality in Vector Spaces (5 days)**

- **Chapter 8: Eigenvectors and Eigenvalues (3 days)**
  Basic Theory of Eigenvectors and Eigenvalues, Diagonalization, and Applications.

- **Other topics as time allows (6 days).**
MATH 470 Syllabus
Probability and Statistics II
Revised: September 2014

Course Description

Point and interval estimation, hypothesis testing, likelihood ratio and sequential testing, correlation and regression. Prerequisite: MATH 370. Three semester hours.

Student Learning Objectives

By the end of the semester, students will be able to:

• Construct and interpret estimation procedures including confidence intervals;
• Explain phenomena using null and alternative hypotheses involving population parameters and test these hypotheses using routine methods for assessing statistical significance;
• Investigate relationships in univariate and multivariate data using linear models;
• Design experiments to extract optimal information from data;
• Analyze proportions and independence of categorical variables for statistical significance; and
• Connect hypothesis testing procedures with associated sampling distributions, where appropriate.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.
Course Outline

• Since Chapters 1 through 7 are covered in MATH 370, they should be briefly reviewed as needed.

  Chapter 1: Introduction
  Chapter 2: Probability
  Chapter 3: Discrete Random Variables and Their Probability Distributions
  Chapter 4: Continuous Random Variables and Their Probability Distributions
  Chapter 5: Multivariate Probability Distributions
  Chapter 6: Functions of Random Variables
  Chapter 7: Sampling Distributions and the Central Limit Theorem

• **Chapter 8: Estimation (5 days)**
  Introduction. The Bias and Mean Square of Point Estimators. Some Common Unbiased Point Estimators. Evaluating the Goodness of a Point Estimator. Confidence Intervals. Large-Sample Confidence Intervals. Selecting the Sample Size. Small-Sample Confidence Intervals for $\mu$ and $\mu_1 - \mu_2$. Confidence Intervals for $\sigma^2$. Summary.

• **Chapter 9: Properties of Point Estimators and Methods of Estimation (4 days)**

• **Chapter 10: Hypothesis Testing (8 days)**

• **Chapter 11: Linear Models and Estimation by Least Squares (8 days)**
$Y$ by Using Multiple Regression. A Test for $H_0: \beta_{g+1} = \beta_{g+2} = \ldots = \beta+k = 0$. Summary and Concluding Remarks.

- **Chapter 12: Considerations in Designing Experiments (2 days)**

- **Chapter 13: The Analysis of Variance (5 days)**

- **Chapter 14: Analysis of Categorical Data (3 days)**
  A Description of the Experiment. The Chi-Square Test. A Test of a Hypothesis Concerning Specified Call Probabilities: A Goodness-of-Fit Test. Contingency Tables. $r \times c$ Tables with Fixed Row or Column Totals. Other Applications. Summary and Concluding Remarks.
MATH 471 Syllabus
Problem Solving for Actuarial Exam P
Revised: September 2014

Course Description

Advanced problem solving by means of extensive review and practice. Preparing students for Exam P of the Society of Actuaries and the Casualty Actuarial Society. MATH 370. Three semester hours.

Student Learning Objectives

From the "learning objectives" listed for this professional exam, candidates (students) should be able to use and apply the following concepts in a risk management context:

- General Probability (Set functions including set notation and basic elements of probability, Mutually exclusive events, Addition and multiplication rules, Independence of events, Combinatorial probability, Conditional probability, Bayes Theorem/Law of total probability);
- Univariate probability distributions (including binomial, negative binomial, geometric, hypergeometric, Poisson, uniform, exponential, gamma, and normal), Probability functions and probability density functions, Cumulative distribution functions, Mode, median, percentiles, and moments, Variance and measures of dispersion, Moment generating functions, Transformations; abd
- Multivariate probability distributions (including the bivariate normal), Joint probability functions and joint probability density functions, Joint cumulative distribution functions, Central Limit Theorem, Conditional and marginal probability distributions, Moments for joint, conditional, and marginal probability distributions, Joint moment generating functions, Variance and measures of dispersion for conditional and marginal probability distributions, Covariance and correlation coefficients, Transformations and order statistics, Probabilities and moments for linear combinations of independent random variables.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.
Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline


MATH 479 Syllabus

Capstone

Revised: September, 2014

Course Description

A course requiring written papers and oral presentations by students on historical and contemporary topics from current mathematical literature. Prerequisite: Senior standing and MATH 250. Two semester hours.

Student Learning Objectives

By the end of the course, students should be able to:

• Read and comprehend mathematics as found in professional journal articles;
• Communicate mathematics by writing formal mathematics papers;
• Communicate mathematics verbally by presenting formal mathematics seminars; and
• Discover the dynamic nature of mathematics and interdependence of its various branches.

Text


Grading Procedure

Grading procedures and factors influencing course grade are left to the discretion of individual instructors, subject to general university policy.

Attendance Policy

Attendance policy is left to the discretion of individual instructors, subject to general university policy.

Course Outline

Project 1: Students present a theorem from a previous course and write a paper about this theorem. (6 days)

Project 2: Students work in groups to present material from the textbook and write a paper about this topic. (8 days)

Project 3: Students each read a professional research paper or complete an undergraduate research project. Each student explores his or her topic in more depth, writes a major paper about the topic, and presents the material during seminar which is advertised to the department. (12 days)
Course Description

A full-time supervised teaching experience in the discipline.
COREQ: EDSE 490, 495

Objectives

At the conclusion of this course, the successful student will:
1. demonstrate proficiency in teaching mathematics at the high school level.
2. be able to identify mathematics curricular goals, plan instruction to meet these goals, implement lesson presentation skills, and evaluate mathematics instruction.

Text

No text for this course

Grading Procedure

Grades will be based on completion of the course activities described in the Course Outline, three observations, mid-term evaluation, final evaluation, and Initial Licensure Portfolio. In general, all work will be directed towards helping you become the best teacher possible. To that end, the final grade will reflect progress and accomplishments overall rather than a collection of small grades throughout the term, but neglecting to do the items outlined below will have a negative impact on your overall grade.

Attendance Policy

Interns report to their schools the first day the host teachers report and remain in the schools until the final day of classes (not exams) at WCU. Full-day participation

Course Outline

Students are expected to complete the following activities for this course:

• complete the introductory assignment that details your bell schedule and contact info.
• submit a brief overview of the upcoming week’s work each Sunday by 5:00 pm. These descriptions should be one or two sentences for each class for each day that identifies the topic to be considered or an activity (test, video, etc) so that I can plan visits accordingly.
• respond to the questions for the week.
• submit lesson plans and reflections for the lessons observed in-person and via video.
• schedule midterm and final evaluations so that I can plan to attend.
## Course offerings and enrollment

### Mathematics and Computer Science

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Prepared by Office of Institutional Planning and Effectiveness
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*Cross listed courses are only counted here, not also in the graduate projections
**624 is offered odd springs. MATH 424 and 470 are offered alternate springs
***670 is offered even springs. MATH 424 and 470 are offered alternate springs
ª300 and 411 are offered alternate falls (now both every fall – 04/12)

Note: This document should only be regarded as a guide. Please consult the proper semester’s schedule of classes to verify the courses offered for a particular semester.
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<td>Post-Masters</td>
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# New Student Averages

## Mathematics

<table>
<thead>
<tr>
<th></th>
<th>New Majors</th>
<th>Average HS GPA</th>
<th>Average HS Rank</th>
<th>Average SAT Math</th>
<th>Average SAT Verbal</th>
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<td>540</td>
<td>1200</td>
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<th>Average HS GPA</th>
<th>Average HS Rank</th>
<th>Average SAT Math</th>
<th>Average SAT Verbal</th>
<th>Average SAT</th>
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<td>653</td>
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## Degrees Conferred

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<td>TTD (Y)</td>
<td>Degrees</td>
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<td>Fall</td>
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<td><strong>Grand Total</strong></td>
<td>25</td>
<td>4.3</td>
<td>13</td>
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Prepared by Office of Institutional Planning and Effectiveness
# Major Program Guide for: BS in Mathematics

**Concentration: Applied Mathematics**

**Suggested Course Sequence**

## First Year

<table>
<thead>
<tr>
<th>Course Prefix or Liberal Studies requirement</th>
<th>Course Number</th>
<th>Course Title</th>
<th>Hours</th>
<th>Course Prefix or Liberal Studies requirement</th>
<th>Course Number</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
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<td>Calculus II</td>
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<td></td>
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<td>3</td>
<td>General Elective</td>
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<td>3</td>
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<td>First Year Seminar</td>
<td>19x</td>
<td></td>
<td>3</td>
<td>COMM</td>
<td>201</td>
<td>Foundations of Communication</td>
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<td>3</td>
<td>ENG</td>
<td>101</td>
<td>Writing and Rhetoric</td>
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<td>Liberal Studies</td>
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</table>

**List Pre-requisites and any statement pertaining to course or program:**

If a student is not beginning in Calculus I, see the department for a revised course sequence. General Electives must include a major or minor in another related field.

## Sophomore Year

<table>
<thead>
<tr>
<th>Course Prefix or Liberal Studies requirement</th>
<th>Course Number</th>
<th>Course Title</th>
<th>Hours</th>
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<th>Course Number</th>
<th>Course Title</th>
<th>Hours</th>
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<tr>
<td>MATH</td>
<td>256</td>
<td>Calculus III</td>
<td>4</td>
<td>MATH</td>
<td>340</td>
<td>Intro to Sci. Computing</td>
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<tr>
<td>MATH</td>
<td>250</td>
<td>Intro Logic &amp; Proof</td>
<td>3</td>
<td>ENGL</td>
<td>202</td>
<td>Writing and Critical Inquiry</td>
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<td>3</td>
<td>General Elective</td>
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<td>General Elective</td>
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</table>

**List Pre-requisites and any statement pertaining to course or program:**

Upper Level Perspective (ULP): An approved Upper Level Liberal Studies Perspectives course is required in one of the Liberal Studies Perspectives categories.
**List Pre-requisites and any statement pertaining to course or program.**

### JUNIOR YEAR

#### FALL

<table>
<thead>
<tr>
<th>Course Prefix or Liberal Studies requirement</th>
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<th>Hours</th>
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<th>Hours</th>
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<td>MATH</td>
<td>310</td>
<td>Discrete Structures</td>
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<td>Linear Algebra I</td>
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#### SPRING

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<tr>
<td>Liberal Studies</td>
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</table>

**List Pre-requisites and any statement pertaining to course or program:**

Graduation Fee: In the first semester of the senior year, students must apply for Graduation.

Upper Level Perspective (ULP): An approved Upper Level Liberal Studies Perspectives course is required in one of the Liberal Studies Perspectives categories.

### SUMMER I

<table>
<thead>
<tr>
<th>Course Prefix or Liberal Studies requirement</th>
<th>COURSE NUMBER</th>
<th>HOURS</th>
<th>Course Prefix or Liberal Studies requirement</th>
<th>COURSE NUMBER</th>
<th>HOURS</th>
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### SUMMER II

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<tr>
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<th>HOURS</th>
<th>Course Prefix or Liberal Studies requirement</th>
<th>COURSE NUMBER</th>
<th>HOURS</th>
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Updated July 2013
**List Pre-requisites and any statement pertaining to course or program:**

### SENIOR YEAR

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<th>Hours</th>
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<th>Course Number</th>
<th>Course Title</th>
<th>Hours</th>
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<td>Upper Level Perspective</td>
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<td>General Elective</td>
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**List Pre-requisites and any statement pertaining to course or program:**

### SUMMER I

<table>
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<tr>
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<th>HOURS</th>
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<table>
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<tr>
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### SUMMER II

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<th>Course Prefix or Liberal Studies requirement</th>
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<th>HOURS</th>
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</table>

**List Pre-requisites and any statement pertaining to course or program:**

**Total Hours for Degree:** 120  
**Total Hours of Pre-requisites:**

**Any notes or other information:** This sequence assumes that students begin in Calculus I. The general electives must include a second major, minor, or a program approved by the Mathematics and Computer Science Department Head.

Students may finish earlier if they attend summer school at WCU or another approved institution.

Updated July 2013
Eight-Semester Plan for B.S.Ed. in Mathematics - starting on even year

Major Program Guide For: B.S. in Mathematics or B.S.Ed. in Secondary Mathematics
Concentration: Mathematics Education
Suggested Course Sequence

For Students beginning in Fall of an EVEN Year

- Total Hours for Degree: 120
- This sequence assumes that students begin in Calculus I in an even numbered year.
- Students may finish earlier if they attend summer school at WCU or another approved institution.

<table>
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<tr>
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<tr>
<td>Course Prefix or Liberal Studies Requirement</td>
<td>Course Number</td>
<td>Course Title</td>
<td>Hours</td>
<td>Course Prefix or Liberal Studies Requirement</td>
<td>Course Number</td>
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<td>Hours</td>
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<td>ENGL</td>
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<td>Writing and Rhetoric</td>
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If a student is not beginning in Calculus I, see the department for a revised course sequence. This course sequence supposes that the first year begins Fall of an even year.

<table>
<thead>
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<th>Sophomore Year</th>
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<td>Course Number</td>
<td>Course Title</td>
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<td>MATH</td>
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Students should apply for admission to Teacher Education after completing EDCI 201.

Upper Level Perspective (ULP): An approved Upper Level Liberal Studies Perspectives course is required in one of the Liberal Studies Perspectives categories.

<table>
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<th>Junior Year</th>
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<tr>
<td>Spring</td>
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</tr>
<tr>
<td>Course Prefix of Liberal Studies Requirement</td>
<td>Course Number</td>
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<td>SPED</td>
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<td>MATH</td>
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<td>MATH Elective</td>
</tr>
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</table>

In the first semester of the senior year, students should apply for graduation.

**Upper Level Perspective (ULP):** An approved Upper Level Liberal Studies Perspectives course is required in one of the Liberal Studies Perspectives categories.

<table>
<thead>
<tr>
<th></th>
<th>Fall</th>
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<td>MATH</td>
<td>415</td>
<td>Secondary Mathematics Teaching Methods</td>
</tr>
<tr>
<td>MATH</td>
<td>479</td>
<td>Capstone</td>
</tr>
<tr>
<td>EDSE or General Elective</td>
<td>484</td>
<td>Internship I</td>
</tr>
<tr>
<td>General Elective</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**
- Total Hours for Degree: 120
- This sequence assumes that students begin in Calculus I in an even numbered year.
- Students may finish earlier if they attend summer school at WCU or another approved institution.
Eight-Semester Plan for B.S.Ed. in Mathematics - starting on odd year

Major Program Guide For: B.S. in Mathematics or B.S.Ed. In Secondary Mathematics

Concentration: Mathematics Education

Suggested Course Sequence

For Students beginning in Fall of an ODD Year

- Total Hours for Degree: 120
- This sequence assumes that students begin in Calculus I in an odd-numbered year.
- Students may finish earlier if they attend summer school at WCU or another approved institution.

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Prefix or Liberal Studies Requirement</td>
<td>Course Number</td>
<td>Course Title</td>
</tr>
<tr>
<td>First-Year Seminar</td>
<td>19X</td>
<td>ENGL</td>
</tr>
<tr>
<td>MATH</td>
<td>153</td>
<td>Calculus I</td>
</tr>
<tr>
<td>Liberal Studies</td>
<td>3</td>
<td>MATH</td>
</tr>
<tr>
<td>Liberal Studies</td>
<td>3</td>
<td>Liberal Studies</td>
</tr>
<tr>
<td>Liberal Studies</td>
<td>3</td>
<td>Liberal Studies</td>
</tr>
</tbody>
</table>

If a student is not beginning in Calculus I, see the department for a revised course sequence. This course sequence supposes that the first year begins Fall of an odd year.

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Prefix or Liberal Studies Requirement</td>
<td>Course Number</td>
<td>Course Title</td>
</tr>
<tr>
<td>EDCI</td>
<td>201</td>
<td>Teacher Leadership in a Diverse Society</td>
</tr>
<tr>
<td>MATH</td>
<td>250</td>
<td>Intro to Logic &amp; Proof</td>
</tr>
<tr>
<td>MATH</td>
<td>256</td>
<td>Calculus III</td>
</tr>
<tr>
<td>MATH</td>
<td>270</td>
<td>Stat. Methods</td>
</tr>
<tr>
<td>Liberal Studies</td>
<td>3</td>
<td>Liberal Studies</td>
</tr>
</tbody>
</table>

Students should apply for admission to Teacher Education after completing EDCI 201.

Upper Level Perspective (ULP): An approved Upper Level Liberal Studies Perspectives course is required in one of the Liberal Studies Perspectives categories.
### Junior Year

<table>
<thead>
<tr>
<th>Course Prefix of Liberal Studies Requirement</th>
<th>Course Number</th>
<th>Course Title</th>
<th>Hours</th>
<th>Course Prefix of Liberal Studies Requirement</th>
<th>Course Number</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSY</td>
<td>323</td>
<td>Psychology Applied to Learning and Teaching</td>
<td>3</td>
<td>SPED</td>
<td>339</td>
<td>Designing Classrooms in Responsive Learning Communities</td>
<td>3</td>
</tr>
<tr>
<td>MATH</td>
<td>362</td>
<td>Linear Algebra I</td>
<td>3</td>
<td>MATH</td>
<td>361</td>
<td>Intro to Abstract Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH</td>
<td>411</td>
<td>Foundations in Geometry</td>
<td>3</td>
<td>MATH</td>
<td>310</td>
<td>Discrete Structures</td>
<td>3</td>
</tr>
<tr>
<td>MATH Elective</td>
<td></td>
<td></td>
<td>3</td>
<td>MATH</td>
<td>414</td>
<td>Introduction to Secondary Mathematics Teaching Methods</td>
<td>3</td>
</tr>
<tr>
<td>Liberal Studies</td>
<td></td>
<td></td>
<td>3</td>
<td>MATH Elective</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the first semester of the senior year, students should apply for graduation.

**Upper Level Perspective (ULP):** An approved Upper Level Liberal Studies Perspectives course is required in one of the Liberal Studies Perspectives categories.

### Senior Year

<table>
<thead>
<tr>
<th>Course Prefix or Liberal Studies Requirement</th>
<th>Course Number</th>
<th>Course Title</th>
<th>Hours</th>
<th>Course Prefix of Liberal Studies Requirement</th>
<th>Course Number</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH</td>
<td>300</td>
<td>Problem Solving</td>
<td>3</td>
<td>EDSE</td>
<td>490 or 485</td>
<td>Supervised Student Teaching or Internship II</td>
<td>6</td>
</tr>
<tr>
<td>MATH</td>
<td>415</td>
<td>Secondary Mathematics Teaching Methods</td>
<td>3</td>
<td>EDSE</td>
<td>495</td>
<td>Seminar</td>
<td>3</td>
</tr>
<tr>
<td>MATH</td>
<td>479</td>
<td>Capstone</td>
<td>2</td>
<td>MATH</td>
<td>491</td>
<td>Student Teaching Math</td>
<td>3</td>
</tr>
<tr>
<td>EDSE or General Elective</td>
<td>484</td>
<td>Internship I</td>
<td>1-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Elective</td>
<td></td>
<td></td>
<td>4-6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

- Total Hours for Degree: 120
- This sequence requires that students begin in Calculus I.
- Students may finish earlier if they attend summer school at WCU or another approved institution.
# Major Program Guide for: BS in Mathematics
## Concentration: Traditional Mathematics
### Suggested Course Sequence

**First Year**

<table>
<thead>
<tr>
<th>FALL</th>
<th>SPRING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Prefix or Liberal Studies requirement</strong></td>
<td><strong>Course Prefix or Liberal Studies requirement</strong></td>
</tr>
<tr>
<td>MATH</td>
<td>MATH</td>
</tr>
<tr>
<td>First Year Seminar</td>
<td>COMM</td>
</tr>
<tr>
<td>General Elective</td>
<td>ENG</td>
</tr>
<tr>
<td>Liberal Studies</td>
<td>Liberal Studies</td>
</tr>
<tr>
<td>Liberal Studies</td>
<td>General Elective</td>
</tr>
</tbody>
</table>

**List Pre-requisites and any statement pertaining to course or program:**
If a student is not beginning in Calculus I, see the department for a revised course sequence. General Electives must include a major or minor in another related field.

**Sophomore Year**

<table>
<thead>
<tr>
<th>FALL</th>
<th>SPRING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Prefix or Liberal Studies requirement</strong></td>
<td><strong>Course Prefix or Liberal Studies requirement</strong></td>
</tr>
<tr>
<td>MATH</td>
<td>MATH</td>
</tr>
<tr>
<td>MATH</td>
<td>MATH</td>
</tr>
<tr>
<td>MATH</td>
<td>ENGL</td>
</tr>
<tr>
<td>Liberal Studies</td>
<td>Liberal Studies</td>
</tr>
<tr>
<td>General Elective</td>
<td>General Elective</td>
</tr>
</tbody>
</table>

**List Pre-requisites and any statement pertaining to course or program:**

Upper Level Perspective (ULP): An approved Upper Level Liberal Studies Perspectives course is required in one
of the Liberal Studies Perspectives categories.

<table>
<thead>
<tr>
<th>Course Prefix or Liberal Studies requirement</th>
<th>Course Number</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH Elective</td>
<td>362</td>
<td>Linear Algebra I</td>
<td>3</td>
</tr>
<tr>
<td>Liberal Studies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liberal Studies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Elective</td>
<td>361</td>
<td>Abstract Algebra I</td>
<td>3</td>
</tr>
</tbody>
</table>

**List Pre-requisites and any statement pertaining to course or program.

**

**List Pre-requisites and any statement pertaining to course or program:

Graduation Fee: In the first semester of the senior year, students must apply for Graduation.

Upper Level Perspective (ULP): An approved Upper Level Liberal Studies Perspectives course is required in one of the Liberal Studies Perspectives categories.

<table>
<thead>
<tr>
<th>Course Prefix or Liberal Studies requirement</th>
<th>COURSE NUMBER</th>
<th>HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH Elective</td>
<td>362</td>
<td>3</td>
</tr>
<tr>
<td>Liberal Studies</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Liberal Studies</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>General Elective</td>
<td>361</td>
<td>3</td>
</tr>
</tbody>
</table>

**List Pre-requisites and any statement pertaining to course or program:
**List Pre-requisites and any statement pertaining to course or program:**

### SENIOR YEAR

<table>
<thead>
<tr>
<th>Course Prefix or Liberal Studies requirement</th>
<th>Course Number</th>
<th>Course Title</th>
<th>Hours</th>
<th>Course Prefix or Liberal Studies requirement</th>
<th>Course Number</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH</td>
<td>479</td>
<td>Capstone</td>
<td>2</td>
<td>MATH Elective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH Elective</td>
<td></td>
<td></td>
<td>3</td>
<td>Liberal Studies</td>
<td></td>
<td>Upper Level Perspective</td>
<td>3</td>
</tr>
<tr>
<td>Liberal Studies</td>
<td></td>
<td></td>
<td>3</td>
<td>General Elective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Elective</td>
<td></td>
<td></td>
<td>3</td>
<td>General Elective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Elective</td>
<td></td>
<td></td>
<td>3</td>
<td>General Elective</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**List Pre-requisites and any statement pertaining to course or program:**

<table>
<thead>
<tr>
<th>Course Prefix or Liberal Studies requirement</th>
<th>COURSE NUMBER</th>
<th>HOURS</th>
<th>Course Prefix or Liberal Studies requirement</th>
<th>COURSE NUMBER</th>
<th>HOURS</th>
</tr>
</thead>
</table>

**Total Hours for Degree:** 120

**Total Hours of Pre-requisites:**

**Any notes or other information:** This sequence assumes that students begin in Calculus I. The general electives must include a second major, minor, or a program approved by the mathematics and computer science department head.
Primary Contact Name/Info:

Dr. Kathy M. C. Ivey, Head
Belk 391 (Stilwell 426A beginning Fall 2006)
227-3831
kivey@email.wcu.edu

Department Mission Statement

The Department of Mathematics and Computer Science serves as a community of scholars involving students and faculty in a broad range of intellectual and aesthetic activities. Its undergraduate programs include the B.S. in mathematics and the B.S. Ed. in mathematics education. Related graduate degrees include the M.A.T. and M.A. Ed. in mathematics education and the M.S. in Applied Mathematics. We also offer a “4+1” program in Applied Mathematics for students to complete a B.S. and an M.S. in five years.

The most significant of the department’s activities are the teaching and learning processes that take place between students and faculty in classrooms and field locations (e.g., student teaching). The department provides curricula for majors in mathematics and mathematics education. To prepare university students for participation in society, the department also offers courses that provide basic intellectual skills and essential perspectives for all university students. In addition, the department offers specialized courses that serve other undergraduate and graduate degree programs of the university.

Scholarly productivity through a variety of discipline-related activities is essential to the vitality of the department. For this purpose, the faculty engage in research, creative activities, and publication. Students are directly involved in many of these scholarly activities.

The department also engages in numerous service activities internal and external to the university. These include faculty participation in university governance, student advisement, sponsorship of student activities, leadership in professional organizations, and a variety of intellectual and problem solving services to others.

Statement on Alignment of Program Mission with University and College Mission

The most significant departmental activities are the teaching and learning processes that occur in the classroom, labs, and field locations. The departmental mission statement also describes activities which complement the teaching mission, including scholarly creativity and service activities. Taken as a whole, the goals and objectives of the department are designed to produce educated citizens who have the potential to become responsible members of society.
Western Carolina University
Program Assessment Plan
Mathematics and Mathematics Education
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Assessment Plan for 2006-2007

Program Goals/Objectives

Outcome Delivery Matrix*
Mathematics and Secondary Mathematics Education

<table>
<thead>
<tr>
<th>Intended Outcome</th>
<th>Course/Experience/Activity</th>
<th>Course/Experience/Activity</th>
<th>Course/Experience/Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Students will demonstrate an understanding of the following fundamental concepts and mastery of the following fundamental skills in mathematics:</td>
<td>1. Students acquire fundamental concepts of the major through a prerequisite-based mathematics curriculum. The specific courses which address the concepts and skills listed in the first Program Goal are discussed here.</td>
<td>1. In conjunction with MATH 479, we have developed a brief test of overall program content material that will be administered during this course and will be reviewed and revised over the next several years. Also in MATH479, students have an opportunity to research and demonstrate their understanding of one or more of the following areas of mathematics.</td>
<td></td>
</tr>
<tr>
<td>a. understanding the derivative concept in terms of slope as well as “rate of change,” with procedural fluency in evaluating derivatives.</td>
<td>a. Students learn about the derivative in MATH153 and 256 (Calculus I and III).</td>
<td>a. In most of the Calculus I sections, students must demonstrate their mastery of evaluating derivatives by passing a “gateway” exam.</td>
<td></td>
</tr>
<tr>
<td>b. understanding the definite integral as a limit process for evaluating sums, with procedural fluency in evaluating integrals.</td>
<td>b. Students learn about the integral in MATH255 and 256 (Calculus II and III).</td>
<td>b. Many sections of Calculus II make use of a “gateway” exam to insure student proficiency in evaluating integrals.</td>
<td></td>
</tr>
<tr>
<td>c. understanding differences</td>
<td>c. Algebraic systems are</td>
<td>Note: Understanding of the calculus concepts is reinforced in other classes, such as MATH320, MATH422, MATH441, and PHYS230-231. Although none of these classes are requirements in our current curriculum, almost all of our students enroll in at least one of these courses.</td>
<td></td>
</tr>
<tr>
<td>and similarities between various algebraic systems, such as groups (including non-commutative systems), fields, and vector spaces, with the ability to correctly operate within these algebraic systems.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>addressed in MATH361 (Abstract Algebra) and MATH362 (Linear Algebra). Some students elect to enroll in a follow-up course (461 or 462) for more depth.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. understanding applications of matrices in mathematics, with the ability to set up and solve matrix equations.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Matrix applications are addressed in MATH362 (Linear Algebra) and the optional follow-up course, MATH462.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. understanding probability as a measurement of likelihood, with the ability to use probabilistic arguments in statistical reasoning.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Concepts of Probability and Statistics are covered in MATH270 (now required of all of our students), and most of our students also take one of: 370, 375, or 470 for additional depth.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. understanding graphs as discrete mathematical models, with the ability to apply graph theory in applicable situations.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Graph Theory and Combinatorics are the subject areas of the required course MATH310 (Discrete Mathematics).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. understanding combinatorial arguments, with the ability to distinguish situations in which various combinatorial methods, such as use of combinations, permutations, the inclusion-exclusion principle, or recurrence relations, are applicable.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. Graph Theory and Combinatorics are the subject areas of the required course MATH310 (Discrete Mathematics).</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Western Carolina University
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<table>
<thead>
<tr>
<th>h. In addition, students in the B.S. Ed. program will demonstrate an understanding of the axiomatic development of geometric systems, and students in the B.S. program will demonstrate understanding of the use of either partial differential equations, computer algorithms, or methods of operations research for modeling and problem-solving.</th>
<th>h. The B.S. Ed. students study the axiomatic development of geometry in MATH411 (Foundations in Geometry), and the B.S. students gain additional experience in mathematical modeling in MATH320 (Intro. to Ordinary Differential Equations), 350 (Operations Research), or 441 (Intro. to Numerical Analysis).</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Be able to effectively use inductive and deductive reasoning, with the ability to formulate mathematical conjectures and then use appropriate mathematical methods and logically valid arguments to prove or disprove those conjectures.</td>
<td>2. Related to the second program goal, students are formally introduced to the logical structure and the nature of proof in Math 250 (Intro. to Logic and Proof). Several upper-division courses build upon this foundation with a strongly proof-oriented structure, including MATH361 (Intro. to Abstract Algebra), 362 (Intro. to Linear Algebra), and 422 (Advanced Calculus). Of course, mathematical arguments form a substantive part of the entire curriculum, although the presentation may be less formal in some of the other courses. Students in the teaching certification track (B.S. Ed. degree or B.S degree with teaching certification) have an additional opportunity to experience the nature of mathematical discovery, including the process of making a conjecture and then</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>proving or disproving that conjecture, in the MATH300 (Problem Solving) course. The culminating “proof experience” is the Capstone course, MATH479, described in further detail in the next section of this report.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Be able to communicate undergraduate-level mathematical concepts correctly and clearly, both orally and in writing. Students will make use of mathematics as a language, i.e., they will use standard, accepted mathematical notation for concise, clear communication.</td>
</tr>
<tr>
<td>3. Related to the third program goal, the use of correct, standard mathematical notation is emphasized throughout the MATH curriculum. In MATH250, students learn the common mathematical shorthand for representing Boolean operators (and, or, not), quantifiers (for every, there exists), and implications (if, if and only if), and students gain experience translating mathematical sentences into symbolic form and vice versa. Throughout the curriculum, students routinely justify their work in written form, which may range from showing the steps of a numeric computation in lower division courses to extensive proofs (either in full prose or using the symbolism learned in MATH250) in upper-division courses. Students also have numerous opportunities to orally justify their reasoning. Our Calculus instructors have made a commitment to devoting extensive time in the MATH153, 255, and 256 courses to student presentations at the blackboard (which involves both writing and discussion on the part of</td>
</tr>
</tbody>
</table>
Western Carolina University  
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| the students). This experience at the lower level of the curriculum builds our students’ confidence and trust in the faculty, so that they are more willing to make verbal contributions in our upper-level classes, as well. Again, the Capstone course (MATH479, described in the next section of this report) serves as a culminating experience for students to communicate their mathematical findings (of independent mathematical research) both orally and in written form. |

| 4. Be able to use technology as part of a problem-solving process. |

| 4. Related to the fourth program goal, many of our classes, including MATH153, 255, 256, 270, 370, and 362 require the use of a graphics calculator. All of our students are required to take at least one course involving the use of computers: EDEL466 (Computers in Education) for those students pursuing teaching certification, and CS340 (Introduction to Scientific Computing) for students in other tracks. Students pursuing teaching certification experience multiple uses of technology in their professional certification courses (including the use of calculators, spreadsheets, and the World Wide Web in the mathematics methods course, MATH415), and the B.S. degree students experience additional use of technology in their required additional |

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<table>
<thead>
<tr>
<th></th>
<th>computing/modeling course  (MATH320, 350, or 441).</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Be able to use mathematics to analyze events and solve problems that occur in numerous areas of human endeavor.</td>
</tr>
<tr>
<td></td>
<td>5. Related to the fifth program goal, applications from various aspects of life are incorporated into our mathematics curriculum. In just MATH153 alone, students will solve problems from areas as diverse as physics (projectile motion), biology (population models), economics (optimization of profit), and chemistry (radioactive carbon dating). Students’ exposure to “real life” applications of mathematics deepens as they experience a diversity of courses (including statistics and discrete mathematics) in the curriculum. In the Capstone course, MATH479, students may choose an area of application in which to apply their mathematical study.</td>
</tr>
<tr>
<td>6.</td>
<td>Be prepared to become a highly qualified secondary teacher of mathematics, to continue studies at the graduate level, or to enter the workforce in a position which requires analytical thinking skills, depending upon the option selected by the individual student.</td>
</tr>
</tbody>
</table>
|   | 6. As the sixth program goal indicates, the Mathematics curriculum is designed to be flexible enough to meet the needs of three broad constituents: students whose goals are to teach high school mathematics, students whose goals are to enroll in graduate school after receiving the B.S. degree, and students who wish to enter the workforce after receiving the B.S. degree. Certain courses taught by our department, including MATH400 (History of Mathematics), 411 (Foundations in Geometry), and especially 415 (Methods &
Materials for Teaching Math.), are designed specifically for the benefit of our future teachers (although all of our majors can benefit from MATH400 and 411). In conjunction with the professional education sequence (28 hours specified by the College of Education), the curriculum prepares our future teachers with depth in subject area as well as knowledge of pedagogy and “best practices” in education. Students receive first-hand experience through field observations in several education courses, and the culmination of the program is the student teaching experience.

To meet the needs of those students who wish to pursue graduate studies in mathematics after completion of the undergraduate degree, the B.S. program includes coursework to give students critical background knowledge for their graduate studies: calculus (153, 255, 256), abstract algebra (361), linear algebra (362) and analysis (422).

To meet the needs of those students who wish to enter the workforce upon graduation, the modeling courses (320, 350, 441) and statistics courses (270, 370, 470) give students experience in problems that might be useful in research or
## Statement on Alignment of Program Goals/Objectives with University and College Mission

The program goals given above for the B.S. in Mathematics and the B.S. Ed. in Mathematics Education are closely tied to the University's mission statement. The alignment of our undergraduate program goals with the aspirations of Western Carolina University (page 5 of the 2005-2006 Undergraduate Catalog) is emphasized below:

<table>
<thead>
<tr>
<th>7. Those students choosing to become secondary teachers (B.S. Ed. students and B.S. students with teaching certification) will</th>
<th>7. Related to the seventh program goal, students address issues of sensitivity, integrity in the classroom, and the learning needs of diverse students in the professional education sequence.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. exhibit behavior characterized by integrity, responsibility, and sensitivity to diverse people and cultures (a desired outcome for all WCU students), with the desire to similarly encourage honest, responsible, sensitive behavior from their future students.</td>
<td>a. Many of these ideas are addressed in the Math Methods (415) class. Issues discussed in the classroom are reinforced by the various field experiences and the student teaching seminar which is paired with the student teaching field experience.</td>
</tr>
<tr>
<td>b. have an awareness of the contributions of mathematics to our social, economic, philosophic, and artistic heritage.</td>
<td>b. MATH400 was designed to heighten our students’ awareness of the contributions of mathematics to our social, economic, philosophic, and artistic heritage.</td>
</tr>
</tbody>
</table>

*Adapted from Bresciani, M.J., 2003, Identifying Projects that Deliver Outcomes and Provide a Means of Assessment: A Concept Mapping Checklist, NASPA NetRESULTS.*
Western Carolina University  
Program Assessment Plan  
Mathematics and Mathematics Education  
Arts and Sciences  
Assessment Plan for 2006-2007

b. Goals 1, 2, and 4 encompass the intellectual and technical skills of the discipline, in alignment with the second aspiration of the university.

c. Goal 7b (of the B.S. Ed program) seeks to connect mathematics to other academic areas including the creative and performing arts, in alignment with the third aspiration of the university.

d. According to Goal 7a, not only are our prospective teachers expected to exhibit important traits of citizenship during their own studies, they are expected to go further by encouraging the next generation of students to exhibit these traits also.

e. As an extension of Goals 2 and 5, it is hoped that our students not only exhibit the ability to reason logically, but that they gain an appreciation of the problem-solving process, and that this appreciation leads to a life-long interest in learning, in alignment with the fourth aspiration of the University.
### Western Carolina University

**B.S. in Mathematics (Actuarial, Applied, and Traditional Options)**

**Department of Mathematics & Computer Science**

**College of Arts & Sciences**

**Annual Assessment Report for 2008-2009**

Primary Contact Name/Info:
Dr. Mark Holliday, Interim Head
Mathematics & Computer Science
Stillwell 426A
227-3951

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Undergraduate: BS Mathematics: Traditional, Applied, and Actuarial Options

3. Be able to communicate undergraduate-level mathematical concepts correctly and clearly, both orally and in writing. Students will make use of mathematics as a language, i.e., they will use standard, accepted mathematical notation for concise, clear communication.

In the Capstone course MATH 479 (taught in Fall 2008), students gave written papers of their research and oral presentations, open to all faculty and students. This is one of our assessment techniques to evaluate the communication skills of our students.

Our assessment is that, even though many of our students have excellent communication skills, increased options for the students to exercise these skills is desirable.

We added Math 400 (History of Mathematics) as an elective in the Traditional Option of the BS in Mathematics. Math 400 has an emphasis on the writing of papers and oral presentations. Thus, the students will strengthen their communication skills by taking this course.
**Western Carolina University**  
**B.S. in Mathematics (Actuarial, Applied, and Traditional Options)**  
**Department of Mathematics & Computer Science**  
**College of Arts & Sciences**  
**Annual Assessment Report for 2009-2010**

Primary Contact Name/Info:  
Dr. Tuval Foguel, Head  
Mathematics & Computer Science  
Stillwell 426A  
227-3931

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**Undergraduate**  
**BS Mathematics: Traditional, Applied, and Actuarial Options**

3. Communicate undergraduate-level mathematical concepts correctly and clearly, both orally and in writing.

| In their Capstone course, MATH 479, students present mathematical research in papers and oral presentations. | In MATH 479 (taught in Fall 2009), students gave written papers of their research and oral presentations, open to all faculty and students. 100% of Capstone oral presentations were deemed at or above standard. | Students will craft a curriculum vita as part of their Capstone course in order to communicate their mathematical accomplishments and hone their writing skills. |
## Western Carolina University

**B.S. in Mathematics (Actuarial, Applied, and Traditional Options)**  
**Department of Mathematics & Computer Science**  
**College of Arts & Sciences**  
**Annual Assessment Report for 2010-2011**  

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Mathematics & Computer Science  
Stillwell 426A  
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Each recommended action must be specific and relate directly to the outcome and results of assessment. A description of the timeline for action and the person(s) responsible must be included. In addition, please include a brief description of resources that will be critical to implementation of the actions proposed, if applicable. |

### Undergraduate

**BS Mathematics: Traditional, Applied, and Actuarial Options**

3. Communicate undergraduate-level mathematical concepts correctly and clearly, both orally and in writing.

In their Capstone course, MATH 479, students present mathematical research in papers using LaTeX and oral presentations. LaTeX was introduced in CS 340.

In MATH 479 (taught in Fall 2010), students gave written papers of their research and oral presentations, open to all faculty and students. 100% of Capstone oral presentations were deemed at or above standard and all used the Mathematical typesetting program LaTeX. Students craft a curriculum vita as part of their Capstone.

We converted CS 340 to Math 340 to better fit the course to the Mathematics curriculum.
## Western Carolina University

**B.S. in Mathematics**

**Department of Mathematics & Computer Science**

**College of Arts & Sciences**

**Annual Assessment Report for 2012-2013**

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**Primary Contact Name/Info:**
Dr. Tuval Foguel, Department Head
Mathematics & Computer Science
Stillwell 438
227-3944

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### Undergraduate BS Mathematics: Traditional and Applied

1. Students will demonstrate an understanding of the following fundamental concepts and mastery of the following fundamental skills in

   a. and b. In most of the Calculus I and II sections, students must demonstrate their mastery of evaluating limits, derivatives and integrals by utilizing WeBWorK an open-source online homework system for math and sciences courses.

   The ability for students to meet the outcomes listed in column one depends on doing multiple problems and receiving input on their work.

   We are hosting WeBWorK at Western Carolina University, thus making this important tool available to all our faculty.
mathematics:

a. understanding the derivative concept in terms of slope as well as “rate of change,” with procedural fluency in evaluating derivatives.

b. understanding the definite integral as a limit process for evaluating sums, with procedural fluency in evaluating integrals.
### Program Name
B.S. in Mathematics

### Department
Mathematics & Computer Science

### College
Arts & Sciences

### Contact Name & Phone
Tuval Foguel 3831

#### Student Learning Outcome (SLO)
What will students know or be able to do upon completion of the program?

#### 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?

#### Results of Assessment
What did you find in the data collected using the assessment methods described?

#### Implementation Plan
What changes do you propose making to your program or curriculum based on the findings described in results?

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<td>3. Be able to communicate undergraduate-level mathematical concepts correctly and clearly, both orally and in writing.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1. All students in the B.S. program who were candidates for graduation completed a capstone project using LaTeX and gave a public presentation of results.</td>
<td></td>
<td>1. 100% of capstone projects were deemed at or above standard. 2. 100% of project presentations were deemed at or above standard.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. Formal guidelines for projects were developed by the instructor and distributed to students. These guidelines will be reviewed and edited by the Mathematics Education Committee this Fall for improvement. By the end of the Fall semester, a set of amended guidelines will be brought to the departmental faculty for review, discussion, and approval that will become the standards for capstone projects.</td>
</tr>
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## Western Carolina University

**B.S. Ed. in Mathematics and Mathematics Education Option of the B.S. in Mathematics**

**Department of Mathematics & Computer Science**

**College of Arts & Sciences**

**Annual Assessment Report for 2008-2009**

**Primary Contact Name/Info:**
Dr. Mark Holliday, Interim Head
Mathematics & Computer Science
Stillwell 426A
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### Undergraduate BS Ed in Mathematics and BS in Mathematics (Mathematics Education Option)

6. Be prepared to become a highly qualified secondary teacher of mathematics, to continue studies at the graduate level, or to enter the workforce in a

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<td>1. Records of all students who completed student teaching/internship II were reviewed for successful completion of the program and successful licensure.</td>
<td>1. 100% of students completing student teaching/internship II were rated at or above standard in the exit review. 2. 100% of students seeking licensure in secondary mathematics were successful.</td>
<td>1. In conjunction with the professional education faculty, a complete review of the curriculum that prepares our future teachers with depth in subject area as well as knowledge of pedagogy and “best practices” in education was completed. Substantial changes</td>
</tr>
</tbody>
</table>
position which requires analytical thinking skills, depending upon the option selected by the individual student.

were recommended in both the professional sequence and the content courses. The new program will be reviewed this summer at the state level, and it will be tested next year and revised for implementation the following year.
### Western Carolina University
**B.S. Ed. in Mathematics and Mathematics Education Option of the B.S. in Mathematics**
**Department of Mathematics & Computer Science**
**College of Arts & Sciences**
**Annual Assessment Report for 2009-2010**

**Dr. Kathy Jaqua**
227-3826
kjaqua@email.wcu.edu

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<td>Identify what programmatic/curricular changes or improvements you will make as a result of the assessment.</td>
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| Undergraduate BS Ed in Mathematics and BS in Mathematics (Mathematics Education Option) 7. Those students choosing to become secondary teachers (B.S. Ed. students and B.S. students with teaching certification) will | Many of these ideas are addressed in the Math Methods (415) class. Issues discussed in the classroom are reinforced by the diverse learners section of the Work Sample completed during student teaching/ internship II. All of the Work Samples for this year’s student teachers were reviewed with particular note paid to the section on diverse learners. | a. 100% of students completing student teaching/internship II were rated at or above standard in the exit review on portions dealing with diverse learners.  
b. 100% of students completing student teaching/internship II were rated at or above standard on the section of the Work Sample dealing with diverse learners. | 1. As part of the restructuring of all education programs, a second mathematics methods course was added to the BSED and BS Teaching Option in Secondary Mathematics. This additional course will allow even more discussion and emphasis on ways to accommodate diversity in the secondary mathematics classroom. During the Fall semester of 2010, this new course in methods will be developed. The Mathematics Education Committee will carefully analyze all of the TWS submissions from the past three years to determine what areas specific to diversity should be included in the new course. This new course will be offered for the first time in Spring 2011, and the first group of students to student teach following that offering will be in the Spring of 2012. |

a. exhibit behavior characterized by integrity, responsibility, and sensitivity to diverse people and cultures (a desired outcome for all WCU students), with the desire to similarly encourage honest, responsible, sensitive behavior from their future students.

b. have an awareness of the contributions of mathematics to our social, economic, philosophic, and artistic heritage.
Overall Program

The mathematics education BSED and BS were re-visioned in spring 2009 to reflect the North Carolina Professional Teaching Standards and the necessary 21st century knowledge, skills, and dispositions embedded in them. Our first year of looking at students based on the new standards showed scores that remain comparable to last year’s. Throughout the next academic year, we will be further developing the new courses in our program with particular attention to the needs of diverse learners. At the same time, the CEAP begins fielding its revised core in Fall 2010. Throughout all of the changes, our program has maintained its strong content emphasis, and our students graduate with a BS in Mathematics and a BSED in Mathematics Education. Unlike some other areas, there remains a strong need for mathematics teachers at all levels, and we maintain a strong enrollment in our program. This academic year we had 16 students complete student teaching or internship.
### Western Carolina University

**B.S. Ed. in Mathematics and Mathematics Education Option of the B.S. in Mathematics**  
**Department of Mathematics & Computer Science**  
**College of Arts & Sciences**  
**Annual Assessment Report for 2010-2011**

**Dr. Kathy Jaqua**  
227-3826  
kjaqua@email.wcu.edu

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Undergraduate BS Ed in Mathematics and BS in Mathematics (Mathematics Education Option)

3. Students will be able to communicate undergraduate-level mathematical concepts correctly and clearly, both orally and in writing. Students will make use of mathematics as a language, i.e., they will use standard, accepted mathematical notation for concise, clear communication.

5. Students will be able to use mathematics to analyze events and solve problems that occur in numerous areas of human endeavor.

As part of our revised programs, all students in the BSED and BS Teaching Option in Secondary Mathematics complete Math 479: Capstone in conjunction with the students in the BS Mathematics and BS Applied Mathematics programs. One of the main goals of this course is for students to complete projects in which they apply mathematics to solve some type of problem and communicate that solution orally and in writing. Their work is assessed using rubrics for the oral portion and the written portion.

a. 100% of BSED and BS Teaching Option students completing Math 479 were rated at or above standard on the oral portion of their work.

b. 100% of BSED and BS Teaching Option students completing Math 479 were rated at or above standard on the written portion of their work.

1. Based on the results of this change in the capstone course of the BSED and BS Teaching Option in Secondary Mathematics, we will formalize this requirement of the same course for all mathematics students. This change will further enhance our students' knowledge and abilities in mathematics. During 2011-2012 academic year, we will discuss appropriate areas for our students to explore that will enhance their mathematical knowledge in relation to their intended profession.
Overall Program

The mathematics education BSED and BS were re-visioned in spring 2009 to reflect the North Carolina Professional Teaching Standards and the necessary 21st century knowledge, skills, and dispositions embedded in them. As we continue to examine our students’ performance based on the new standards, we find that the scores remain comparable to prior years. Throughout the next academic year, we will be further developing the new courses in our program with particular attention to problem solving and communication. We will also begin to assess the results of the added methods course from last year. (Note that next year is the first year that assessment is possible.) Throughout all of the changes, our program has maintained its strong content emphasis, and our students graduate with a BS in Mathematics and a BSED in Mathematics Education. Unlike some other areas, there remains a strong need for mathematics teachers at all levels, and we maintain a strong enrollment in our program. This academic year we had XX students complete student teaching or internship.
**Western Carolina University**  
**B.S. Ed. in Secondary Mathematics and Mathematics Education Option of the B.S. in Mathematics**  
**Mathematics & Computer Science**  
**College of Arts & Sciences**  
**Annual Assessment Report for 2012-2013**

**Primary Contact Name/Info:**  
Dr. Kathy Jaqua  
227-3826  
kjaqua@email.wcu.edu

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<td>4. Be able to use technology as part of a problem-solving process.</td>
<td>Three primary methods were used to assess this outcome for our students.</td>
<td>All assessments were reviewed by the Mathematics Education Committee.</td>
<td>a. 100% of students who completed the BSED Mathematics and BS Mathematics-Teaching Option in 2012-2013 successfully completed Math 340 including all of the assessments within that course. Overall, students were seen to improve in their ability to electronically produce mathematical writing, use spreadsheets, high level mathematical computation software, as well as other specialized software.</td>
</tr>
<tr>
<td>a. All of our students are required to take at least one course involving the use of computers: Math 340 (Introduction to Scientific Computing).</td>
<td>a. Students must complete Math 340 successfully which includes several measures of students’ ability to use a variety of types of technology with a particular emphasis on different software packages useful in mathematical analysis.</td>
<td></td>
<td>a. No changes are indicated by the results of this assessment.</td>
</tr>
<tr>
<td>b. Students must use technology as an integral part of their teaching of mathematics during the internship/student teaching experience.</td>
<td>b. Students in their internship/student teaching experience must complete the Teacher Work Sample Portfolio—in particular EE-3. This portion of the TWSP requires that students include at least one lesson plan that integrates technology.</td>
<td>b. 100% of students in internship/student teaching successfully completed the TWSP and received either 3 or 4 on EE-3 in particular. It was noted by Cooperating Teachers, University Supervisors and Academic Supervisors, that many of our students did not have prior knowledge of working with “Smart Boards” which are in many area high school mathematics classrooms.</td>
<td>b. One major needed curricular adjustment is noted from this assessment. Specifically, students in this program must learn to successfully use “Smart Boards” or graphical interface teaching devices before entering the final semester of internship/student teaching. This instruction will be included in Math 415, the second mathematics education methods course beginning this fall. The department currently has one of these devices, but it requires some type of software/computer equipment enhancement that the IT group will need to supply, and it is mounted in a far corner of a classroom which makes it difficult to use for a large group. The department has requested funds for a second one of a different type to be mounted in a second classroom in a more useful configuration. This request has already been made. These two configurations will allow students to learn to use the two leading types of graphical interface teaching devices. Department Head, Dr. Tuval Foguel, and Director of Secondary Mathematics Education, Dr. Kathy Jaqua, will monitor these changes.</td>
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<td>c. Students pursuing teaching certification experience multiple uses of technology in their professional certification courses (including the use of calculators, spreadsheets, and the World Wide Web in the first mathematics methods course, Math 414).</td>
<td>c. Students in the third year cohort complete the initial methods course—Math 414—which has a technology emphasis. As part of this course, each student must complete three lesson plans with at least two of them directly integrating different technologies into mathematics instruction.</td>
<td>c. 100% of students in Math 414 completed at least two of three lesson plans with technology integrated into the instruction. Each lesson was simulated through teaching to the rest of the class. Each lesson was evaluated using a rubric based on the standard evaluation rubric used during internship/student teaching.</td>
<td>c. With the increase in access to working graphical interface teaching devices, students in Math 414 will be expected to demonstrate their use in at least one lesson. This change will be monitored by the Mathematics Education Committee, cochaired by Dr. Axelle Faughn and Dr. Kathy Jaqua.</td>
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227-3826
kjaqua@email.wcu.edu

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3. Be able to communicate undergraduate-level mathematical concepts correctly and clearly, both orally and in writing. Students will make use of mathematics as a language, i.e., they will use standard, accepted mathematical notation for concise, clear communication.

Two primary means of assessment are used, first student grades throughout the curriculum serve as formative evaluation points—students must make C or better in the identified core courses, and must make at least a C average in all mathematics courses. Mathematics faculty are committed to requiring students to demonstrate mastery of mathematical concepts and language throughout these courses.

Second, students must complete Math 479— the Capstone course—and in this course, students complete an independent project that includes communication of their results both orally and in written form.

100% of students who completed the BSED Mathematics and BS Mathematics-Teaching Option in 2013-2014 met all grade requirements.

100% of students who completed the BSED Mathematics and BS Mathematics-Teaching Option in 2013-2014 successfully completed Math 479 including all of the requirements within that course. Overall, students were seen to continually improve in their ability to communicate mathematics both orally and in writing.

Based on discussions among mathematics faculty and mathematics education faculty, the current content requirements for mathematics education students will be reviewed. As we examine our program for revisions based on new requirements that will be implemented this fall, we anticipate the need for other changes. We will need to reconsider all of our expectations so that our students can continue to be successful in all areas.

This process will be monitored by the Director of Secondary Mathematics Education Dr. Kathy Jaqua.
Department: Mathematics & Computer Science  
Program: B.S. Mathematics

Program Goals:
1. Produce educated citizens who have the potential to become responsible members of society.
2. Provide a curriculum that allows the student to become a highly qualified secondary teacher of mathematics, continue studies at the graduate level, or enter the workforce in a position with requires analytical thinking skills, depending upon the option selected by the individual student.

Student Learning Outcomes:
1. Understand the derivative concept in terms of slope as well as "rate of change" with procedural fluency in evaluating derivatives.
2. Understand the definite integral as a limit process for evaluating sums, with procedural fluency evaluating integrals.
3. Understand differences and similarities between various algebraic systems fields and vector spaces with the ability to correctly operate within these algebraic systems.
4. Understand application of matrices in mathematics with the ability to set up and solve matrix equations
5. Understand probability as measurement of likelihood, with the ability to use probabilistic arguments in statistical reasoning.
6. Understand graphs as discrete mathematical models, with the ability to apply graph theory in applicable situations.
7. Understand combinatorial arguments, with the ability to distinguish situations in which various combinatorial methods, such as use of combinations, permutations, the inclusion-exclusion principle, or recurrence relations are applicable.
8. Use inductive and deductive reasoning, with the ability to formulate mathematical conjectures and then use appropriate mathematical methods and logically valid arguments to prove or disprove those conjectures.
9. Communicate undergraduate-level mathematical concepts correctly and clearly, both orally and in writing.
10. Use technology as part of a problem-solving process.
11. Use mathematics to analyze events and solve problems that occur in numerous areas of human endeavor.
# Faculty distributions

## Mathematics and Computer Science

(\# faculty)

<table>
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## Academic rank

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## Tenure status

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## Race or ethnicity

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<td>Hispanics of any race</td>
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## Age range

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## All

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<td>Atanasov, Risto</td>
<td>Ph.D. in Mathematics, State University of New York at Binghamton, Binghamton, New York</td>
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<td>Atterholt, Daniel</td>
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<td>Full-time</td>
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<td>Barnes, Julia</td>
<td>Ph.D. in Mathematics, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina</td>
<td>Full-time</td>
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<td>Best, Kate</td>
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<td>Full-time</td>
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<td>Borchelt, Nathan</td>
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<td>Budden, Mark</td>
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<td>Chockla, Andrew</td>
<td>M.S. in Applied Mathematics, Western Carolina University, Cullowhee, North Carolina</td>
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<td>Chockla, Malgorzata</td>
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<td>Despeaux, Sloan</td>
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<td>Faughn, Axelle</td>
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<td>Foguel, Tuval</td>
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<td>Goehle, Geoff</td>
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<td>Heath, Jeanne</td>
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<td>Howk, Cory</td>
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<td>Jaqua, Kathy</td>
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<td>Korb, Cristina</td>
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<td>Lembeck, Laura</td>
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<td>McNelis, Erin</td>
<td>Ph.D. in Mathematical Sciences, Clemson University, Clemson, South Carolina</td>
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<td>Miglino, Christopher</td>
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<td>Prochaska, Nory</td>
<td>Ph.D. in Chemistry, University of Virginia, Charlottesville, Virginia</td>
<td>Part-time (MTC Director)</td>
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<td>Rupinski, Brandon</td>
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<td>Sizemore, Nicholas</td>
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<td>Wagaman, John</td>
<td>Ph.D. in Statistics, Texas A&amp;M University, College Station, Texas</td>
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<td>Walters, Deborah</td>
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Samples of MATH Faculty Activities Funded by External Sources

Risto Atanasov
Activity/Name of grant: Institute for Advanced Studies/Park City Mathematics Institute

Your role: Participant in the summer undergraduate faculty program at Park City Mathematics Institute (July 1-21, 2012).

Amount funded: $500 for airfare and meal allowance $230, registration, room and board (B/L) for three weeks, totaling an approximate value of $3000.


Your role: Presenter/participant

Amount funded: Lodging and meals for a week, totaling approximately $700.

Julie Barnes
Activity/name of grant: Carolina Dynamics Symposium funded through NSF grant DMS-1201546, PI Jane Hawkins

Your role: Participant, Chapel Hill NC 2013 and Davidson NC 2014

Amount funded: $1000

Nathan Borchelt and Sloan Despeaux
Activity/Name of grant: Smoky Mountain Math Teachers’ Circle (SM^2TC), American Institute of Mathematics and National Association of Math Circles (Mathematical Sciences Research Institute)

Your role: Our team (including three local middle school math teachers) participated in a national workshop held in Washington D.C. 13-18 July 2014. The mission of the national Math Teachers’ Circle (MTC) program is to establish the foundation for a culture of problem solving among middle school mathematics teachers in the United States. By fostering the confidence to tackle open-ended math problems, middle school teachers become better equipped to initiate more student-centered, inquiry-based pedagogies in their classrooms. Our first pilot session is 23 October 2014. After a spring pilot session, we will hold a four-day intensive summer institute at the North Carolina Center for the Advancement of Teaching from 28 June to 1 July 2015.

Amount funded: $2500 plus travel, totaling approximately $4500.

* Source: self reporting
Sloan Despeaux

Activity/Name of grant: Snapple/Dr. Pepper grant: WHEE PLAY

Your role: Facilitated a playground improvement initiative for Cullowhee Valley School, Jackson County Public Schools, 2014.

Amount funded: $15,000

Activity/Name of grant: Blue Cross/Blue Shield grant: WHEE PLAY

Your role: Supplemented funding for playground improvement initiative for Cullowhee Valley School, Jackson County Public Schools, 2014.

Amount funded: $5000

Activity/Name of Grant: National Research Agency (ANR). One, ANR-CaaFÉ: Circulations of algebraic and arithmetic practices and knowledge (1870-1945).

Your role: This project features an international team of researchers from France, Belgium, Germany, Denmark, and the U.S. who seek to understand how knowledge of algebra and number theory circulated between Europe and the United States from 1870 to 1945. Our group is currently working on an edited volume of contributions that will explore the question, "What is Algebra?" from a variety of historiographical perspectives. Specifically, I am currently writing, with Caroline Ehrhardt, Maître de conferences at Université Paris 8, a chapter on “competitive algebra” practiced by mathematics teachers in Britain and France from 1870 to 1914. We plan to extend this research, still focusing on the mathematics teachers, but broadening our mathematical scope beyond algebra within the context of questions and answers journals. This extended research will form part of our contribution to a second ANR grant, which was just awarded in July 2014 and will continue for the next four years.

Amount funded: Share of grant not yet calculated.

Axelle Faughn

Activity/Name of Grant: California Math Project

Your role: Research Associate

Amount funded: From 2008 to 2012 $8000/year from 2008 to 2012 for a total of $40,000.

Activity/Name of Grant: NSF travel grant, ICME, Korea, Summer 2012

Your role: Research Associate

Amount funded: $2500

Geoff Goehle

Activity/name of grant: WeBWorK: Improving Student Success in Mathematics

Your role: Developer
Amount funded: Approximately $750 per camp, totaling $4500

Any other important information: This is travel funding for travel to the following WeBWorK Code Camps: Winona (2012), Raleigh (2013), Ann Arbor (2013), Rochester (2013), Asheville (2014), Portland (2014)

Activity/name of grant: Bridging Mathematics Contents to Engineering Contexts: Just-In-Time Assessment and Review Modules

Your role: Developer

Amount funded: $20,000 (over two years)

Kathy Jaqua

Activity/name of grant: NCCTM Board Meetings

Your role: State Vice-President for Colleges and Universities

Amount funded: $350/year (2013-2015) totalling $1050

Jeff Lawson

Activity/name of grant: Focus Program on Geometry, Mechanics and Dynamics: The Legacy of Jerry Marsden, The Fields Institute, Toronto, Ontario, July 2012, Fields Institute for Research in Mathematical Sciences

Your role: Scientific Researcher

Amount funded: $2100 CDN

Activity/name of grant: Carolina Dynamics Symposium funded through NSF grant DMS-1201546, PI Jane Hawkins

Your role: Presenter/Participant, Chapel Hill NC 2013 and Davidson NC 2014

Amount funded: $1000

Erin McNelis

Activity/name of grant: WeBWorK Problem Library Workshop, Charlottesville VA, December 2013, and Tempe AZ May 2014 and December 2014

Your role: Workshop participant; reorganized problems in library; classified individual according to Blooms taxonomy; identified duplicate problems for removal; created “more like this” problem sets of related problems

Amount funded: $650 stipend per workshop plus reimbursement for travel ($393 per workshop) and per diem, totaling approximately $3600
Samples of MATH Faculty Activities Funded by WCU Sources*

Nathan Borchelt and Sloan Despeaux

Activity/Name of grant: Provost’s Research Grant: Smoky Mountain Math Teachers’ Circle (SM²TC).

Your role: Initiating the SM²TC and piloting a study that may lead to external funding.

Amount funded: $9750

Jeff Lawson

Activity/Name of grant: Coulter Faculty Center Professional Development Grant

Your role: Travel funding to attend department heads training at the Joint Mathematics Meetings, San Antonio TX 2015.

Amount funded: $1200

John Wagaman

Activity/name of grant: Coulter Faculty Center Microgrant

Your role: Participant, Minicourse attendance at Joint Mathematics Meetings 2010: Remodeling Data Analysis and Teaching with Clickers in the Classroom

Amount funded: $602

* Sources: self-reporting
Research Interests


Education

- Ph.D Mathematics, SUNY Binghamton, August 2007, advisor Ross Geoghegan
- M.S. Mathematics, St. Cyril and Methodius University, Skopje, Macedonia, December 1998, advisor Dončo Dimovski
- B.S. Mathematics, St. Cyril and Methodius University, Skopje, Macedonia, October 1993

Teaching and Related Experience

- Associate Professor and Graduate Program Director, Western Carolina University, August 2013–present

- Assistant Professor, Western Carolina University, August 2007–July 2013

- Teaching Assistant, SUNY Binghamton, Fall 2000–July 2007
  - Courses taught as the instructor of record: Precalculus, Calculus for Business and Management, Calculus I, Calculus II, Calculus III, and Linear Algebra
  - Courses taught as a teaching assistant: Calculus I, Introduction to Higher Mathematics and Discrete Mathematics

- Teaching Assistant, St. Cyril and Methodius University, Skopje, Macedonia, 1994–2000
  - Courses taught as a teaching assistant: Real Analysis II, General Topology, Algebraic Topology, Differential Equations, Partial and Integral Equations, Projective Geometry, Practicum in Elementary Mathematics (Duties included: recitation sessions, preparing problems and grading written exams eight times per year.)
Publications (refereed)


Work Under Review (in refereed journals)


Work in Progress

1. Risto Atanasov, Mark Budden, Joshua Hiller1, Tylor Hardin1, Andrew Kimball1, and Joshua Lambert “Cliques and Character Difference Graphs and Generalized Ramsey Numbers”.

Conference Presentations on Discovery in Mathematics

- “Groups that are Equally Partitioned by Groups”, Second Joint International Meeting of the Israeli Mathematical Union and the American Mathematical Society, Tel Aviv June 16-19, 2014; special session “Quasigroups, Loops, and Applications (invited).


- “Equal Quasi-Partition of p-groups” (joint work with Tuval Foguel and Andrew Penland1), Southeastern Section of the Mathematical Association of America (MAA-SE), Atlanta, GA, March 2012.

1Denotes a student co-author
• “Solitary Solvable $p$-groups” (joint work with Tuval Foguel), *Finite Groups and Their Automorphisms Conference*, Istanbul, June 2011 (invited).


• “Completing Latin Squares”, *Conference on Information Technologies for Young Researchers*, Ohrid, Macedonia, June 2010 (Keynote speaker).

• “Solitary Solvable Groups” (joint work with Tuval Foguel), *30th Ohio State Denison Mathematics Conference*, Columbus, OH (May 2010).


**Conference Presentations on Teaching and Learning in Mathematics**

• “Optimizing Capstone With Multiple Constraints” (joint work with Tuval Foguel and Jeffrey Lawson), MAA Special Session on Capstone Seminar Courses, *AMS/MAA Joint Meeting*, Boston, MA, January 2012.

• “Preparing Undergraduate Students for Mathematical Contests”, *MAA-SE*, Tuscaloosa, AL, March 2011.

• “Teaching Capstone Seminar Course”, *MAA-SE*, Elon, NC (March 2010).


**Seminar Presentations**

• “2-dimensional Cohen-Macaulay Complexes”, invited lecture in honor of electing Dr. Dončo Dimovski as a member of the Macedonian Academy of Sciences and Arts, Institute of Mathematics, St. Cyril and Methodius University, Skopje, Macedonia, June 2009.

• “Brouwer’s Fixed Point Theorem”, UNC Asheville, October 2007 (invited).

• “Introduction to 2-dimensional topology”, Western Carolina University, Department of Mathematics and Computer Science, Colloquium Series, April 2007.

• “Gromov’s link condition for cubical complexes” (2 talks), Geometry and Topology Seminar, Binghamton University, March 2006.

• “Local-To-Asymptotic Topology for Cocompact CAT(0) Complexes” (2 talks), Geometry and Topology Seminar, Binghamton University, March 2002.

Books


Conferences/Workshops Attended on Discovery in Mathematics

• Geometric Group Theory, Institute for Advanced Study, Park City Mathematics Institute (PCMI), July 1-21, 2012. This was an international three-week program for undergraduate faculty, undergraduate students, graduate students, mathematical researchers, and secondary school teachers. I was one of the 16 faculty that participated in the undergraduate faculty program and our goal was to develop projects for undergraduate research.

• 16th Jerusalem Mirdasha Mathematicae one-week international summer school on “Words and Growth”, Jerusalem, Israel, June 2012. The participants of the school were selected through an application process and the lecturers were the leading researchers in this area of mathematics.

• Topics in Geometric Group Theory, Mathematical Sciences Research Institute (MSRI) Berkeley, CA, November 2007. This was a week-long international workshop and the participants were selected through an application process. The lecturers were the leading researchers in Geometric Group Theory.

• Geometric and Probabilistic Methods in Group Theory and Dynamical Systems, Texas A&M, College Station, TX, 2005.

• Non-Positive Curvature in Group Theory, Albany, NY, 2004. This was a week-long workshop and the principle lecturer was Dr. Martin Bridson from the
University of Oxford.


**Workshops/Conferences on Teaching and Learning in Mathematics**

- “Dance and Mathematics”, a mini-course at the *AMS/MAA Joint Mathematics Meetings*, Boston, January 2012.
- *Project NExT* (New Experiences in Teaching), series of workshops, Portland, OR, August 2009.

**Supervision of Master’s Thesis**

- “Group Coverings with Specified Pairwise Intersection”, Andrew Penland (March 2011).

**Supervision of Master’s Project**

- “Zagreb Index and Graphs With Cut Vertex”, James Adam Schrum (expected April 2014).
- “Connectivity Index of Graphs”, Brandon Rupinski (expected November 2012).
- “Galois Groups of Quatric Polynomials”, Kathleen Melhuish (May 2010).

**Supervision of Undergraduate Student Research**

- “Graph Lineage and Graph Generation”, Benjamin Casses, poster presentation at the MAA-SE Conference in Elon, NC, March 2010 (received award for outstanding student poster
Benjamin also presented his poster at the WCU Undergraduate Expo, 2010.


- “Factoring Polynomials of Type \((x - a_1)(x - a_2)\cdots(x - a_n) \pm 1\)”, Stephen Nanney, presented at the MAA-SE Conference in Elon, NC, March 2010 (received award for outstanding undergraduate student presentation). Stephen also presented his results at the WCU Undergraduate Expo, 2010.


- “Polynomials with all Real Zeros and Coefficients 1 or -1”, Craig DeFelice, poster presentation at the MAA-SE Conference in Nashville, TN, March 2009 and at the WCU Undergraduate Expo 2009 at WCU.


### Supervision of Graduate Student Research


### Travel Funds

- Funding from the Institute of Advanced Studies at Princeton to participate in the summer undergraduate faculty program at Park City Mathematics Institute (July 1-21). The funding covered: up to $500 for airfare, meals (breakfast and lunch during weekdays, registration fee, lodging, and meal allowance of $230).

- Funding from the Institute of Advanced Studies at the Hebrew University, Jerusalem (June 9-16, 2012) to attend the 16th Jerusalem Midrasha Mathematicae, school on “Words and
Growth”. The funding covered the lodging and meals for 7 nights in Jerusalem.

- WCU Chancellor’s Travel Fund to attend and give a presentation at the *MAA-SE Conference* in Atlanta, GA, March 2012 ($290.15).

- WCU Microgrant to attend the mini-course “Dance and Mathematics” in Boston, MA, January, 2012 ($700).

- WCU Chancellor’s Faculty Travel Fund to attend and give a presentation at the *Spring Topology and Dynamics Conference*, Starkville, MS, March 2010 ($1000).

- Funds given by *Spring Topology and Dynamics Conference*, Starkville, MS (NSF grant) to attend the conference, March 2010 ($425).

- WCU Microgrant to attend the mini-course *Directing Undergraduate Research*, January 2009 ($662).


- WCU Chancellor’s Faculty Travel Fund to attend and give a presentation at the *MAA-SE Conference*, Charleston, SC, April 2008 ($517).

- Funds given by DFG (German Research Foundation) to attend a research workshop *Topics in Geometric Group Theory* in MSRI, Berkeley, CA. November 2007 ($500).

**Professional Service Activities**

- Co-organizer (together with Dr. Tuval Foguel) of the *2013 Zassenhaus Group Theory Conference* at WCU, May 24 - 26 2013.

- Co-organizer and co-host (together with Dr. Mark Budden) of the conference *SERMON 2012* (SouthEast Regional Meeting On Numbers) at WCU, March 30 - April 1, 2012.

- Coordinator for the comprehensive test for the State Math Contest 2010, 2011, 2012, and 2013 sponsored by NCCTM. My duties include writing the questions and editing the test for the contest.


- Leader of the Macedonian team at the Balkan Mathematical Olympiad 1999; Deputy leader of the Macedonian team at the Balkan Mathematical Olympiads 1996, 1997.
• Member of the Jury at the Balkan Mathematical Olympiad 1999, Member of the Jury for high school and middle school Macedonian Olympiads, 1994–2000.

• Editor of the mathematical journal Sigma (for high school students in Macedonia) 1998–2000.

Service Activities at Western Carolina University

Department

– Graduate Program Director and Chair of the Graduate Committee, Fall 2013-present
– Co-chair of the Contest and Awards Committee, Fall 2010-Spring 2014.
– Departmental TPR Committee, Fall 2013-present.
– Departmental AFE Committee, Fall 2013-present.
– Departmental PTR Committee, Fall 2013-present.
– Graduate Committee, Fall 2008-Spring 2009, Fall 2012-Fall 2013.
– Mathematics Curriculum Committee (member), Fall 2007-Spring 2008, Fall 2009-Spring 2012.
– Organizer of the “Mathematics Problem of the Week Contest”, Fall 2008-Spring 2014.
– Local organizer for the Virginia Tech Regional Mathematics Contest, Fall 2007-present.
– Local organizer for the William Lowell Putnam Competition, Fall 2007-present.
– Contest and Awards Committee, Fall 2007-Spring 2010.
– Co-advisor for the Math Club, Fall 2009-Spring 2011.

University

– Member of the Chancellor’s Travel Fund Committee, Fall 2010-Fall 2013.

Awards and Honors

• Finalist for the Chancellor’s Distinguished Teaching Award (2013 and 2014).
• Project NExT fellowship, 2008-2009.
• Award for Best Student, 1993, Faculty of Natural Sciences and Mathematics, St. Cyril and Methodius University, Macedonia

Membership in Professional Societies:

• American Mathematica Society
• Mathematical Association of America
• Macedonian Mathematical Association
Daniel Atterholt
110 Foxwood Dr
Waynesville, N.C.
828 456 8917
dcatterholt@email.wcu.edu

OBJECTIVE: Instructor - Mathematics

EDUCATION

Wthrop University
Master of Mathematics

University of South Carolina
Bachelor of Arts School of Applied Professional Sciences
Concentration: Business Administration

University of Akron
Associates Degree Electronics Engineering Technology

RELATED COURSEWORK/RELATED EXPERIENCE
For the past two years, I have taught College Algebra at WCU. For three and one-half years I taught Mathematics at Blue Ridge High School. My responsibilities included teaching Advance Functions/Pre-Calculus, Algebra I and II and Geometry. For two years (2011/2012) I taught an Applied Mathematics course (MAT 140) at Southwestern Community College. Additionally, for the past 3 years I have been teaching GED Math (including; Basic Mathematics, Pre-Algebra, Algebra I & II) at LBJ Job Corps in Franklin, N.C.

EXPERIENCE

Western Carolina University
Adjunct Faculty, Math Department
Cullowhee, N.C
8/2012 to present

LBJ Job Corp.
Math Instructor
Franklin, N.C.
6/14/2011 to present

S.C.C. Southwestern Community College
Adjunct Faculty-Math Department
Silva, N.C.
8/05/2011 to present

Blue Ridge Early College
High School Math Teacher
Cashiers, N.C.
2/2008 to 6/2/2011

Cadec Global
Account Sales Executive
Manchester, N.H.
4/89 to 2/2008

Atek Information Systems
Sales Representative
Charlotte, N.C.
5/81 to 4/89
Education:
Ph.D. in Mathematics, University of North Carolina at Chapel Hill, 1996.
  
  Dissertation Advisor: Jane Hawkins
  Dissertation Title: “Applications of non-invertible ergodic theory to rational maps of the sphere.”

BS. in Mathematics, University of Central Florida, 1990.

Work Experience:

Faculty Member, Western Carolina University (WCU)
  Professor of Mathematics: 2011 – present.
  Associate Professor of Mathematics: 2002 – 2011.
  Responsibilities include but are not limited to:
    • Teaching almost any undergraduate mathematics course or graduate analysis course.
    • Serving on a variety of committees like college and university wide teaching award committees, mathematics curriculum committee, the departmental annual faculty evaluation committee, the departmental tenure committee, and various faculty search committees.
    • Advising students majoring in mathematics, math education, and computer science.
    • Publishing articles in complex dynamics & ergodic theory as well as articles related to teaching and learning mathematics.

Project NExT Leadership Team, 2010 – present.
  Assist in all areas of the Project NExT program as seen fit by the director.

Distinguished Visiting Professor, United States Air Force Academy, 2009 – 2010.
  Responsibilities include but are not limited to: bringing pedagogical expertise and academic leadership to all aspects of departmental activities, teaching, serving as a mentor to junior faculty members, serving as an advisor to departmental leadership, and speaking in the department on a variety of mathematics topics.

Associate Head, Department of Mathematics & Computer Science, WCU, 2007 – 2009.
  Responsibilities include but are not limited to:
    • Observing classes taught by untenured faculty members.
    • Assisting students with course placement and course overrides.
    • Working with the Registrar’s Office and the Advising Center to assist students.
Faculty in Residence, Department of Residential Living, WCU, 2004 – 2009.
Responsibilities include but are not limited to: living in a student residence hall, working with a
student resident assistant each month to plan, organize, and run a program for residents,
organizing courses to be taught in the multipurpose room, teaching classes of my own in the
hall, and increasing faculty student interaction.

Summer Ventures is a four week residential program for gifted high school students.
Responsibilities include but are not limited to:
• Working with a four person earth science leadership team.
• Teaching an activity based statistics course.
• Assisting student research teams as they collect data in streams.

Teaching Awards and Honors:

Summer Commencement Keynote Speaker, Western Carolina University, August 2007.

North Carolina State Board of Governors Teaching Award, 2007.
One award per university awarded by the governing body for the state’s 16 campus system.

Student Affairs’ Faculty Member of the Year, Western Carolina University, 2005.
One award presented by the Student Affairs Division on campus.

College of Arts & Sciences Teaching Award, Western Carolina University, 2004.
One award presented by the college which at the time of these awards contained 14
departments and approximately 180 faculty members.

Refereed Publications:

1. Barnes, Julie; Koehler, Tom; Schaubroeck, Beth, “Fly with the Wind,” Math Horizons. April

2. Barnes, Julie and Libertini, Jessica, “Introduction to Special Issue on Tactile Learning
Activities,” PRIMUS, Vol. 23, No. 7, 2013, pp. 585 – 589. (This was refereed by the editor
in chief.)

Note: Jessica and I were also guest editors of PRIMUS, Vol. 23, No. 7, 2013, pp. 585-670. It
has eight articles in it besides our own.

3. Barnes, Julia and Koss, Lorelei, 遍历理论狂欢节，学科与专题介绍，Fall 2011, pp. 18-27. (This is a reprint of Number 7 below, translated into Chinese.)

4. Barnes, Julia; Curry, Clinton; and Schaubroeck, Lisbeth, “Real and Imaginary Parts of
pp. 749-761.


**Other Publications:**

Consulted for mathematical computation in a publication outside my field:


Papers Refereed:

Four papers for PRIMUS. Spring 2014.
Eight papers for PRIMUS that were part of guest editing PRIMUS, Vol. 23, No. 7, 2013.
One paper for PRIMUS. Spring 2012.
One paper for PRIMUS. Spring 2010.
One paper for PRIMUS. November 2007.


Grants:

External Grants:

Mathematical Association of America grant to support work as Associate Director of Project NExT. Fall 2012 – Spring 2016 ($21,600 used as course release).

Department of Defense grant to be a Distinguished Visiting Professor at the US Air Force Academy. Fall 2009 – Spring 2010 ($105,098).

Mathematical Association of America grant to support student travel to a national conference. Spring 2005 ($450).

National Science Foundation and the Association for Women in Mathematics grant to support travel to attend the ESI Programme in Ergodic Theory held in Vienna, Austria. 1997. ($1500).

National Science Foundation grant to support travel to attend a NATO-Advanced Study Institute in Hillerod, Denmark. 1993 ($1000).

United States Department of Education: Graduate Assistance in Areas of National Need, grant to study mathematics at UNC-Chapel Hill. 1992-93, 1994-96.

Internal Grants:

Chancellor’s Travel Grant to present research at the Southeast Section Mathematical Association of America Meeting in Cookeville, TN. March 2014. ($429.20).

Chancellor’s Travel Grant to present research at the Southeast Section Mathematical Association of America Meeting in Atlanta, GA. March 2012. ($199.01).
Chancellor’s Travel Grant to present research at the regional American Mathematical Association (AMS) meeting in Davidson, NC. March 2007. ($410).

WCU Microgrant to attend a workshop on Bridging the Gap between Mathematicians and the Physical Sciences in Atlanta, GA. January 2005 ($500).

WCU Microgrant to attend a workshop on Teaching Contemporary Statistics with Active Learning in Washington, DC. January 2000. ($700).


**Invited Presentations:**

**International Invitation:**
"Conservative exact rational maps of the sphere." ESI Programme on Ergodic Theory.

**National Invitations:**

**Project NExT sessions:** These presentations are all based on innovative teaching ideas that I have developed over the years. Part of the Departmental Collegial Review Document includes dissemination of innovative ideas. Since these were personal invitations at the national level, there is external validation.


“Introducing Innovative Teaching Methods into Established Courses.”
Madison, WI. July 30, 2008.
“Teaching Calculus using Creative Hands-on Activities.” San Jose, CA. August 1, 2007.
“Teaching Calculus using Creative Hands-on Activities.” Knoxville, TN. August 9, 2006.

**Spring Opportunities for Women in Mathematical Sciences, NSF Funded Program**
State Invitations:

**Keynote Speaker, Alabama Mathematical Association of America State Dinner**

**Keynote Speaker, North Carolina Mathematical Association of America State Dinner**

Presentations:

Presentations on Complex Dynamics and Ergodic Theory:

“Connections between bounded Julia sets and the level curves generated from related functions,” Analysis Seminar at Clemson University. February 27, 2014.


“Julia Sets and Graphs of Polynomial Iterates,” Carolina Dynamics Symposium at Furman University, Greenville, SC. March 26, 2011.

“Julia Sets and Graphing Iterates of Quadratic Polynomials.” (Joint with Clinton Curry and Lisbeth Schaubroeck) AMS (American Mathematical Society) Special Session on Use of Technology in Modern Complex Analysis Research at the Joint Mathematics Meetings in San Francisco, January 14, 2010.


“Julia Sets: the good, the bad, and the ugly.” University of Montevallo in Montevallo, AL. March 3, 2005.


Presentations on the Teaching and Learning of Mathematics:

“Teaching students how to write mathematics: addressing writing issues in freshman seminars, bridge classes, and senior capstone courses,” Special Session on Writing in Mathematics, MAA-SE (Southeast section) meeting in Cookeville, TN. March 15, 2014.

“Pringles, Icing, and Multivariable Calculus: A hands-on way to explore calculus on a saddle surface,” MAA-SE Section meeting, Rock Hill, SC. March 16, 2013.

“Ball toss, crackers & cheese, and line dancing: Concrete ways to help students understand functions in precalculus,” Section NExT Session on Neat Teaching Ideas, Rock Hill, SC. March 15, 2013.

“Ball toss, crackers & cheese, and line dancing: Concrete ways to help students understand functions in precalculus,” Joint Mathematics Meetings in San Diego, CA. January 12, 2013.


“Ball toss, crackers & cheese, and line dancing: Concrete ways to help students understand functions in precalculus,” Southeast Section MAA Meeting in Atlanta, GA. March 10, 2012.

“Using feather boas to teach students about functions in pre-calculus, calculus, and real analysis,” Joint Mathematics Meetings in Boston, MA. January 5, 2012.

“Motivating Students to Complete Homework” (Joint with Beth Schaubroeck of the US Air Force Academy), Improving College Mathematics Teaching Through Faculty Development, West Point, NY. June 14, 2011.


“Using feather boas to teach students about functions,” Southeast Section MAA meeting, Tuscaloosa, AL, April 2, 2011.

“Tactile Activities in Teaching Statistics,” Department of Mathematical Science Colloquium at The United States Military Academy at West Point. October 15, 2010.

“Tactile Activities in Teaching Calculus,” Department of Mathematical Science Colloquium at The United States Military Academy at West Point. October 14, 2010.

“Teaching at the Air Force Academy,” Department of Mathematics and Computer Science Faculty Seminar, Western Carolina University. September 17, 2010.

"Visitor’s Seminar" (a collection of professional development talks covering teaching ideas, math club activities, fractals, Rocky Mountain Section NExT, and a variety of issues of interest). Lecture Series at US Air Force Academy (Joint with Brian Winkel). Six of the sessions were led me. US Air Force Academy. Colorado Springs, CO. Fall 2009 - Spring 2010.

“Logic and Logistics of Running Math Treasure Hunts,” Two Hour Training Session for the math counselors at Las Chicas de Mathematicas, a summer math program for high school girls at the University of Northern Colorado. Greeley, CO. May 19, 2010.


“The Fun and Frustrations of Teaching First Year Seminars.” Presentation for the Coulter Faculty Center for Teaching and Learning. Western Carolina University. September 26, 2008.


“Teaching a First Year Seminar on Fractals: Frustrations, Fumbles, & Finally Fruition.” Southeast Section MAA meeting special session on Connecting Math to the Liberal Arts. Charleston, SC. March 29, 2008.


“Do we know what we think we know about what our students know?” (Joint with Amy Martin, Melissa Wargo, & Chesney Reich) Session for WCUs Faculty Enrichment and Education Day. February 21, 2007.

“Teaching First Year Students.” Facilitator for the week-long Summer Institute for Teaching and Learning at WCU. May 15 – 18, 2006.

“Linear Regression Models that Make a Difference.” Southeast Section NExT teaching ideas session, Auburn, AL. March 30, 2006.


“Learning What Students are Learning.” Panel Member, Faculty Series on Teaching and Learning through the Faculty Center at WCU. October 21, 2003.


“Using Children's Literature in Proof Classes.” Southeast Section NExT teaching ideas session, Atlanta, GA. March 8, 2002.


“Cookies and Calorie Estimations.” Southeast Section NExT teaching ideas session, Memphis, TN. March 12, 1999.


“Creative Writing in Introductory Math Classes.” Southeast Section NExT teaching ideas session, Charleston, SC. March 13, 1998.


**Service:**

**National Service:**

**Associate Director for Project NExT.** This is a program of the Mathematical Association of America, and is a professional development program for new PhDs in mathematics. 2012 - present

**Assistant Director for Project NExT.** This is a professional development program of the Mathematical Association of America for new PhDs in mathematics. Project NExT (New Experiences in Teaching) is a professional development program of the Mathematical Association of America for new or recent Ph.D.s in the mathematical sciences who are interested in improving the teaching and learning of undergraduate mathematics. It addresses the full range of faculty responsibilities in teaching, research, and service. 2010 -2012.

**Member of Committee for Professional Development.** Committee of the Mathematical Association of America that provides opportunities for professional development at national Mathematical Association of America meetings. 2011 - present.

**Member of committee tasked to write the complex analysis portion of the MAA Curriculum Guide for Undergraduate Programs in Mathematics.** This report will be published on the MAA website. It is co-authored with Michael Brilleslyper (US Air Force Academy), Stephanie Edwards (Hope College), and Matthias Beck (San Francisco State University). 2013 – 2014.

**Session Organizer:** I organized two Special Sessions at the Joint Mathematics Meetings with Jessica Mikhaylov (US Military Academy at West Point – now Jessica Libertini at Virginia Military Institute)


“Touch It, Feel It, Learn It: Tactile Learning Activities in the Undergraduate Mathematics Classroom.” Joint Mathematics Meetings in Boston, January 4 – 5, 2012. 35 speakers.

**Regional Service:**

**Southeast Section NExT Involvement:** Section NExT is an outgrowth of national Project NExT and serves new faculty in the southeast section of the Mathematical Association of America, servicing Alabama, Georgia, North Carolina, South Carolina, and Tennessee.

Southeast Section NExT Co-Chair, 2003 – 2006.


Organized and presented "The Death of Dr. D. Ed. Body -- A Mathematical Murder Mystery" (Joint with Kathy Ivey) at the Southeast Section NExT meeting. March 11, 1999.
Rocky Mountain Section NExT Involvement:

Provided advice for Rocky Mountain Section NExT on starting their section’s program. Also, facilitated in a session on innovative teaching and was invited to provide advice on obtaining tenure during the Rocky Mountain Section NExT program at the University of Colorado. Fall 2009 – Spring 2010 (with conference in April 2010).

Conference Activities for Students at Southeast Section of the Mathematical Association of America Meeting:

Organized and presented either a Math Treasure Hunt or a Math Murder Mystery for an average of 70 students & 20 faculty advisors on the night prior to the section MAA meeting. Each year collected ideas and assistance from a variety of faculty volunteers. Spring 2004 – 2014.

Service to Public Education:

Guest speaker for regional educational institutions on various mathematical topics and career opportunities in mathematics. 1999 – 2014.
- 1 community college campus presentation
- 6 high school mathematics classes
- 1 high school honor society club meeting
- 17 middle school mathematics classes
- 4 middle school social studies classes
- 1 elementary school class
- 1 presentation for Sonya Kovalevsky day (program for middle school girls)


University Service:

Service related to Teaching Awards and Curriculum:

Board of Governors Teaching Award Committee. Fall 2007 - Spring 2009; Fall 2012 - present. Chair 2007 - 2008; 2012 - 2013.

Liberal Studies Teaching Award Committee. Spring 2006.


Service Related to Faculty Development:

Panel to discuss woman and full professorships. Panel was sponsored by the Coulter Faculty Commons. Spring 2011.

Coulter Faculty Center Advisory Board. Fall 2008 - Spring 2009.

Faculty Mentor for Maridy Troy. Fall 2002 - Spring 2004; for Anjana Sharma, Fall 2004 - Spring 2006.

Participated in the Open Classroom Project through the Faculty Center. 2002 - 2005.

Microgrant Selection Committee through the Faculty Center. Fall 2001 - Spring 2004; Chair 2003 - 2004.

Participated on a Panel for "Coping with the Expectations of the Superwoman," on March 17, 2003. This event was sponsored by Women’s Studies and was a part of the university’s Women’s History Month events.

Organized a new faculty project team, UFO (Untenured Faculty Organization), and coordinated volunteers for the organization. Summer 1999 - Spring 2002.

Panel member for New Faculty Orientation. August 10, 1999.

Other University Service:

Director of Disabilities Services Search Committee. Fall 2013.

2020 Commission Listening Session Moderator, Fall 2012.

Housing Cancellation Appeals Committee. Fall 2008 - Spring 2009.

Presentation: "Faculty & Students in Action! Residential Living’s Faculty in Residence Program," (Joint with Kim Hardaway, Resident Director of Central Drive Hall). Poster presentation at Faculty Enrichment and Education Day. Western Carolina University. September 23, 2008.

Search Committee for the Director of Advising. Spring 2008.

Participated on a Panel for "Bridging the Gap Between Faculty Affairs and Student Affairs." Fall 2006.

Plemmons Award Selection Committee. 2003 - 2006.


Western After Hours, Faculty Project Team. Fall 1996 - Fall 1997, Fall 1998 - 1999.


**College Level Committees:**


Arts and Sciences Dean Search Committee. Fall 2012 - 2013.

Search Committee for the Director of Summer Ventures. Fall 2008. (We filled the position, and then the program was cancelled.)

Dooley Teaching Award Committee in Music – Fall 2007 - Spring 2008.

Tenure, Promotion, & Reappointment Committee for Political Science Department. Fall 2005.

Arts & Sciences (Student) Awards Committee. Fall 2001 - Spring 2003; Chair Fall 2002 - Spring 2003.

Barry Goldwater Scholarship Committee. Fall 2001.
Departmental Committees:

Mathematics and Computer Science Tenure and Promotion Committee.  
Fall 2003 - Spring 2009.  Fall 2010 - present.


Mathematics Curriculum Committee. Fall 1996 - Spring 2001; Fall 2002 - Spring 2009;  
Fall 2011 - present.  
Joint with Mathematics Education, Fall 2001 - Spring 2002;  
Chair Fall 2000 - Spring 2001; Fall 2002 - Spring 2005; Fall 2012 - present.

Search Committees  
  Department Head:  Fall 2006 - Spring 2007.  


Mathematics and Computer Science Steering Committee.  
Fall 2000 - Spring 2001; Fall 2002 - Spring 2005.

Contest and Awards Committee.  Fall 2002 - Spring 2005.

Mathematics and Computer Science Colloquium Committee.  
Chair Fall 1998 - Spring 2001.

Mathematics Department Graduate Committee. Fall 1997 - Spring 1998.

MTRC (Mathematics Teaching Resource Center) Committee.  
Fall 1996 - Spring 2000.

Engagement with WCU Mathematics Students Outside of Class:

Student Research

Directed Master’s Projects
  Chris Miglino:  Fall 2012 - Spring 2013.  

Undergraduate Research
Master’s Project Committee Member
Vicki Todd: Fall 2014.
Megan Cavanah: Spring 2011.
Sam Doud: Spring 2007.

Organized, accompanied, and helped secure funding to take students to MAA Activities, Spring 2000 - Spring 2009.
• 10 Southeast Section MAA Meetings
• 3 National MAA meetings
• 1 State MAA dinner

Math Club, Western Carolina University.
Faculty Co-advisor, Fall 1996 – Spring 1999.
Primary Faculty Advisor, Fall 2000 – Spring 2007.

Organized a WCU undergraduate Jeopardy Team for the Southeastern Section of the Mathematical Association of America Meeting. Spring 2003 - 2007.


Professional Memberships:

Mathematical Association of America (MAA)
North Carolina Council of Teachers of Mathematics (NCCTM)
EDUCATION

Doctoral Student, Mathematics Education  2001-2010
Department of Mathematics and Statistics  Portland State University

M.A., Mathematics  May 2000
Master Project: Characterizations of Topological Homeomorphisms  Miami University
Co-advisors: Dr. Sheldon Davis & Dr. Dennis Burke

B.A., Political Science, Diplomacy and Foreign Affairs, Religion  May 1992
Miami University

RESEARCH EXPERIENCE

Doctoral Fellow with the Center for Learning and Teaching in the West (CLTW)  2004-2007
Portland State University

This five-university collaborative was designed to create future leaders in mathematics and science education and to examine mathematics and science teaching and learning with an eye towards equity and diversity. At Portland State University, we focused on examination of the achievement gap in K-12 mathematics in the urban Portland public school setting. I collaborated with Portland Public Schools teachers on the design of teaching episodes and lesson study that promote equity in a diverse urban classroom setting. Other aspects of my fellowship included attending four CLTW conferences, attending weekly brainstorming meetings with PSU faculty and other fellows, and taking a CLTW online educational policy course. Additionally I worked on a pilot project where I assisted in the design of an interview protocol and interviewed elementary school children about their perceptions of, attitudes towards, and understanding of the Oregon State Mathematics Benchmarks standardized tests items. Currently I am analyzing data from a second round of data collection in regards to this study.

This project was funded by the National Science Foundation.
CLTW Advisor: Dr. Dalton Miller-Jones
Research Associate  
Department of Mathematics and Statistics  
Portland State University  
2003-2005

An Investigation of Secondary Students’ and Teachers’ Conceptions of Variation
This grant was designed to examine students’ conceptions of variation and distributional reasoning as they appear in diverse probabilistic and statistical settings with an understanding that this kind of examination would help the statistics community create better pathways to teach statistics and probability. As part of the data collection, I helped develop interview schedules and conducted interviews with middle school and high school students in six schools regarding their understanding of variation. I assisted teachers’ generation of a one-week teaching episode that focused on variation and distributional reasoning with respect to data sets. I recorded classroom episodes and analyzed data from classroom interventions. I presented findings at the National Council of Teachers of Mathematics Presession in April, 2004. I also organized and conducted several collaborative meetings with the researchers and the teachers involved in the grant. As part of the grant, the six participating teachers were to develop and present findings from their own action research projects. I collaborated with the teachers about their action research and assisted them in collecting and analyzing data.
This project was funded by the National Science Foundation.
Principal investigator: Dr. J. Michael Shaughnessy.

PAPERS & PUBLICATIONS


RESEARCH PRESENTATIONS


TEACHING EXPERIENCE

Instructor 2008-Present
Department of Mathematics and Computer Science Western Carolina University

Solely responsible for teaching the following courses:
  MATH 153: Calculus I
  MATH 140: Introductory Calculus
  MATH 170: Applied Statistics
  MATH 101: Mathematical Concepts
  MATH 321: Theory of Arithmetic I
  MATH 322: Theory of Arithmetic II
  MATH 311: Informal Geometry
  MATH 694: Topics in Mathematics Education

Adjunct Instructor 2005-2008
Department of Mathematics and Statistics Portland State University
Department of Curriculum and Instruction Portland State University

Solely responsible for teaching the following graduate and undergraduate courses for preservice teachers:
  MTH 211: Mathematics for Elementary School Teachers I (6 sections)
  MTH 212: Mathematics for Elementary School Teachers II (1 section)
  ED 510: Methods of Teaching Math for Inclusion (1 section)
  CI 518: Integrated Methods III: Mathematics (3 sections)

Graduate Teaching Assistant 2001-2003
Department of Mathematics and Statistics Portland State University

Solely responsible for holding office hours and teaching the following mathematics courses:
  MTH 251: Calculus I (2 sections)
  MTH 252: Calculus II (1 section)
MTH 241: *Calculus for Social Science Majors* (1 section)
MTH 299 SPST: *Calculus EXCEL* (2 sections)

Also solely responsible for teaching the following graduate and undergraduate courses for preservice teachers:
- MTH 4/596: *Concepts of Calculus for Middle School Teachers* (1 section)
- MTH 4/591: *Probability and Statistics for Middle School Teachers* (1 section)
- MTH 211: *Mathematics for Elementary School Teachers I* (2 sections)
- MTH 212: *Mathematics for Elementary School Teachers II* (1 section)

**Visiting Instructor**
*Department of Mathematics and Statistics*  
*Miami University*

Solely responsible for teaching the following courses:
- MTH 151: *Calculus I* (4 sections)
- MTH 104: *Precalculus with Algebra* (1 section)
- MTH 123: *Precalculus* (1 section)

**Graduate Teaching Assistant**
*Department of Mathematics and Statistics*  
*Miami University*

Solely responsible for teaching the following courses:
- MTH 151: *Calculus I* (3 sections)
- MTH 104: *Precalculus with Algebra* (1 section)

**PROFESSIONAL SERVICE**

**NCCTM Student Affiliate Association Faculty Representative**  
*Department of Mathematics and Computer Science*  
*Western Carolina University*

I was responsible for taking sixteen WCU students to the annual NCCTM conference this fall in Greensboro, NC. These responsibilities included seeking and coordinating funding for the trip, organizing transportation and hotel rooms, putting together a student information packet, recruiting students for the trip, hosting a planning meeting, and taking students to and from the conference. I also was responsible for hosting a six-speaker series for the NCCTM Student Affiliate. These responsibilities included recruiting six speakers throughout the year, making arrangements for the talks, and advertising the talks.

**Mathematics Education Curriculum Committee Member**  
*Department of Mathematics and Computer Science*  
*Western Carolina University*

I collaborated with other faculty members regarding various aspects of the mathematics education programs in the Mathematics and Computer Science Department at Western
Carolina University including admission of new students, curriculum issues, and review of certain programs.

**Contests and Awards Committee Member** 2008-2011

*Department of Mathematics and Computer Science*  
*Western Carolina University*

I assisted in generating tests for the annual high school mathematics competition to be held at WCU in the spring, 2009. I also assisted in the competition in April, 2009 as a proctor for the comprehensive exam. I graded exams and participated in the awards ceremony. I also helped select student awardees for the Annual Mathematics and Computer Science Department Awards Banquet in April. I will continue to participate in these activities through the next academic year.

**Mathematics Social Club Co-Chair** 2008-2009

*Department of Mathematics and Computer Science*  
*Western Carolina University*

I met with undergraduate students and faculty members in order to plan departmental social events throughout the year. I also co-organized the departmental fall picnic, a progressive dinner, and a holiday dinner. Currently I am organizing a mathematical games night for spring term.


*Department of Mathematics and Statistics*  
*Portland State University*

I advised first-year and transfer students regarding mathematics coursework. Also I advised undergraduates entering the Graduate Teacher Education Program. I attended summer orientations for new students. I conducted DARS student transcript evaluations and worked with Admissions staff in coordinating student admission.

**MTH 211, 212, 213 Textbook Adoption Committee Member** March 2006

*Department of Mathematics and Statistics*  
*Portland State University*

I reviewed curricula materials with respect to courses for mathematics elementary education preservice teachers. I collaborated with two other faculty members and coordinated mathematics education curriculum materials for the 2006-2009 academic years.

**Faculty Mentor for Graduate Teaching Assistants** 2005-2007

*Department of Mathematics and Statistics*  
*Portland State University*

I mentored and advised five graduate teaching assistants prior to their first teaching experiences of the Mathematics for Elementary School Teachers. These classes are taught with a hands-on, constructivist, activity-based approach. Students assisted in my classes while I mentored them.
Exam Designer, Spring 2002, 2006
Department of Mathematics and Statistics, Portland State University

I assisted in designing and scoring the geometry and calculus exams for the Annual Oregon Secondary School Students’ Mathematics Invitational Competition.

Faculty Mentor for Graduate Teaching Assistants, 2000-2001
Department of Mathematics and Statistics, Miami University

I mentored and advised three graduate teaching assistants during the first year of their teaching experiences, conducted weekly meetings, and attended their classes periodically. I also provided reviews and feedback of students’ teaching.

Co-organizer: Sonia Kovalevsky Day, March 2000
Department of Mathematics and Statistics, Miami University

I co-organized events for the day and registered participants.

COMMUNITY OUTREACH

North Carolina Early Mathematics Placement Testing Advisory Committee Attendee, October, 2008
Department of Mathematics and Statistics, Miami University

Using the TI 84+ Graphing Calculator in Secondary School Classrooms, May 2006
Grant Union High School, John Day, Oregon

I developed and presented a one-day professional development workshop for middle school and high school teachers in eastern Oregon regarding how to use the TI-84+ graphing calculators in their mathematics and statistics classrooms.

HONORS, AWARDS, & DISTINCTIONS

WCU CLAS Teaching Award Semi-Finalist, 2013-2014

WCU Excellence in Liberal Studies Award Nominee, 2013-2014

WCU First Year Advocate Nominee
Recognized by first year students as a faculty member who is an exemplary advocate for them during the 2012-2013 academic year, 2013-2014

Teaching Recognition at Western Carolina University, 2009-2010
Recognized by the Women’s Center for being a faculty member who inspires female students at WCU
Recognized by Department of Residential Living for being a faculty member whose teaching has had a positive impact on first-year students at WCU

**Center for Learning and Teaching in the West Doctoral Fellowship** 2004-2007
Three year support for tuition and stipend with summer support in 2006

**Phi Kappa Phi National Honor Society Membership** 2003-2007
Membership limited to the top ten percent of graduate students

**College of Arts and Science Graduate Student Effective Teaching Award** 2000
Only master’s level student chosen in the entire college at Miami University

**Mathematics Department Graduate Student Effective Teaching Award** 2000
Chosen from approximately 15 graduate peers at Miami University

**M.A.A. Journal Award for Outstanding Academic Achievement** 2000
Recognized for academic achievement at Miami University

**TECHNOLOGICAL PROFICIENCIES**

Extensive experience with Texas Instruments graphing calculators, EXCEL, Blackboard, Geometer’s Sketchpad
Moderate experience with Derive, Tinker Plots, SPSS, Fathom

**PROFESSIONAL ORGANIZATION MEMBERSHIPS**

National Council of Teachers of Mathematics (NCTM)
North Carolina Council of Teachers of Mathematics (NCCTM)
Curriculum Vitae

Nathan Allan Borchelt
Associate Professor (Tenured)
Western Carolina University
Department of Mathematics & Computer Science
Cullowhee, NC 28723
Telephone: 828-227-2484
naborchelt@email.wcu.edu

EDUCATION
Ph.D., Teaching and Learning: Mathematics Education, Georgia State University, Atlanta, GA, 2005
M.S.T., Mathematics, University of Florida, Gainesville, FL, 1996
B.S., Mathematics and Computer Science, Newberry College, Newberry, SC, 1994

ACADEMIC EXPERIENCE

Employment
Associate Professor (Tenured), Western Carolina University, Cullowhee, NC, Department of Mathematics & Computer Science (2014-present)
Assistant Professor (Tenure-Track), Western Carolina University, Cullowhee, NC, Department of Mathematics & Computer Science (2011-2014)
Associate Professor (Tenured), Clayton State University, Morrow, Georgia, Department of Mathematics (2009 - 2011).
Assistant Professor (Tenure-Track), Clayton State University, Morrow, Georgia, Department of Mathematics (2004 - 2009).
Instructor, Clayton College & State University, Morrow, Georgia, Department of Mathematics (1996 - 2004).
Graduate Teaching Assistant, Georgia State University, Atlanta, Georgia, Department of Middle/Secondary Education and Instructional Technology (2002).
Graduate Teaching Assistant / Teaching Professional, University of Florida, Gainesville, FL, Georgia, Department of Mathematics (1994 - 1996).

Administrative Assignments at Clayton State University
  Interim Chair, Department of Mathematics (July 2010 – June 2011).
  Program Coordinator, Mathematics (August 2009 - June 2010).
  Interim Chair, Department of Mathematics (August 2007 - June 2008).

Courses Taught at Western Carolina University
  MATH 146 – Precalculus
  MATH 153 – Calculus I
  MATH 255 – Calculus II
  MATH 300 – Problem Solving
  MATH 322 – Theory of Arithmetic II
  MATH 414 - Introduction to Secondary Mathematics Teaching Methods I
  MATH 415 – Methods and Materials for Teaching Mathematics in the Secondary School
  MATH 491 - Supervised Student Teaching in Mathematics, 9-12
  MATH 601 – Modern Mathematics for Teachers I

Courses Taught at Clayton State University
  CSCI 1301 - Computer Science I
CSCI 1302 - Computer Science II
CSU 1022 - University Foundations
MATH 0099 - Intermediate Algebra
MATH 1101 - Introduction to Mathematical Modeling;
MATH 1111 - College Algebra (course also taught in online format)
MATH 1112A - Trigonometry & Analytic Geometry;
MATH 1113 – Precalculus
MATH 1221 - Finite Mathematics (course also taught in online format)
MATH 1241 - Survey of Calculus
MATH 1501 - Calculus I
MATH 2502 - Calculus II
MATH 3020 - Concepts of Algebra
MATH 4020 - Concepts of Discrete Mathematics
MATH 4231 – Modern Geometry
MATH 4800 – Selected Topics in Mathematics
MAED 6400 - Directed Research in Mathematics Education
MATH 5010 - Modern Methods of Teaching Mathematics
MATH 5231 - Modern Geometry
MAED 6200 - Theory & Research in Math Education

Courses Taught at Georgia State University
EDMT 7360 - Integration of Technology in Mathematics Instruction (GTA)

Courses Taught at University of Florida
MAC 1142 - Precalculus (GTA)
MGF 1202 – Fundamental Concepts of Mathematics (GTA);
MAC 3311 - Calculus 1
MAC 3512 - Calculus 2 for AP Students (GTA)

SCHOLARLY ACTIVITIES

Refereed Journal Articles, Book Chapters, and Conference Proceedings

Non-Refereed Conference Proceedings

Presentations
International
Underwood, J. M., Borchelt, N. A. (2007, February). Using Mathcad to Enhance the Teaching and


National


State and Regional


Local


Borchelt, N. A. (2010, February). Graduate School 101. CSU Math Club, Clayton State University, Morrow, GA.

Grants, Fellowships, or Contracts (Funded)

2014 – “Smoky Mountain Math Teacher’s Circle Workshop”, American Institute For Mathematics, ($10000) with Dr. Sloan Despeaux


2006 - "Teachers Teaching with Technology Short Course Program for Pre-service Teachers (Middle-Grades)," The Ohio State University / Texas Instruments Inc., ($6,000).

Reviewer

Program Review (2013). Clayton State University, Department of Mathematics, Comprehensive Program


Faculty Development

Professional Conference/Meeting
July 13-18, 2014: How to Run a Math Teachers’ Circle, Washington D.C.
February 24-25, 2012: WCU Scholarship Boyer Retreat, Asheville, NC.
October 25-26, 2012: NCCTM Annual Conference, Greensboro, NC
October 26-28, 2011: NCCTM Leadership Seminar and Annual Conference, Greensboro, NC
October 7 - 9, 2010: CCAS Department Chairs Seminar, San Diego, CA.
April 21- 24, 2010: NCTM Annual Meeting & Exposition, San Diego, CA.
March 6, 2010: Eagle Undergraduate Research Conference, Georgia Southern University, Statesboro, GA.
April 27 - 29, 2006: NCTM Annual Meeting & Exposition, St. Louis, Missouri.

SERVICE ACTIVITIES

Western Carolina University
December 2012 – Feb 2013: CEAP Faculty Search Committee for Mathematics Education
August 2012 – present: Whee Teach Living and Learning Community Advisory Council
August 2012 – July 2014: IT Liaisons Committee (A&S representative)
August 2011 - present: Mathematics Curriculum Committee
August 2011 - present: Mathematics Education Committee
August 2011 - present: Contest and Awards Committee
August 2011 – May 2014: Colloquium Committee
August 2011 - present: Commencement Receptions
January 2012 – August 2012: Departmental Displays Committee (ad hoc)

Clayton State University
September 2010 – June 2011: Enrollment Management Advising Committee
August 2009 - June 2011: Professional Education Program Committee (PEPC)
August 2005 - June 2011: Mathematics Education Committee
August 2003 - June 2011: Teacher Education Curriculum Committee
June 2009 - July 2010: Graduate Council
January 2010 - May 2010: Regents Test Exemption Committee
August 2009 - Spring 2010: CIMS Faculty Awards Committee
August 2009: Professional Standards Commission Review Committee
August 2008 - July 2009: University Advisors Council
October 24, 2008 - May 2009: University Planning and Budget Council
August 2008 - Spring 2009: CIMS Student Awards
August 2008 - Spring 2009: Mathematics Faculty Search Committee; Chair
August 2008 - Spring 2009: Precalculus Curriculum Committee; Chair
August 2007 - August 2008: Living Learning Community Planning Group
September 2007 - April 2008: CIMS Dean Search Screening Committee
August 2006 - August 2007: Curriculum and Academic Policies Council (CAPC); Vice-Chair.
January 2006 - August 2007: Program Assessment Committee; Chair
August 2006 - August 2007: Departmental Governance;
August 2005 - August 2006: University Curriculum and Academic Policies Council (CAPC); Chair

Professional Service
October 2012 – present: Executive Steering Committee for the P-16 Western North Carolina Education Consortium.
2006: (PTE-M) Technology Workshop; Pre-Service Math Teacher Educator (PTE-M) Technology Workshop: Host Site Organizer.
2005: Mathematical Association of America SAUM Workshop Host Site Organizer.

Membership in Professional Organizations
August 2011 – Present: North Carolina Council of Teachers of Mathematics
April 2000 - Present: National Council of Teachers of Mathematics (NCTM)
January 2003 – Present: Georgia Council of Teachers of Mathematics (GCTM)
January 2005 - December 2009: Mathematical Association of America (MAA); Dept Liaison (2007-2008)

External Service Related to Field of Expertise
2012-2014: Coached Junior First Lego League Team which met at WCU
2012, 2013: Assisted with organizing and delivering providing programming for the WCU Lego Summit
2011-present: Volunteer, Cullowhee Valley School, Jackson County, NC
2009, 2010: Mathematics Games Volunteer, Red Oak Elementary School, Henry County, GA
2005: Educator Preparation Academic Advisory Committee: Elementary Mathematics Task Force
Mark R. Budden

CURRICULUM VITAE - SEPTEMBER 2014

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE
WESTERN CAROLINA UNIVERSITY, CULLOWHEE, NC 28723 (828)227-3946

mrbudden@email.wcu.edu

Academic Appointments

• 1997-2003 Graduate Teaching Assistant at University of Missouri-Columbia.
• 2003-2009 Assistant Professor of Mathematics at Armstrong Atlantic State University.
• 2009-2010 Associate Professor of Mathematics at Armstrong Atlantic State University.
• 2010-2013 Assistant Professor of Mathematics at Western Carolina University.
• 2012-2013 Director of Master of Science in Applied Mathematics program at Western Carolina University.
• 2013-present Associate Professor of Mathematics at Western Carolina University.
• 2013-present Associate Department Head of Mathematics and Computer Science Department at Western Carolina University.

Education

• 1994-1997 B.S. in Mathematics from Louisiana State University.
• 1997-1999 M.A. in Mathematics from University of Missouri-Columbia.
  Title: “Fourier Coefficients of Certain GL(2) Eisenstein Series”
  Advisor: Daniel Lieman (NTRU Cryptosystems, Inc.)
• 1999-2003 Ph.D. in Mathematics from University of Missouri-Columbia.
  Title: “On the Local Coefficients of Principal Series Representations of Metaplectic Groups”
  Advisor: William Banks

Research Interests

• Extremal Graph Theory
• Algebraic Number Theory
• Automorphic Forms
• Hypergeometric Functions over Finite Fields
• Representation Theory

Memberships

• American Mathematical Society (AMS)
• Mathematical Association of America (MAA)
• Council on Undergraduate Research (CUR)
Research Publications (* indicates student coauthor)

(1) M. Budden, Local Coefficient Matrices of Metaplectic Groups, J. Lie Theory 16 (2006), 239-249.

Other Publications

(2) B. Bailey, M. Budden, M. Dorff, and U. Ghosh-Dastidar, Undergraduate Research: How Do We Begin?, MAA Focus 29 No. 1 (2009), 14-16.

Awards and Grants

- 2001-2002 Mathematics Distinguished Teaching Award, University of Missouri-Columbia.
- 2002-2003 Superior Graduate Student Achievement Award, University of Missouri-Columbia.
- 2005 Research and Scholarship Grant for $2500 from Armstrong Atlantic State University in support of research on metaplectic groups.
- 2006 Student-Faculty Summer Research Grant for $3800 from Armstrong Atlantic State University in support of work with R. Jeremiah Eisenmenger on cyclotomic fields and reciprocity.
• 2007  Gignilliat Research Fellowship for $5000 from Armstrong Atlantic State University in support of research on rational reciprocity laws.

• 2008  Research and Scholarship Grant for $2000 from Armstrong Atlantic State University in support of research on rational reciprocity laws.

• 2008-2009 Grant from CURM (Center for Undergraduate Research in Mathematics at BYU) for $13,150 in support of research on rational reciprocity laws with students Kristin Ellis Lea and Stephen Savioli.

• Award of tenure and promotion to Associate Professor at Armstrong Atlantic State University, effective August 2009.

• 2009 College of Science and Technology Summer Research Grant for $14,800 from Armstrong Atlantic State University in support of research on reciprocity within finite groups with students Scott King and Alex Moisant.

• 2010 Research and Scholarship Grant for $2000 from Armstrong Atlantic State University in support of research on rational reciprocity laws.

• Chancellor’s Travel Fund Award for $417.76 to support travel to give presentation at SERMON 2011 in Savannah, GA, April 16-17, 2011.

• Chancellor’s Travel Fund Award for $288.40 to support travel to give presentation at 2012 MAA Southeastern Section Meeting in Morrow, GA, March 9-10, 2012.

• Award of tenure and promotion to Associate Professor at Western Carolina University, effective August 2013.

Teaching Experience

• University of Missouri-Columbia (1997-2003)
  – College Algebra
  – College Algebra (for non-Calculus-bound students)
  – Finite Mathematics
  – Analytic Geometry and Calculus I
  – Calculus for Social and Natural Sciences I
  – Trigonometry
  – Geometric Concepts

• Armstrong Atlantic State University (2003-2010)
  – College Algebra
  – Calculus I
  – Calculus II
  – Calculus III
  – Foundations of Numbers and Operations
  – Spirit and Structure of Mathematics
  – Linear Algebra
  – Abstract Algebra
  – Advanced Linear Algebra
  – Functions of Complex Variables
  – Theory of Numbers
  – An Introduction to Galois Theory (Special Topics in Mathematics)
  – Cyclotomic Field Extensions and Reciprocity (Special Topics in Mathematics)
Algebraic Extensions of Fields (Special Topics in Mathematics)
– An Introduction to Algebraic Number Theory (Special Topics in Mathematics)

Western Carolina University (2010–present)
– Undergraduate
  • Calculus I
  • Calculus II
  • Discrete Structures
  • Introduction to Abstract Algebra
– Graduate
  • Survey of Algebra
  • Matrix Analysis

Presentations

• Introduction to Ramsey Theory, University of Missouri-Columbia, Graduate Seminar, Spring 1998.
• Fourier Coefficients of Certain GL(2) Eisenstein Series, 13th Annual Workshop on Automorphic Forms and Related Topics, University of California-Santa Barbara, Spring 1999.
• Introduction to Metaplectic Groups and Their Representations, University of Missouri-Columbia, Graduate Seminar, Spring 2002.
• Special Values of the Riemann Zeta-Function, University of Missouri-Columbia, Number Theory Seminar, Fall 2002.
• The Fundamental Theorem of Galois Theory, University of Missouri-Columbia, Seminar on Valuation Theory, Spring 2003.
• Integrally Closed Rings, University of Missouri-Columbia, Seminar on Valuation Theory, Spring 2003.
• Structure of Nonarchimedean Local Fields, University of Missouri-Columbia, Langlands Program Seminar, Spring 2003.
• Norms in Algebraic Number Theory and the Hilbert Symbol, Armstrong Atlantic State University, Spring 2003 (invited presentation).
• p-adic Fields and Their Rise in Number Theory, Armstrong Atlantic State University, Hudson Luncheon Colloquium, Spring 2004.
• A Brief History of Reciprocity, Armstrong Atlantic State University, Hudson Luncheon Colloquium, Fall 2004.
• Automorphic Forms and Metaplectic Groups, Armstrong Atlantic State University, Mathematics Research Seminar, Spring 2005.
• Rational Reciprocity Laws, Armstrong Atlantic State University, Mathematics Research Seminar, Fall 2005.
• Local Coefficient Matrices and Shimura’s Correspondence, AMS/MAA Joint Mathematics Meeting in San Antonio, Spring 2006.
• Representations of Metaplectic Groups, Minnesota State University, Mathematics Colloquium, Spring 2006 (invited presentation).
• Generalizing Scholz’s Reciprocity Law, MAA Southeastern Section Meeting, Georgia Southern University, Spring 2007.
• *The Search for Unique Factorization*, Armstrong Atlantic State University, Hudson Luncheon Colloquium, Fall 2007.
• *Rational Residuacity of Prime Numbers*, MAA Southeastern Section Meeting, Citadel, Spring 2008.
• *Rational Reciprocity and Algebraic Number Fields*, Georgia College and State University, Spring 2009 (invited presentation).
• *Permutations of Rational Residues*, Armstrong Atlantic State University, CST Symposium, Fall 2009.
• *Permutations of Rational Residues II*, Armstrong Atlantic State University, Hudson Luncheon Colloquium, Fall 2009.
• *Rational Extensions of Quadratic Reciprocity*, Western Carolina University, Math and C.S. Colloquium, Spring 2010 (invited presentation).
• *Counting Triangles in Quartic Residue Graphs*, Western Carolina University, Math and C.S. Faculty Seminar, Fall 2010.
• *Quartic Residue Graphs and Jacobi Sums*, Armstrong Atlantic State University, SERMON, Spring 2011.
• *Paley Graphs and Beyond*, Armstrong Atlantic State University, Hudson Luncheon Colloquium, Fall 2011 (invited presentation).
• *The Search for Ramsey Numbers*, Western Carolina University, Math and C.S. Faculty Seminar, Spring 2012.
• *Character Difference Graphs and Generalized Ramsey Numbers*, MAA Southeastern Section Meeting, Clayton State University, Spring 2012.
• *Cliques in 3-uniform Hypergraphs*, AASU/GSU Discrete Mathematics Seminar, Armstrong Atlantic State University, Spring 2014 (invited presentation).

**Conferences, Workshops, and Professional Meetings**

• 12th Annual Workshop on Automorphic Forms and Related Topics, University of Missouri-Columbia, 1998.
• 13th Annual Workshop on Automorphic Forms and Related Topics, University of California-Santa Barbara, 1999.
• Midwest Arithmetical Geometry in Cryptography Workshop, University of Illinois-Urbana, 1999.
• 14th Annual Workshop on Automorphic Forms and Related Topics, University of Colorado-Boulder, 2000.
• Millenial Conference on Number Theory, University of Illinois-Urbana, 2000.
• Combinatorial Game Theory Workshop, MSRI, Berkeley, California, 2000.
• Workshop on Zeta Functions and Associated Riemann Hypothesis, New York University, New York City, 2002.
• AMS/MAA Joint Mathematics Meeting, Atlanta, Georgia, 2005.
• MAA Southeastern Section Meeting, Georgia Southern University, Statesboro, GA, 2007.
• MAA Southeastern Section Meeting, Citadel, Charleston, SC, 2008.
• CURM (Center for Undergraduate Research in Mathematics) Workshop, Provo, Utah, 2008.
• MAA Southeastern Section Meeting, Belmont University, Nashville, TN, 2009.
• CURM (Center for Undergraduate Research in Mathematics) Spring Conference, Brigham Young University, Provo, Utah, 2009.
• CUR 31st Annual Business Meeting, Montana State University, Bozeman, MT, 2009.
• PANTS X (PAmetto Number Theory Series), Armstrong Atlantic State University, Savannah, GA, 2009.
• EUMC (Eagle Undergraduate Mathematics Conference), Georgia Southern University, Statesboro, GA, 2010.
• SERMON 2011 (SouthEast Regional Meeting On Numbers), Armstrong Atlantic State University, Savannah, GA, 2011.
• MAA Southeastern Section Meeting, Clayton State University, Morrow, GA, 2012.
• SERMON 2012 (SouthEast Regional Meeting On Numbers), Western Carolina University, Cullowhee, NC, 2012.
• 25th Cumberland Conference on Combinatorics, Graph Theory, and Computing, East Tennessee State University, Johnson City, TN, 2012.
• Bioprocessing Workshop: A Science in the Mountains Workshop Series (highlighting bioprocessing and fermentation sciences), Appalachian State University, Boone, NC, October 18, 2012.
• MAA Southeastern Section Meeting, Winthrop University, Rock Hill, SC, 2013.
• PANTS XX (PAmetto Number Theory Series), Davidson College, Davidson, NC, 2013.

Service

• Armstrong Atlantic State University (2003-2010)
  – Departmental
    » Chair of Advisement, Placement, and Internship Committee (2003-present).
    » Student Affairs Committee (2003-present).
    » Grader for 2004 AASU High School Mathematics Tournament.
    » Proctor and Grader for 2006 High School Mathematics Tournament.
    » Proctor and Grader for 2007 High School Mathematics Tournament.
    » Proctor for 2008 AASU High School Mathematics Tournament.
    » Proctor for 2009 AASU High School Mathematics Tournament.
    » Hiring Committee for Statistics Assistant Professor position in 2004.
    » Hiring Committee for Mathematics Assistant Professor position in 2005.
    » Chair of Hiring Committee for Mathematics Assistant Professor position in 2007.
    » Hiring Committee for Mathematics Assistant Professor position in 2009.
* Coach (joint with S. Eastman) for AASU Undergraduate Math Jeopardy Team (2008-2009).

– University
  * Advisor for undeclared majors and Mathematics majors (2003-present).
  * University Research and Scholarship Committee (2005-2006).
  * Judge for AASU 2005 Moot Court Competition.
  * Judge for AASU 2006 Moot Court Competition.
  * Judge for AASU 2005 Student Scholarship Symposium.
  * Judge for AASU 2007 Student Scholarship Symposium.
  * Judge for AASU 2008 Student Scholarship Symposium.
  * Scholarly Excellence and Achievement (SEA) Steering Committee (2009-2010).

– Student Research
  * Jonathan Kish (2004-2005)
  * Alex Collins (2008)
  * Kristin Ellis Lea (2008-2009)
  * Stephen Savioli (2008-2009)
  * Scott King (2009)
  * Alex Moisant (2009)
  * Kimberly Thompson (2010)
  * Nicole Calkins (2010)
  * William Nathan Hack (2010)

• Western Carolina University (2010-present)
  – Departmental
    * Contests and Awards Committee (2010-2012)
    * Graduate Committee (2010-present)
    * Undergraduate Math Contests (2010-present)
    * Colloquium Committee (2012-2013)
    * Director of M.S. in Applied Mathematics Program (2012-2013)
    * QEP ad-hoc Committee (2013-present)
    * Alternate on TPR Committee (2013-present)
    * Alternate on AFE Committee (2013-2014)
    * Departmental Steering Committee (2014-present)
  – College of Arts and Sciences
    * Dean’s Advisory Board (2011-present)
  – University
    * Served on panel discussion on Open Access publishing organized by the Coulter Faculty Commons (October 26, 2011).
  – Student Research - Undergraduate
    * Kyle Murphy (Summer 2011)
    * Greg Ferrin (2011-2012)
    * Stephen Nanney (2011-2012)
    * Zach Hollifield (2011-2012)
    * Andrew Kimball (2011-2012)
* Chris Sanford (2013)
  * Tyler Hardin (2013-2014)
  * Melody Bruce (2014-present)

- Student Research - Graduate
  * Andrew Penland (Summer 2011)
  * Dragosh Negrea (2012-2013)
  * Joshua Hiller (2012-2014)
  * Aaron Rapp (2014-present)

- Thesis Committee
  * Brandon Rupinski (2012)
  * Joshua Hiller (2014)

• Community
  - Judge for 2009 Heard Elementary School 5th Grade Science Fair (Savannah, GA).

• Professional
  - Chair of AMS Number Theory II Session at 2006 Joint Mathematics Meeting.
  - Reviewer for Mathematical Reviews (2006-present):
  - Judge for Undergraduate Math Jeopardy Tournament at 2008 MAA-SE Section Meeting.
  - Judge for Undergraduate Math Jeopardy Tournament at 2009 MAA-SE Section Meeting.
  - Judge for Session on Undergraduate Research at 2009 CURM Spring Conference.
  - Local organizer (with Sungkon Chang) for PANTS X (PAlmetto Number Theory Series) held at AASU September 19-20, 2009.
  - Elected to serve as CUR Councilor for Mathematics/Computer Science Division during 2009-2010 academic year.
  - Re-elected to serve a 3-year term as CUR Councilor for Mathematics/Computer Science Division during 2010-2013.
  - Reviewer for 2010 CURM grant proposals (reviewed 10 proposals).
  - Reviewer for 2011 CUR Posters on the Hill Mathematics and Computer Science Division (reviewed 9 proposals).
– Reviewer for 2012 CUR Posters on the Hill Mathematics and Computer Science Division (reviewed 3 proposals).
– Organizer (with Risto Atanasov) for SERMON 2012 (SouthEast Regional Meeting On Numbers) held at WCU March 30 - April 1, 2012.
Andrew Thomas Chockla

PO Box 361
Cullowhee, NC 28723
Cell: (828) 399-9763

achockla@email.wcu.edu

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<th>Education</th>
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<tr>
<td><strong>Western Carolina University</strong></td>
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<tr>
<td><em>Master of Science in Applied Mathematics</em></td>
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<tr>
<td><strong>Western Carolina University</strong></td>
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<tr>
<td><em>Bachelor of Science in Applied Mathematics</em></td>
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<td><strong>Western Carolina University</strong></td>
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<tr>
<td><em>Minor in Computer Science</em></td>
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<th>Experience</th>
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<tr>
<td><strong>Mathematics Lecturer, WCU</strong></td>
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<tr>
<td><em>Cullowhee, NC</em></td>
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<td><strong>Mathematics Adjunct Instructor, SCC</strong></td>
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<tr>
<td><em>Sylva, NC</em></td>
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<tr>
<td><em>Learning Assistance Center, SCC, Sylva, NC</em></td>
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<tr>
<td><em>Mathematics Tutoring Center, WCU, Cullowhee, NC</em></td>
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<td><em>Computer Science Lab, WCU, Cullowhee, NC</em></td>
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<tr>
<th>Presentations, and Professional Training</th>
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<tr>
<td><strong>Graduate education classes</strong>, Western Carolina University, 2009</td>
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<tr>
<th>Computer Skills</th>
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<tr>
<td>Demonstrated experience using Windows and Mac; Blackboard, MS Office Suite, MyMathLab, StatsPortal, Educo; LaTeX, MATLAB, R Software</td>
</tr>
</tbody>
</table>
Malgorzata Chockla
PO Box 361
Cullowhee, NC 28723
Cell: (828) 736-0478

**Education**

- **Western Carolina University**
  Cullowhee, NC
  *Master of Science in Applied Mathematics*
  *Thesis: “Statistical Analysis of Student Performance in Redesigned Developmental Mathematics Courses”*
  December 2013

- **Western Carolina University (WCU)**
  Cullowhee, NC
  *Bachelor of Science in Applied Mathematics, Summa Cum Laude*
  May 2012

- **The K. Adamiecki University of Economics**
  Katowice, Poland
  *Master of Science in Economics*
  April 2003

- **The K. Adamiecki University of Economics**
  Katowice, Poland
  *1.5 year Pedagogic Study program; Teaching License*
  April 2003

- **Southwestern Community College (SCC)**
  Sylva, NC
  *A.A.S. in Business Administration and Electronic Commerce*
  May 2007

**Experience**

- **Adjunct Lecturer, WCU**
  Cullowhee, NC
  Aug. 2014 – present

- **Graduate Teaching Assistant, WCU**
  Cullowhee, NC

- **Mathematics Adjunct Instructor, SCC**
  Sylva, NC
  May 2013 – July 2013

- **Developmental Mathematics Adjunct Instructor, SCC**
  Sylva, NC

- **Mathematics and Computer Science Learning Consultant**
  Learning Assistance Center, SCC, Sylva, NC

- **Mathematics and Computer Science Tutor**
  Student Support Services, SCC, Sylva, NC

- **Basic Skills Instructor and Mathematics Tutor, SCC**
  Oconaluftee Job Corps Center, Cherokee, NC
  Apr. 2005 – Aug. 2005

- **Mathematics Instructor, The K.K. Baczynski High School**
  Radomsko, Poland
  Sept. 2003 – June 2004
Publications, Presentations, and Professional Training

- Conducted a 2-yr study at Southwestern Community College (SCC) on the effectiveness of computer-assisted instruction (Educo vs. MyMathLab) in developmental mathematics courses (DMA 030, 040, and 050), Aug. 2011-Dec. 2013
- Presented the results of graduate research at the Graduate Research Symposium, WCU, March 2013
- Attended NCMATYC conferences in 2010 in Hickory, NC, and in 2012 in Wilmington, NC

Computer Skills

Demonstrated experience using Windows and Mac; Blackboard, MS Office Suite, MyMathLab, StatsPortal, Educo; Adobe Suite: Dreamweaver, Flash, and Fireworks; LaTeX, Mathematica, MATLAB, R, WeBWorK
Sloan Evans Despeaux
Associate Professor
Department of Mathematics and Computer Science
Western Carolina University
Cullowhee, NC 28723

despeaux@wcu.edu
(828) 227-3825

Curriculum Vitae

Research Area: History of mathematics in Britain, specifically the mathematics, mathematicians, and scientific journals of the 18th and 19th centuries.

Education:

1997 - 2002: University of Virginia
August, 2002: Ph.D. in Mathematics

Dissertation Advisor: Karen H. Parshall, University of Virginia

1995 - 1997: Florida State University
August, 1997: M.S. in Mathematics

1992 - 1995: Francis Marion University
May, 1995: B.A. in Mathematics, Summa Cum Laude

Employment History:

2008 - present: Associate Professor of Mathematics, Western Carolina University
2002 - 2008: Assistant Professor of Mathematics, Western Carolina University

Grants and Awards:

• Western Carolina University Scholarly Development Assignment, Fall 2012
• Western Carolina University Excellence in Teaching Liberal Studies Award, 2010
• Western Carolina University Arts and Sciences Teaching Award, 2008
• Western Carolina University's Summer Research Grant Recipient, 2003
• Faculty sponsor for Western Carolina University Visiting Scholars Program Grants: April 2014 (Dr. Caroline Ehrhardt, Université Paris 8), March 2012 (Dr. Victor Katz, University of the District of Columbia), January 2007 (Dr. Laura Martini, Siena, Italy), April 2004 (Dr. Ivor Grattan-Guinness, Middlesex University, England), March 2003 (Dr. Karen Hunger Parshall, University of Virginia).

Publications:

REFEREED PUBLICATIONS:

On the history of mathematics:

On the practice of mathematics:
OTHER PUBLICATIONS:

- University of Virginia Department of Mathematics: Professors 1825 through 1900 (with Laura Martini, Karen Hunger Parshall, and Adrian C. Rice), (Department of Mathematics, University of Virginia, 1999) available at: [http://www.math.virginia.edu/about/history](http://www.math.virginia.edu/about/history). My contribution to this project was approximately 25%.

Research groups/seminars

*Chercheur associé* (Research Associate) of the laboratoire Groupe d'histoire et de diffusion des sciences d'Orsay/History and Diffusion of Sciences Group of Orsay (GHDSO), Université Paris Sud.

- GHDSO is a partner laboratory on the grant CIRMATH (*Circulation des mathématiques dans et par les journaux : histoire, territoires et publics*) funded in July 2014 by the French National Research Agency.

*Invitée permanente* (permanent invitee) of the GHDSO seminar *Presse et périodiques: sources et méthodes* (*Press and Periodicals: sources and methods*).

Member, “ANR-CaaFÉ: Circulations of algebraic and arithmetic practices and knowledge (1870-1945).”

- This research project is a collaboration with nine other historians of mathematics from Europe and the US all relatively early in their careers funded by the French National Research Agency (ANR-10-JCJC 0101).

Invited research-related presentations:

“Teachers doing algebra in France and England (1870-1914),” (with Caroline Ehrhardt)

“Mechanics and Mathematical Physics in Nineteenth-Century Britain: An Overview”  

“The Teaching of Algebra in Nineteenth-Century France and England,” (with Caroline Ehrhardt)  

“Mathematical Exchanges in Britain through Questions and Answers”  
- *Mathematical exchanges: case studies (18th-20th centuries)* Centre international de rencontres mathématiques (CIRM), Luminy, France, 16-20 September 2013.

“Mathematical Questions: A Convergence of Mathematical Practices in British Journals of the Eighteenth and Nineteenth Centuries”  
- *Mathematics and Computer Science Departmental Colloquium*, Western Carolina University, 31 January 2013  
- *Special Session on the History of Mathematics*, AMS-MAA Joint Meeting in San Diego, 11 January 2013

“The mathematical publication landscape in Britain before the *Cambridge Mathematical Journal*”  
- *Circulating Mathematics: the Role of Journals (From the Age of Enlightenment to World War II)*, Fondation des Treilles, France, 6 November 2012

“An enduring genre: the specialized mathematics journals for British university students”  
- *Circulating Mathematics: the Role of Journals (From the Age of Enlightenment to World War II)*, Fondation des Treilles, France, 7 November 2012

“An editor’s mission: William Thomson’s promotion of applied mathematics in the *Cambridge and Dublin Mathematical Journal*”  
- *Circulating Mathematics: the Role of Journals (From the Age of Enlightenment to World War II)*, Fondation des Treilles, France, 9 November 2012

“Changing audiences, shifting missions: British mathematical journals, 1890-1914.”  

“Mathematics for Public Consumption: Augustus De Morgan's Anonymous Reviews for the *Athenaeum*.”  
- *Quels publics pour quelles mathématiques?* Centre international de rencontres mathématiques (CIRM), Luminy, France, 5 January 2011.  
- *Special Session on the History of Mathematics*, AMS-MAA Joint Meeting in Boston, 5 January 2012

“Poetry in the Service of Mathematics: A Historical Perspective.”
− *Keynote Address*, Francis Marion University Undergraduate Mathematics Conference, 28 March 2014.
− *Keynote Address*, WCU Departmental Student Awards Dinner, April 26, 2011.

“The First Attacks on a ‘Man-Eating Problem’: the Four Color Problem in Nineteenth-Century Britain.”
− *Keynote Address*, WCU High School Mathematics Contest, 7 April 2011.
− *Mathematics Colloquium*, Brevard College, 29 November 2008
− *Science Colloquium*, Francis Marion University, 27 February 2004.
− *Mathematics Colloquium*, High Point University, 6 February 2002.

“Fit to Print? Referees’ Reports of Mathematics in Nineteenth-Century London.”
− *Keynote Address*, MAA State Dinner, UNCA, 29 October 2009.

“The Mathematics of Nature.”

“Victorian Mathematical Societies and Journals.”
− *Spring Southeastern Sectional Meeting of the AMS*, Florida International University, Miami, Florida, 1 April, 2006.

“Statesmen of British Mathematics: Scientific Society Involvement of Mathematicians in Nineteenth-Century Britain.”

“‘…work done, and, if done correctly, …done for all time’: James Whitbread Lee Glaisher and the Early BAAS Mathematical Tables Committee.”

“Purpose through Publication: Catalysts for Research by Junior Mathematicians in Nineteenth-Century Britain.”

“Guarding the Gates: the Role of the Refereeing Process in Nineteenth-Century Mathematical Articles Published by the Royal Society of London.”
Sloan Evans Despeaux, 6


“Before the PhD: Mathematical Mentoring in Nineteenth-Century Britain.”
− Exploring the History of Mathematics: How do we know what questions to ask?, an international conference held at the University of Richmond, 12-15 May 2004.

− Mathematics Department Colloquium Series, Appalachian State University, 24 October 2002.

“‘Very Full of Symbols’: Duncan F. Gregory, the Calculus of Operations, and the Cambridge Mathematical Journal”

“Breathing Life into the History of Nineteenth-Century British Mathematics.”
− “Historians at Work” Colloquium Series, Western Carolina University, 18 February 2003.


“Turning the Pages: Tracing the Development of Nineteenth-Century Mathematics in Britain through the Pages of Its Scientific Journals.”

− Special Session on the History of Mathematics, Fall Eastern Section of the AMS Meeting, Williamstown, MA, 13 October 2001.

“International Contributions to British Mathematical Journals, 1800-1900.”
− Graduate Seminar, University of Virginia, 4 February 2000.

“International Contributions to British Mathematical Journals, 1800-1865.”

“Mathematics at U.Va. During the Nineteenth Century.”
–  *Graduate Seminar*, University of Virginia, 7 May 1999.

“Mathematics in Navigation.”
–  *Graduate Student Seminar*, Florida State University, 2 December 1996.

**Selected Outreach Activities:**


Member of the organizing team for the Smoky Mountain Mathematics Teacher Circle, Spring 2014-present.

“Mathematics and Poetry,” SUTEP Visiting Speaker’s Program, Enka Middle School, 22 January 2013.

“The Pythagorean(?) Theorem,” SUTEP Visiting Speaker’s Program, Cullowhee Valley School, 10 December 2009, 19 November 2012; Enka Middle School, 19 November 2010; Hayesville Middle School 30 October 2007, and 20 April 2011.


Member, Organizing Committee for Sonja Kovalevsky Mathematics Day for High School Women, 20 March 2010 and 13 November 2010.


“The Hardy-Weinberg Equation.” Invited Speaker to Kathy Mathew’s Evolutionary Biology Course, 26 October 2010.

Co-developed and piloted an online history of mathematics course for secondary education mathematics students. Funding through the Joint 2+2 Initiative, sponsored by UNC-
Sloan Evans Despeaux, 8

General Administration and LEARN NC (K-12 teaching and learning from UNC-CH School of Education), 2007.


**Selected University Service:**

- Chair, Quality Enhancement Plan Committee, 2014-2015.
- Member, Faculty Scholarship Advisory Council, 2012-2014.
- Writing and Learning Commons/ Mathematics Tutoring Center Advisory Board, 2012-present
- Member, College Collegial Review Committee, 2009-present
- College Secretary: 2005-2008.
- College Committee on Committees, (Chair: 2007-2012, Member, 2012 – present)
- Associate Department Head, Department of Mathematics and Computer Science, Fall 2009-Spring 2011.
- Member, Mathematics and Computer Science Collegial Review Committee (2009-present)
- Member, Mathematics and Computer Science Annual Faculty Evaluation Committee (2009-2014)
- Mathematics Curriculum Committee, (Chair 2006 – 2012, Member, 2012 – present)

**Professional Service:**

- Member, Association of Women in Mathematics (AWM) Essay Contest Committee 2012-present.
- Editor of the *Abstracts* section of *Historia Mathematica,* Summer 2006-August 2008.
- Co-editor of the *Abstracts* section of *Historia Mathematica,* Fall 2004 – Spring 2006.
Memberships
American Mathematical Society
British Association for the History of Mathematics
Canadian Society for the History and Philosophy of Mathematics
Mathematical Association of America

Courses Taught
Mathematical Concepts (MATH 101)
Trigonometry (MATH 145)
Precalculus (MATH 146)
Calculus I (MATH 153)
Applied Statistics (MATH 170)
Fractals: The Geometry of Nature (MATH 192)
Introduction to Logic and Proof (MATH 250)
Calculus III (MATH 256)
Logic for Computer Science (CS 260)
History of the Scientific Revolution (MATH 301)
Introduction to Abstract Algebra (MATH 361)
Introduction to Linear Algebra (MATH 362)
History of Mathematics (MATH 400/500)
Abstract Algebra (MATH 461/561)
Capstone: Seminar (MATH 479)
Survey of Algebra (MATH 507)
Applied Algebra (MATH 661)
1. ACADEMIC HISTORY:

- August 2013 – Present: **Associate Professor**, Mathematics Education, Western Carolina University.
- August 2007 – July 2013: **Assistant Professor**, Mathematics Education, Western Carolina University.
- September 2005-July 2007: **Assistant Professor**, Mathematics Education, California State University, Bakersfield.
- 2001: National High School **Teaching Certification** in France – Rank “Agrégée” (National French competitive examination for high-school teachers with additional European Teacher Certification).
- 1998: **Master’s degree** in Mathematics, Université de Rennes1, France.
- 1992-1996: **Bachelor’s degree** in Mathematics, Université de Rennes1, France.

2. TEACHING/SERVICE:

- **July 2004-present:**
  - Teaching Experience: (* at WCU)
    - Pre-Calculus*
    - Introductory Calculus*
    - Secondary pre-service teachers Math. Ed. methods courses*
    - Undergraduate senior research seminar in Math. Ed.*
    - Calculus I* & II
    - Mathematics for El. Ed. Pre-service teachers course sequence*
    - Discrete Dynamical Models (graduate)
    - Introduction to Research in Mathematics Education (graduate)*
    - Problem Solving*
    - Teaching Mathematics with Technology (graduate)*
    - Mathematics for Liberal Studies – Face-to-face and Online*
    - Informal Geometry*
    - Student Teaching Supervision in Secondary Mathematics*

  - Selected Service to Profession/Community Outreach:
- International Programs and Services, **faculty-led trip coordinator**, WCU, September 2013-June 2014.
- Mathematics Teacher Retention Symposium **steering committee member**, November 2010 – March 2012;
- NC-Quest RtI Professional Learning Team **Workshop Leader**, August 2011;
- M4M in Math & Science Leadership **Institute Leader**, July 2010;
- M4M Developing Inquiry Lessons **Workshop Leader**, May 2010;
- M4M Inquiry and Learning Walks **Workshop Leader**, April 2010
- Discovery Learning in Math and Science **Workshop Leader**, July 2009;
- Foundations in Geometry **Workshop Leader**, July 2008;
- Mathematics Visiting Speakers **Program Coordinator**, Fall 2008 – present;
- School University Teacher Education Partnership **University Contact**, Spring 2008;
- Proportional Reasoning **Consultant** for the Texas Instrument – TODOS Proportional Reasoning Taskforce, Summer 2007;
- Bakersfield Math Council **Conference Host and Speaker** at CSUB, 10/21/2006;
- Middle school mathematics curriculum reform **Coordinator** for AFAMaC, 2004/2005.

- Local Talks:
  - “**Systemic and Cultural Differences in Mathematics Education: Insights from a visit to East Asia**” - Mathematics and Computer Science Colloquium Series, Western Carolina University, 10/04/2012
  - “**Issues of teacher retention: Learning from a 4-year professional development intervention**” – Mathematics and Computer Science Colloquium Series, Western Carolina University, 04/19/2012
  - “**The Game Show: Using Different Approaches to solve a Mathematics Problem**” – Teachers of Tomorrow Reaching to Teach Conference, 09/28/2010
  - “**Back to Basics: Engaging Students through Inquiry**” - WCU Beta Student Chapter of the North Carolina Council of the Teachers of Mathematics talk series, 09/15/2010
  - “**People Proportions, Ratios that shape the world**” - WCU Beta Student Chapter of the North Carolina Council of the Teachers of Mathematics talk series, 01/21/2009.
  - “**The Mathematics of Change in Middle School: Using Handheld Calculators to Foster Connections**” WCU Beta Student Chapter of the North Carolina Council of the Teachers of Mathematics talk series, 10/31/2007.
  - “**Investigating a Proportional Reasoning approach to teaching trigonometry**”, California State University Bakersfield Departmental Seminar, 10/04/2006.
  - “**Proportional Reasoning: Linking instructional representations of curricular topics**”, Utah State University, 03/04/2005.

- Selected Professional Enrichment:
  - Professional Development for Korean Teachers attended at ICME 12 conference, Seoul, South Korea, July 2012.
- TI-Nspire Webinars on using the device for teaching Calculus, Geometry, and Algebra, March 2011.
- Carnegie Learning Webinar on Common Core implementation, February 2011.
- Tammy Stiles and Kerri Bernhardt presentation on how to efficiently use the Smartboard in the Mathematics classroom, November 2010.
- North Carolina Department of Public Instruction workshop on Common Core implementation, November 2010.
- WebCat Fundamentals and Certification workshop, at WCU Fall 2007
- Passages to E-learning Retreat, at WCU Fall 2007
- Rubric Design workshop, at CSUB, Spring 2007
- Developing online courses with WebCT, at UPRM, Spring 2005
- Texas Instrument Situational Leadership workshop, at UPRM, Fall 2004

  • Committee work:
  2007-Present  - Contest and Awards Committee – Co-Chair (Ongoing)
  - Mathematics Education Curriculum Committee – Co-Chair (Ongoing)
  - Graduate Committee (2008-2013)
  - Professional Education Council (University, ongoing)
  - Student Award Committee (Arts & Sciences, 2012 – present)
  - Mathematics Curriculum Committee (2009-2011)
  - Colloquium Committee (2010-2011)
  - Faculty Load Committee (2008-2009)
  - Recruitment, Retention and Graduation Committee (Arts & Sciences, 2009-2011)
  - Mathematics Education Graduate Re-visioning Taskforce (CEAP, 2010-2011)
  2005-2007  - Liberal Studies Committee
  - Math. Ed. Committee
  - Graduate Studies Committee
  - Departmental Seminar co-organizer

  ➢ January 2003- Spring 2004: Postdoctoral research and teaching, CRMSE, NCSU.
  • Apprenticeship in teaching undergraduate and graduate Math. Ed. courses with Dr.Berenson, Dr. L. Stiff (former NCTM President) and Dr. R. Tzur.
  • Research on instructional representations of proportional reasoning topics.
  • Data collection and analysis on girls’ achievement in high level Math classes.
  • NSF-supported Girls On Track co-organizer and team leader.

  ➢ 2000–2001: 6th & 10th grade certified mathematics teacher in France, with a European Teacher specialization obtained in Birmingham, UK.

3. SCHOLARSHIP:
➢ Editor’s work:


➢ Published Papers:


*Peer-Reviewed Paper* - Equal contributions, 30% acceptance, 8 pages limited.

*Peer-Reviewed Abstract* - Equal contributions, 36% acceptance, 13 pages paper submitted to discussant.

*Peer-Reviewed Full Proposal* - Equal contributions, 10 pages limited by conference guidelines.

*Peer-Reviewed Paper* - Principal author, 67% acceptance, 9 pages limited by conference guidelines.


*Peer-reviewed Poster*  

➢ **Conference Presentations:**

*Invited research-related presentations*

“Research in Mathematics Teacher Retention: Lessons learned from the field” – given for a featured speaker address at the Mathematics Teacher Retention Symposium held in Los Angeles, CA, in March 2012.


“Using Multiple Instructional Representations to enhance Conceptual Understanding” - Instituto para el Fortalecimiento en la Ensenada de las Matemáticas Annual Conference,
University of Puerto Rico in Mayaguez, 06 November 2004.

**Contributed research-related presentations**


“Mathematics Teacher Support with Technology: Challenges, Successes and Reflections” - Presented at the NCCTM State conference held in Greensboro, NC, October 2011.

“Impacting the Work, Perceptions and Retention of New Mathematics Teachers through Professional Development: Research/Implications”, Research Symposium under the Research on Teacher Induction Special Interest Group given at the annual meeting of American Educational Research Association in New Orleans, LA, April 2011.


“Empowering Beginning Teachers through Technology-focused Professional Development” – Extended session at the Teachers Teaching with Technology conference held in Atlanta, GA, March 2010


“Preparation, support and retention of middle and high school mathematics teachers in urban districts: Views from the East and West coasts” – Research Symposium on Teacher Retention given for Division K at the annual meeting of AREA in San Diego, CA, April 2009.

“Teacher Attrition and Mobility: Fostering collegiality to improve retention” – Presented at the NCCTM State conference held in Greensboro, NC, October 2008.

“Teacher Retention through Building Professional Learning Communities” – extended session at the 40th Annual NCSM Conference in Salt Lake City, Utah, April 2008, with Carol Cronk, Davida Fischman, Susie Hakansson, Barbara Pence, Chris Yakes.

"How do the components and structure of a curriculum affect the knowledge of mathematics teachers?" - ICMI15, Brazil, Work Session leader with Luis Caceres, and Arturo Portnoy, May 2005.
- **Grants awards:**

  - NSF Travel Award for ICME 12 held in South Korea, July 2012, $2500.
  - NC-Quest Responsiveness to Intervention with Transylvania County, awarded March 2011, $299,44, renewed Spring 2012, $150,000.
  - Research Council of the University Grant, Fall 2006, CSUB.

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**Affiliations:**

- California Association of Mathematics Teacher Educators
- Mathematical Association of America (2007-2009)
- North Carolina Council of Teachers of Mathematics (Current Vice-President for Colleges in the Western Region representative)
- National Council of Teachers of Mathematics

**Languages:** English, French, Spanish, German, and some Chinese. ESL trained instructor.

**Skills:** Wilderness First Responder.
Geoff Goehle

Curriculum Vitae

I. Education
3. M.S. in Mathematics, Portland State University, 2002-2004
4. B.S. in Mathematics, University of Colorado at Boulder, 2000-2002

II. Appointments
1. Assistant Professor, Western Carolina University, Department of Mathematics and Computer Science, 2009 – present

III. Papers Published or Accepted for Publication
(All publications are in refereed journals)
   The Transactions of the American Mathematical Society is an international journal devoted to research articles in all areas of pure and applied mathematics. To be published in the Transactions, a paper must be correct, new, and significant. Further, it must be well written and of interest to a substantial number of mathematicians. Journal Impact Factor: 1.02
   I did 50% of the work for this paper.

   The Bulletin of the Australian Mathematical Society is an international journal that aims at quick publication of original research in all branches of mathematics. The Bulletin concentrates on presenting new and interesting results in a clear and attractive way. Journal Impact Factor: 0.48

3. Geoff Goehle, Gamification and Web Based Homework, PRIMUS, Volume 23, Number 3 (2013), 234-246
   PRIMUS: Problems, Resources, and Issues in Mathematics Undergraduate Studies is a national refereed journal devoted to dialogue and exchange of ideas among those interested in teaching undergraduate mathematics. Journal Impact Factor: None
   This paper should be considered part of the scholarship of teaching and learning.

Published by the Mathematical Association of America, the *CMJ* is a national journal that seeks lively, well-motivated articles that will enrich undergraduate instruction and enhance classroom learning, as well as expository papers that stimulate the thinking and broaden the perspectives of those who teach undergraduate-level mathematics. Journal Impact Factor: None

While my paper published in this journal does constitute new mathematics it is written at the undergraduate level and should be considered part of the scholarship of teaching and learning. I did 50% of the work for this paper.


The *Houston Journal of Mathematics* is an international journal that appears quarterly and publishes original research papers on mathematical topics. It welcomes contributed papers that develop interesting, or important, new mathematical ideas and results or solve outstanding problems. Journal Impact Factor: 0.357

I did 33% of the work for this paper.


The *Rocky Mountain Journal of Mathematics* is an international journal that endeavors to publish significant research papers and substantial expository/survey papers in a broad range of theoretical and applied areas of mathematics. For this reason the editorial board is broadly based and submissions are accepted in most areas of mathematics. Journal Impact Factor 0.39


The *Indiana University Mathematics Journal* is a national journal that publishes research papers at the forefront of both pure and applied mathematics. Emphasis is placed on significance, originality, lucidity, and expository concision. Journal Impact Factor: 0.42


The *Houston Journal of Mathematics* is an international journal that appears quarterly and publishes original research papers on mathematical topics. It welcomes contributed papers that develop interesting, or important, new mathematical ideas and results or solve outstanding problems. Journal Impact Factor: 0.357


Published quarterly by the University of Illinois Press since 1957, *IJM* is an international journal in pure and applied mathematics. It has been recognized for its typographical excellence as well as for its scholarly eminence. The journal publishes important contributions in English, German, and French by mathematicians from around the world. Journal Impact Factor: 0.34
IV. Presentations

1. Essay Answers: Using Free Response Questions in WeBWorK, MAA Session on Using Online Resources to Augment the Traditional Classroom, Joint Mathematics Meetings, Baltimore, MD, (2014), contributed

   The JMM is the largest mathematics meeting in the world and is hosted by both the Mathematical Association of America and the American Mathematical Society. This very large conference features invited and contributed talks on a wide variety of topics.

2. Math Achievements: Gamification and Online Homework, MAA Session on Teaching With Technology, Joint Mathematics Meetings, Baltimore, MD, (2014), solicited

   (see above)


   GPOTS is a five-day conference on topics in Operator Algebras and Operator Theory that features both invited speakers and contributed talks. The conference is 32 years old and is the most important national conference for my specific field of mathematics.


   This is an annual regional undergraduate conference held at Francis Marion University in South Carolina. It is supported by a grant from the National Science Foundation.

5. Groupoid Equivalence and the Associated Iterated Crossed Product, Great Plains Operator Theory Symposium, Houston, TX, (2012), contributed

   (see above)


   This is a regional meeting hosted by the American Mathematical Society. The AMS sectional meetings often feature special sessions which focus on a particular topic or field.


   (see above)

8. The Spectrum of Regular Groupoid Crossed Products, Great Plains Operator Theory Symposium, Denver, CO, (2010), contributed

   (see above)


   (see above)


   (see above)

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1 I was asked to submit a talk for this contributed session.
(see above)

V. WeBWorK Contributions

WeBWorK is an open-source online homework system for math and sciences courses. WeBWorK is supported by the MAA and the NSF, is used at over 700 colleges and universities, and comes with a problem library of over 30,000 homework problems. This section lists my contributions to WeBWorK projects that have been accepted into the “core” WeBWorK code. The following were all reviewed and tested before being integrated into WeBWorK and the contents of this section should be considered non-traditionally refereed scholarship.

1. Just-In-Time Homework (2014)
   Part of a grant being run out of NCSU Raleigh, this is a new homework type which allows instructors to create adaptive homeworks. The homework sets themselves are ordered tree structures. Each problem can have a list of one or more sub-problems associated to it. If a student gets the problem wrong or passes a certain threshold of incorrect attempts they are directed to the sub-problems, which will contain a structured review of the concepts relevant to the parent problem.

2. Past Answers (2013)
   I upgraded the existing "Past Answers" answer viewer to include typesetting of equations and essay answers, better formatting for various problem types, and the ability for instructors to use wildcards (|, ?, and *) and numerical ranges in the user id, set id and problem numbers. This allows instructors to view answers from multiple students or problems simultaneously.

   I upgraded the existing MathView equation editor to be more visually compatible with WeBWorK, as well as more usable overall. This equation editor gives students live previews of their entered equations and has a “calculator style” list of available functions. Other new features are a "typeahead" functionality and LaTeX editing capabilities for essay questions.

4. Achievement Items (2013)
   This is an upgrade to the Achievement System. It adds several "items" that can be awarded to students when they earn a level or a particular achievement. These items are one-time-use objects which allow students to manipulate the WeBWorK system in some way, from extending a due date on a homework, to getting a problem marked 100%, to resetting incorrect attempts.

5. Math4 Theme (2012)
   This is a visual upgrade to the entire WeBWorK interface. While it is functionally similar to the older math3 theme, it upgrades the look of WeBWorK to make it feel cleaner and more modern. The math4 theme is based off of Bootstrap (2.3.2) and introduced new functionality in the form of tooltips and popovers.

   This allows instructors to create and assign open ended "essay" style WeBWorK problems. Students enter their answers to these problems using a text field. These answers are not graded immediately. The system also includes a grader tool for instructors to later grade and comment on student answers. These comments are then available to the student after the grades have been
7. Math Achievements (2011)
   This is a “gamification” system for WeBWorK which allows instructors to create and assign
   achievements to students. The conditions for earning these achievements are checked (via an
   "evaluator script") every time a student submits an answer. If the student meets these conditions
   they are awarded the achievement. The system also includes a way for students to keep track of
   their achievements, as well as earn experience points by solving math problems and earn math
   “levels”.

VI. Courses Taught
1. Western Carolina University, (2009 – present)
   ◦ Math 153 – Calculus I
   ◦ Math 255 – Calculus II
   ◦ Math 256 – Calculus III
   ◦ Math 320 – Ordinary Differential Equations
   ◦ Math 441/541 – Introductory Numerical Analysis
   ◦ Math 622 – Functional Analysis
   ◦ Math 640 – Numerical Analysis
   ◦ Math 3 – Introduction to Calculus
   ◦ Math 20 – Discrete Probability
   ◦ Math 147 – Dartmouth Teaching Practicum
   ◦ Math 111 – Introductory College Mathematics I
   ◦ Math 112 – Introductory College Mathematics II

VII. Training
1. IRB Social/Behavioral Research course, (2013)
2. WeBWorK Consultant Training, (2012)

VIII. Awards and Grants
1. Innovative Scholar Award, Western Carolina University, (2014)
2. WeBWork::Portland Development Camp Travel Grant, *Mathematics Association of America*, (2014)
3. WeBWork::Asheville Development Camp Travel Grant, *Mathematics Association of America*, (2014)
5. WeBWork::Raleigh Development Camp Travel Grant, *Mathematics Association of America*, (2013)
8. WeBWork::Ann Arbor Development Camp Travel Grant, *Mathematics Association of America*, (2012)

IX. **Service and Committees**

**National Service**
1. WeBWork Maintainer, *Mathematical Association of America*, (2013-present)
2. WeBWork Developer, *Mathematical Association of America*, (2010 – present)

**University Service**
4. Faculty and Staff Email Task Force, *Western Carolina University*, (2013-2014)
5. WeBWork Administrator, *Western Carolina University*, (2011 – present)

**Departmental Service**
6. CS Committee, *Department of Math and Computer Science*, (2014-present)
11. Colloquium Committee (chair), *Department of Math and Computer Science*, (2009 – present)

**X. References**

1. Dana Williams, Professor of Mathematics, *Dartmouth College*, 603-646-2990, Dana.Williams@dartmouth.edu
2. Michael Gage, Professor of Mathematics, *University of Rochester*, 585-275-9424, gage@math.rochester.edu
3. Jeff Lawson, Professor of Mathematics, *Western Carolina University*, 828-227-2483, jlawson@wcu.edu
4. Paul Muhly, Professor of Mathematics, *University of Iowa*, 319-335-0714, pmuhly@math.uiowa.edu
Curriculum Vitae

Cory Lee Howk
Assistant Professor (Tenure-Track)
Western Carolina University
Department of Mathematics & Computer Science
Cullowhee, NC 28723
Telephone: 828-227-3827
clhowk@email.wcu.edu

Education
   Thesis: A Mathematical Model for IL6-induced Differentiation of Neural Progenitor
   Cells on a Micropatterned Polymer Substrate.
   Advisors: Dr. Howard Levine and Dr. Michael Smiley

M.A., Mathematics: Community College Teaching Track, Minnesota State University, Mankato,
   Mankato, MN, 2005.
   APP: Mathematical Analysis of Crystal Precipitation with Ostwald Ripening
   Advisor: Dr. Namyong Lee

B.A., Mathematics, Chemistry, Anthropology (3 majors), Minnesota State University, Mankato,

Employment (Academic)
Assistant Professor (Tenure Track), Western Carolina University, Cullowhee, NC, Department
   of Mathematics & Computer Science (2012-present)
Postdoctoral Teaching Associate, Iowa State University, Ames, IA, Department of Mathematics,
   Spring 2010.
Predoctoral Teaching Associate, Iowa State University, Ames, IA, Department of Mathematics,
   Fall 2009.
Graduate Teaching Assistant, Iowa State University, Ames, IA, Department of Mathematics,
Graduate Teaching Assistant, Iowa State University, Ames, IA, Department of Mathematics,
Graduate Teaching Assistant, Minnesota State University, Mankato, Mankato, MN, Department

Employment (Research)
Postdoctoral Research Scholar, under supervision of Donghai Dai, M.D., Ph.D., University of
   Iowa College of Medicine, Iowa City, IA, Department of Obstetrics & Gynecology,
   (2010-2012).
Research Assistant, under supervision of Prof. Howard Levine and Prof. Michael Smiley, Co-
NIH Grant GM072005-BB,B-NILSEN-HAMILTON, “Neural Stem Cell Pattern”.

**Academic Awards**
Nominated as a First Year Experience (FYE) Advocate for 2013-2014.
ISU Graduate College Teaching Excellence Award, (December 2008).
  --Awarded annually to the top 10% of teaching assistants in each department.

**Teaching Experience**

**Western Carolina University**
- MATH 153 – Calculus I
- MATH 255 – Calculus II
- MATH 320 – Ordinary Differential Equations
- MATH 430/530 – Mathematical Modeling
- MATH 441/541 – Introduction to Numerical Analysis
- MATH 640 – Numerical Analysis

**Iowa State University**
- MATH 104 – Introduction to Probability and Matrices
- MATH 151 – Business Calculus
- MATH 165 – Calculus I
- MATH 166 – Calculus II
- MATH 181 – Calculus and Mathematical Modeling for the Life Sciences I
- MATH 182 – Calculus and Mathematical Modeling for the Life Sciences II
- MATH 267 – Differential Equations and Laplace Transforms

**Minnesota State University, Mankato**
- MATH 112 – College Algebra
- MATH 098 – Intermediate Algebra

**Scholarship and Professional Activities**

**Refereed Publications**

**Manuscripts under Review**
Presentations
An introduction to Berkeley Madonna – a “free” tool for visualizing differential equations, Western Carolina University, Mathematics and Computer Science Department Research Seminar (contributed talk), November 2012.
Competitive Exclusion in a Vector-Host Model for Dengue Fever, Minnesota State University, Mankato, Colloquium (invited talk), April 2012.
A Mathematical Model for IL6-induced Differentiation of Neural Progenitor Cells, Minnesota State University, Mankato, Colloquium (invited talk), April 2011.
A Mathematical Model for IL6-induced Differentiation of Neural Progenitor Cells, University of Iowa, Mathematical Biology Seminar (invited talk), October 2010.
The Interplay between Mathematics and Biology: An Analysis of Two Deterministic Models, University of Iowa, Department of Obstetrics & Gynecology (invited talk), April 2010.
A Mathematical Model for IL6-induced Differentiation of Neural Progenitor Cells on a Micropatterned Polymer Substrate, Moffitt Cancer Center, Integrated Mathematical Oncology, seminar talk, April 2009.

Poster Sessions
A Mathematical Model for IL6-induced Differentiation of Neural Progenitor Cells on Micropatterned Polymer Substrates, Marrakesh International Conference and Workshop on Mathematical Biology, January 2008.

Workshops and Conferences Attended
March 19-23, 2012: MBI Workshop: Evolution and Spread of Disease, Mathematical Biosciences Institute, Columbus, OH.
  • Hotel Accommodations provided by the MBI.
  • Travel Funds provided by the Dept. of Ob/Gyn, University of Iowa, $500.
October 14-16, 2011: 2011 Fall Central AMS (American Mathematical Society) Sectional Meeting, Lincoln, NE.
  • Travel funds provided by the Dept. of Ob/Gyn, University of Iowa, $300.
April 2-6, 2011: AACR (American Association of Cancer Research) 102nd Annual Meeting, Orlando, FL.
  • Travel funds provided by the Dept. of Ob/Gyn, University of Iowa, $903.
  • Funds provided by NIH Grant G072005-BBMB-NILSEN-HAMILTON, $25.
January 26-30, 2009: MBI Workshop: Cancer Development, Angiogenesis, Progression, and Invasion, Mathematical Biosciences Institute, Columbus, OH.
  • Hotel Accommodations provided by the MBI.
  • Travel Funds provided by the MBI, $509.
January 3-8, 2008: Marrakesh International Conference and Workshop on Mathematical Biology, Marrakesh, Morocco.
  • NSF Grant #DM5075669-Math-Boushaba, $539.92.
  • Internal Funding, ISU Department of Mathematics, $146.10.
  • Professional Advancement Grant, ISU College of Graduate Studies, $300.
Performed Peer Reviews for the Following Journals

- Mathematical Methods in the Applied Sciences
- PLoS One
- Frontiers in Molecular and Cellular Oncology

Service Activities

Departmental Service – Committee Memberships
August 2012 – present: Mathematics Committee
August 2012 – present: Colloquium Committee
August 2012 – 2014: Contests and Awards Committee
August 2014 – present: Contests Committee
Spring 2013 – ad hoc committee on potential restructuring of early mathematics courses and their target audience to improve student success

College and Institution Service
Summer 2014 – ad hoc university task force on the effectiveness of current placement criterion for early mathematics classes, and examining early-semester predictors of student success once enrolled

Professional Memberships
Society of Mathematical Biology (SMB), February 2008 – present.
Society for Industrial and Applied Mathematics (SIAM), October 2006 – present.
VITA
Dr. Kathy M.C. Jaqua
Mathematics and Computer Science
Associate Professor of Mathematics
Director Undergraduate Secondary Mathematics Education Program

Academic Degrees
Ph.D.  Washington State University  1994  Mathematics Education
M.S.  Oregon State University  1990  Mathematics
B.S.  East Tennessee State University  1981  Mathematics and English

Professional Experience
1981-1984  Wytheville, VA, High School Mathematics Teacher
1984-1987  Wytheville, VA, Department Chair and High School Mathematics Teacher
1987-1990  Oregon State University, Graduate Assistant in mathematics
1990-1994  Washington State University, Graduate Assistant in mathematics & education
1994-2000  Western Carolina University, Assistant Professor of Mathematics
2000-2002  Western Carolina University, Associate Professor of Mathematics
2002-2007  Western Carolina University, Department Head and Associate Professor of Mathematics
2007-present  Western Carolina University, Associate Professor of Mathematics

Teaching Awards
1989  Graduate Teaching Assistant Award for Excellence in Teaching Mathematics,
      Oregon State University
1992  Teaching Assistant Excellence Award for Independent Instruction,
      Washington State University
1998  Finalist for the Chancellor’s Distinguished Teaching Award
      Western Carolina University
1999  Finalist for College of Arts and Sciences Teaching Award
      Western Carolina University
2000  Finalist for the Chancellor’s Distinguished Teaching Award
      Western Carolina University
2000  College of Arts and Sciences Teaching Award
      Western Carolina University
2001  Chancellor’s Distinguished Teaching Award
      Western Carolina University
2002  Board of Governor’s Award for Excellence in Teaching
      Western Carolina University

Publications


Selected Research Papers Presented


Selected Workshops and Talks on Teaching


Ivey, K.M.C. (1999, August-December). Using Graphing Calculators and CBLs in Middle School Mathematics and Science. A 30 hour in-service workshop presented in Cherokee County as part of a Technology Grant, Murphy, NC.


Ivey, K.M.C. (2000, March). Problem solving on Geoboards. A talk given to the Beta Student Chapter of NCCTM, Cullowhee, NC.


Ivey, K.M.C. (2001, March) Art and Mathematics: Grids go to grade school. A talk given at the Western Regional NCCTM Meeting, Asheville, NC.


Ivey, K.M.C. (2002, September) *Who Am I?: The Riddle of a Teacher’s Identity*. Talk given in the Coulter Faculty Center series on Teaching and Learning.

Barnes, J. & Ivey, K.M.C. (2003, October) *Algebra Aerobics*. A talk given at NCCTM. Greensboro, NC.

Ivey, K.M.C. & Tucker, A. (2004, June) Organized and presented a 10-day workshop at SUNY-Stony Brook as part of PMET: Preparing Mathematicians to Education Teachers, a grant to the Mathematical Association of America.


Ivey, K.M.C. & Narayan, J. (2005, June) Organized and presented a 10-day workshop at SUNY-Oswego as part of PMET: Preparing Mathematicians to Education Teachers, a grant to the Mathematical Association of America.

Ivey, K.M.C. & Evan, J. (2005, August) Organized and presented a two-week workshop at Texas Southern University as part of PMET: Preparing Mathematicians to Education Teachers, a grant to the Mathematical Association of America.


Ivey, K.M.C. & Narayan, J. (2006, June) Organized and presented a 5-day workshop at SUNY-Oswego as part of PMET: Preparing Mathematicians to Education Teachers, a grant to the Mathematical Association of America.

Ivey, K.M.C. & Evan, J. (2006, August) Organized and presented a 7-day workshop at Texas Southern University as part of PMET: Preparing Mathematicians to Education Teachers, a grant to the Mathematical Association of America.


Jaqua, K.M.C. (2011, October) *Picture this: Using proportions and equations artfully!*. A talk given at the Annual Meeting of NCCTM, Greensboro, NC.

Jaqua, K.M.C. (2012, March) *In the Middle of the Common Core*. A talk given at the Western Region Meeting of NCCTM, Asheville, NC.


**Invited Keynote Addresses**


Ivey, K.M.C. (2004, September) *Has anyone seen my methodology? Finding the right research methodology for the questions that you want to answer*. Keynote Address of the 2004 Mathematics Teacher Preparation in Appalachia Research Pre-Session to the Appalachian Collaborative Center for Learning, Assessment, and Instruction in Math (ACCLAIM) conference, Huntington, WV.

Grant Activity

Off-campus Scholar Grant, 1995. ($665 awarded) This grant supported attendance at the National Council of Teachers of Mathematics Annual Meeting.
Vice-Chancellor's Instructional Improvement Grant, 1995. ($1795 awarded) This grant purchased equipment used in mathematics laboratory activities in Calculus and Pre-Calculus.
Using CBLs to explore functions and their graphs through real-life data: Eisenhower Year Seven grant #5-41493-E7-G57, 1995-1997. ($34,761 awarded) (With Dr. J. Scott Sportsman).
Microgrant for professional development, 1997 ($700.00 awarded) This grant supported attendance at an MAA Short Course on History of Mathematics courses.
NSF Early Career Grant, 1997. ($386,081.00 not funded)
Public Schools Project Grant, 2000. ($800 plus travel awarded)
AACSU Improving Elementary Teacher Preparation, 2001. ($4000 awarded, year 1; $1900, year 2) (With several other faculty)
NSF proposal, Preparation, Experience, Practice: A University Program Leading to Excellence in Mathematics Teaching [Project PEP-UP], ($3,428, 816—not funded) (With five other faculty)
NC Quest proposal (lead authors N. Borchelt and T. Rose) Partnership for Strengthening Technological Pedagogical Content Knowledge in Mathematics. (221,872—not funded)

Current Professional and Academic Association Memberships

International Group for the Psychology of Mathematics Education, North American Chapter
Mathematical Association of America
National Council of Teachers of Mathematics
North Carolina Association of Mathematics Teacher Educators
North Carolina Council of Teachers of Mathematics
Phi Kappa Phi

Professional Assignments, Activities, and Service

Western Carolina University

Department of Mathematics & Computer Science

Cosponsor, Beta Student Chapter of North Carolina Council of Teachers of Mathematics, 1994-present.
Cosponsor, WCU Student Affiliate of Mathematical Association of America, 1994-2007.
Advisor for Mathematics majors, 1994-present.
Coordinator of High-School Speakers Program, 1994-1997
Director of the Graduate Mathematics Education Program, 1997-2008.
Director of the Undergraduate Mathematics Education Program, 2003-present.
Academic Supervisor for Student Teachers, 1998-present.
College of Arts & Sciences

Teacher Education Committee (1997-present)
Search Committee for Dean (1998-1999)
Honors and Awards Committee (1998-2000); Chair (1999-2000);
Technology Committee (1999-2000)
Teaching Award Committee (2001-2004)
Biotechnology Initiative Committee (2003-2004)
Curriculum Committee (2003-2005)
Taskforce on Issues of College Restructuring (Chair) (2006)

College of Education & Allied Professions

B.S.ED Core Review Committee (1997-1998)
M.A.ED Revision Committee (1998-1999)
School University Teacher Education Partnership (1999-2010)
Search Committee for Director of Center for Mathematics and Science Education (2001-2002)
School Improvement Grants Committee (2003-2004)
Center for Mathematics and Science Education Advisory Council (2006-2010)
Professional Education Council (2009-present)

University service

Faculty Marshal, 1997-2001; Chief Faculty Marshal, 2000-2001
Vice-Chancellor’s Instructional Improvement Grant Committee (1998-2001); Chair (1999-2000)
Academic Problems Committee (1999-2000)
Athletic Committee (2003-2006)
First Year Cabinet (2002-2004)
Chancellor’s Internal Advisory Committee on Economic Development (2005-2006)
Registrar’s Advisory Committee (2006-2010)

Professional Organizations

Reviewer of submissions to *Journal for Research in Mathematics Education*, 1995-present. (reviewed approximately 65 manuscripts to date)
President of WCU Chapter of Phi Kappa Phi, 1999-2001.
President-elect of Western Region of the North Carolina Council of Teachers of Mathematics 2008-2009.
President of Western Region of the North Carolina Council of Teachers of Mathematics 2009-2011.

Regional Organizations

Member of the Advisory Panel for the Mathematics Department of Haywood Community College (2004-2007)
Founding Member of the Board of Directors of the Appalachian Homestead/Farmstead Preserve (2005-present)
JEFFREY K. LAWSON
Mathematics and Computer Science
Western Carolina University
Cullowhee NC 28723
828.227-3831 (phone) 828.227.7240 (fax)
jlawson@wcu.edu

EDUCATION
Ph.D. in Mathematics, North Carolina State University, Raleigh NC, 1994.

EMPLOYMENT
2010–present: Professor, Mathematics, Western Carolina University, Cullowhee, NC.
2005–2010: Associate Professor, Mathematics, Western Carolina University, Cullowhee NC.
2001–2005: Associate Professor, Mathematics, Trinity University, San Antonio TX.
1998–2001: Assistant Professor, Mathematics, Trinity University, San Antonio TX.
1994–1998: Visiting Assistant Professor, Mathematics, Wake Forest University, Winston-Salem NC.
1991–1994: Nuclear Science Tutor, University of Maryland University College, College Park MD.

VISITING RESEARCH POSITIONS
2012: Scientific Researcher, Fields Institute for Research in Mathematical Sciences, Toronto ON.
2003–2004: Visiting Scholar, Mathematics and Computer Science, St. Mary’s College of Maryland, St. Mary’s City MD.

SELECTED LEADERSHIP POSITIONS
2014–present: Department Head, Mathematics and Computer Science, Western Carolina University, Cullowhee NC.

Duties include strategic planning and assessments, managing department budget, coordinating faculty evaluation and faculty mentoring, maintaining course section enrollments, overseeing department office functions, and serving as a departmental liaison to administration and to partner disciplines. Training: American Mathematical Society (AMS) Workshop for Department Chairs and Department Leaders; Washington DC 2010, Boston MA 2012, and San Antonio TX (2015); UNC Department Chair Workshop, Chapel Hill (2015).

2008–2013: Associate Department Head, Mathematics and Computer Science, Western Carolina University, Cullowhee NC.

Duties include course forecasting and scheduling, coordinating staffing plans, and management of all faculty hiring, as well as covering vacations and leaves for the head.


2012–present: Associate Editor, American Mathematical Monthly, MAA, Washington DC.

Management of manuscripts, including screening, referee assignments, and assistance to the managing editor for a highly selective and internationally recognized general mathematics journal.

2004–2005: Faculty Advisor, Academic Honor Council, Trinity University, San Antonio TX.

Advisor to the student-led honor council in its inaugural year. Service on steering committee in a five-year process to implement the academic honor code. Training: Center for Academic Integrity. Presentation: “Implementing an Academic Honor Code: Balancing the Needs of the Faculty and Students,” with C.D. Hosein (Student Co-Chair of the Trinity University Academic Honor Council), Center for Academic Integrity Conference, Blacksburg, VA, October 2005.


2001-2003: Faculty Representative, Barry M. Goldwater Scholarship Foundation, Trinity University.

Recruitment for applications for the scholarship and advising students in preparing applications. Coordination with representatives for other major scholarships. Three scholarships were awarded to students during this two-year term.

SELECTED GRANTS AND AWARDS

Professional Development Grant, Coulter Faculty Commons for Excellence in Teaching and Learning, 2014, $1200.

Travel support, Focus Program on Geometry, Mechanics, and Dynamics: The Legacy of Jerry Marsden, Fields Institute, 2012, $2100 CDN.

Faculty Research Grant Award, Graduate School and Research Administration, Western Carolina University, 2008, $5000.

Math/Science Public School Project, Asheville Middle School, Asheville City Schools, and School University Teacher Education Partnership, Western Carolina University, 2007, $1000.


INTERMATH Mini-Grant, COMAP, Inc. (funded by NSF grant DUE-9555414), 2002, $9850. Co-PI with Allen Holder, Department of Mathematics, Trinity University.

INTERMATH Adapt and Implement Mini Planning Grant, COMAP, Inc. (funded by NSF grant DUE-9555414), 2000, $5000. Co-PI with Allen Holder, Department of Mathematics, Trinity University.

Project Kaleidoscope Faculty for the 21st Century Fellowship, 2000.

ROA Supplement to NSF grant DMS-9802106, “Geometric Analysis of Mechanical Systems with Symmetry,” 1998, $10,000. PI: J.E. Marsden, Control and Dynamical Systems, California Institute of Technology.

John M. Bennett, Sr., Fellowship, Trinity University, 1998–2001, $15,000.

ROA Supplement to NSF grant DMS-9633161, “Geometry and Dynamics of Mechanical Systems with Symmetry,” 1997, $10,000. PI: J.E. Marsden, Control and Dynamical Systems, California Institute of Technology.


Research and Publication Fund, Graduate School, Wake Forest University, 1996, $500.


RESEARCH PUBLICATIONS


PUBLICATIONS ON TEACHING AND LEARNING


“Reforming the mathematics core for engineers and everyone else,” Mathematicians and Education Reform (MER) Forum Newsletter 16 no. 3 (2004), 6–9.


MASTERS’ PROJECTS (all at Western Carolina University)


“Kinematics and Dynamics of the Straight Lead,” Blake Queen, 2006, presented at Southeastern Section of the MAA, Charleston, SC, April 2008.


UNDERGRADUATE RESEARCH

“Geometric Phase and Parameterizations of Tori and Mobius Strips,” MATH 256 Honors Contract, Matthew Savarda, Western Carolina University, 2014.

“Tail-assisted Pitch Control in Lizards, Robots, and Dinosaurs,” Lauren Miller, MATH 256 Honors Contract, Lauren Miller, Western Carolina University, 2014.


“Muscles in Motion,” independent study, Shawn Rigdon, Western Carolina University, 2009, poster presented at the Undergraduate Research Expo, Cullowhee NC, April 2007.


“Discrete Euler-Lagrange Equations,” sophomore independent study project, Barbara McClain, Trinity University, 2002, presented at Texas Section, MAA, Mesquite, TX, April 2002.

“Exploring the Inside of a Black Hole,” senior project, Emily Peterek, Trinity University, 2001, presented at Texas Section, MAA, Houston, TX, April 2001.


COURSES TAUGHT

SELECTED SERVICE ACTIVITIES

Reviewer (abstracts), *Mathematical Reviews, Historia Mathematica.*


Department committees, Western Carolina University: Annual Faculty Evaluation; Departmental Collegial Review (Tenure, Promotion, and Reappointment); Post-tenure Review; Graduate; Undergraduate Curriculum; Contests and Awards; Faculty Searches in Mathematics and Computer Science (chair).

Task force to review C2 Liberal Studies requirement, Liberal Studies Program, Western Carolina University, 2007.

Faculty Representative, Barry M. Goldwater Scholarship Foundation, Trinity University, 2001–2003.

Co-advisor, National Scholarships, Department of Mathematics and Computer Science, Western Carolina University, 2005–2014.

Co-advisor, Undergraduate Contests, Department of Mathematics and Computer Science, Western Carolina University, 2005–2014.

Mentoring at Western Carolina University: Departmental junior faculty, 2008–2014; Coulter Faculty Center Mentoring Program, 2008–2006; First-year Faculty Mentoring Program, 2005–2006.

Mentor Jackets, Alumni Association, Georgia Institute of Technology, 2012–present.

Safe Zone Certification, Multicultural Affairs, Western Carolina University.


Reader, AP Calculus, College Board, 2003.

Nominating Committee, Texas Section, MAA, 2002–2003


MEMBERSHIPS

AMS, Association for Women in Mathematics, MAA, Mathematicians and Education Reform Forum, Phi Beta Delta International Honor Society, American Association of University Professors, SEANC.
Laura Setzer Lembeck  
Curriculum Vitae

210 Madison Road, Cullowhee, NC  28723
770-330-5409 (Cell)
llembeck@comcast.net

**SUMMARY STATEMENT**

My two areas of teaching research and expertise are in Mastery-Based Redesign Models, and in the blending the best of online and face-to-face classroom pedagogy. As a teacher in both developmental- and collegiate-level courses, I am passionate about my students’ ability to thrive as they continue their education well beyond our classroom. I am a popular instructor while receiving exemplary evaluations from my colleagues and administration.

I focus my efforts on preparing students academically, making learning enjoyable and enticing, and coaching students in varied learning methods. With eight years of classroom experience, at both the research institution level and the community college level, I have developed my teaching style to become ever more engaging, while providing a course platform that is conducive for student learning and retention of mathematical concepts and their usefulness. Through maintaining high academic standards, my students perform well on assessments. Classroom situations that arise can typically be resolved with an empathetic ear, and a solution-focused attitude.

I enjoy becoming an active member of my college community by supporting student government, clubs and competitions, sporting events, and by serving as a math ambassador by delivering presentations accessible to the college at large. I focus on providing support services to students and that encourage retention and academic success. I work well with other departments within the college, like the offices of Students with Disabilities, Student Athletes, Military Veterans Programs, and recruitment and advising.

This is my life’s work – I enjoy mentoring others regarding the learning of mathematics. I have been invited to share my research findings within the University System of Georgia as a presenter at conferences, as well as with educational publishers who want to design their platforms to support these learners.
Laura Setzer Lembeck  
Curriculum Vitae

**EMPLOYMENT HISTORY**

2013-Present  Instructor of Mathematics, Georgia Perimeter College/Alpharetta Center & Online Campus  
2013  Interim Department Chair, Georgia Perimeter College/Alpharetta Center  
2009-2012  Instructor of Mathematics, Georgia Perimeter College/Dunwoody & Alpharetta Campuses  
2007  Instructor of Mathematics, Florida Atlantic University, Boca Raton, FL  
2003-2006  Graduate Assistant, Florida Atlantic University, Boca Raton, FL  
1999-2000  Owner, Enterprise Telecommunications Consulting, LLC, Rocky Mount, NC  
1988-1991  Quality Assurance Manager, Tel Plus Communications, Boca Raton, FL  
1985-1988  Systems Design & Trainer, Tel Plus Communications, Tampa, FL  
1982-1985  Systems Design & Trainer, East West Telecommunications, Asheville, NC

**ACADEMIC ACHIEVEMENT**

2006  MS, Mathematics, 3.56 GPA  Florida Atlantic University, Boca Raton, FL  
1983  BS, Computer Science, 3.71 GPA  Western Carolina University, Cullowhee, NC  
1982  BS Ed, Mathematics, 3.45 GPA  Western Carolina University, Cullowhee, NC

**HONORS & SPECIAL RECOGNITION**

2012  Nominee, 2012 GPC Teaching Excellence Award  
2011  Honoree, Influential Faculty Member GPC Alpha Zeta Mu Chapter of Phi theta Kappa Honor Society  
2006  Inducted Member, Florida Atlantic University’s Parliament of Owls  
2000  North Carolina Governor’s Volunteer of the Year Award  
1988  Inducted Member, Siemens’ National Circle of Excellence  
1986  National Finalist, Siemens Saturn System Design & Training Contest  
1982  WCU Mathematics Competition Scholarship, National Merit Scholar

**PRACTICES & PERFORMANCE IN MATHEMATICS**

Attendee AMATYC National Conference (GMATYC Delegate) 2014  
Invited attendee ALEKS Corporation SuperUsers’ Group, 2013  
GPC representative USG Conference on Transforming Math (Complete College Georgia) 2012  
25th Annual Georgia Perimeter College Mathematics Conference Redesign Panel of Experts 2012  
Invited Attendee Pearson Developmental Math Forum 2011  
GPC representative NCAT Redesign Alliance Conference, 2010  
Annual Georgia Perimeter College Math Conference 2010 - 2014  
Member of MAA & AMS 2007-2010  
Member AMAYTC & GMATYC 2011-Present
Laura Setzer Lembeck  
Curriculum Vitae

Presentation and Publications


“Life after Math 98 - Which class should I take next?” Georgia Perimeter College Academic Advising 2012

“Alpha or Omega – A Redesign in Progress at the GPC Alpharetta Center” 24th Annual Georgia Perimeter College Mathematics Conference, 2011 & GPC MCSE Faculty Development Day 2011

“Math 0098 Redesign Textbook Discussion” GPC MCSE Faculty Development Day 2011

“Learning Platforms in Redesign Mode” Concurrent Session, GPC MCSE Faculty Development Day 2011

“Breaking the Enigma Encryption System” Georgia Perimeter College World War II Symposium 2011

Meetings, Conferences, Workshops for Post-Secondary Education

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<tr>
<th>Teaching</th>
<th>Technology</th>
<th>Civic Engagement / Service / General Interest</th>
<th>Online &amp; Blended Learning</th>
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<tr>
<td>AMATYC National Conference (GMATYC Delegate)</td>
<td>GPC iCollege Workshops, Degree Works, PeopleSoft</td>
<td>GPC Military Outreach</td>
<td>GPC OIT / CTL Webinar “Online and Blended Learning”</td>
</tr>
<tr>
<td>USG Finding Using and Creating Open Educational Resources</td>
<td>GPC T^2 Teaching and Technology Conference</td>
<td>GPC STEM Talk Series</td>
<td>Sloan Consortium, Successful Online Outcomes (Group Work)</td>
</tr>
<tr>
<td>AACU PKAL Program</td>
<td>USG Webinar Managing Grades in D2L, Learn without Leaving</td>
<td>GPC Advising Training &amp; Enrichment Series</td>
<td>GPC TOWI (Teaching Online with iCollege), AsSOFT (Asynchronous/Synchronous Online Faculty Teaching)</td>
</tr>
<tr>
<td>GPC Student Learning Assessment, Math Across the Curriculum</td>
<td>Pearson Teaching Using MML and D2L, Addressing the College Readiness Crisis Webinar</td>
<td>GPC Donuts and Dialogue (Civic Engagement/Service Learning)</td>
<td>McGraw Hill ALEKS Reporting/eTextbook Workshop</td>
</tr>
<tr>
<td>GPC Center for Teaching and Learning New Faculty Academy</td>
<td>GPC Instructional Media Workshop</td>
<td></td>
<td>Pearson Visit to Cleveland State Community College for Redesign, Pearson Course Redesign Workshops</td>
</tr>
</tbody>
</table>
# Laura Setzer Lembeck
## Curriculum Vitae

### Service at GPC

<table>
<thead>
<tr>
<th>GPC</th>
<th>Math / CS Division</th>
<th>Campus</th>
<th>Community</th>
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</thead>
<tbody>
<tr>
<td>Convocations, Faculty Development Days, Commencement Exercises, Title IX Hearing Panel</td>
<td>Committees: Executive Committee, Math 97, Math 98 Redesign Committee Chair, Chair Liaison, Member</td>
<td>Faculty Mentoring / Special Assignments: Project RAISE ALFS, Campus Rep Math 98 Committee, iCollege Expert</td>
<td>GPC ALPH Web Site Design &amp; Implementation 2012 GPC ALPH Open House</td>
</tr>
<tr>
<td>Nominations for student candidates to Jack Kent Cooke Foundation, “Allen Entrepreneurial Institute” Circle of Excellence, Honors Program</td>
<td>Nominations for student candidates to Student of the Semester each Section, AMATYC Student Math League Competition</td>
<td>SGA/JAG Student Activities: Welcome Week, Student Activity Fee Budget, Spring Outdoor Movie Spring Fling Volunteer</td>
<td>GPC ALPH Dual Enrollment Outreach</td>
</tr>
<tr>
<td>Attendance at Student/Faculty Events</td>
<td>PILOT Programs: Tested use of iPad for Instructors in Redesign Setting Alpharetta Mini-Redesign, GPC Redesign</td>
<td>Advising Activities: “Ask Me” Volunteer, New Student Orientation, Involvement Expo, Academic Exclusion, Military Outreach advisor</td>
<td>Elementary School Math Competition Committee</td>
</tr>
<tr>
<td>Search Committees</td>
<td>Advisor and Liaison to Project RAISE, MCSE Redesign Tours, McGraw Hill / ALEKS Technology and Program Administration Support, Bookstore Advisory Council, LS SACS Report</td>
<td>Collegiality: “We Did It” Organizer, “Holiday Potluck,” SGA President Baby Shower Host</td>
<td>Student Funerals, Distraught Students</td>
</tr>
<tr>
<td>LTC Coordinator, MCSE Department Chair Alpharetta, Assistant Dean of Student Services Alpharetta, MCSE Lecturer</td>
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</tbody>
</table>
Laura Setzer Lembeck  
Curriculum Vitae  

**Professional References**

**Margaret Ehrlich**  
Academic Division Dean, Math, Computer Science & Engineering, Georgia Perimeter College  
Office: NA-2140, 2101 Womack Road, Dunwoody, GA 30338-4435  
Phone #: (770) 274-5830  
Email: Margaret.Ehrlich@gpc.edu  

**Ms. Kim Bennett**  
Department Chair, Math, Computer Science & Engineering, Online Campus, Georgia Perimeter College  
Office: CL-1225 3251 Panthersville Road, Decatur, GA 33-34-3832  
Phone #: Current (678) 983-0652  
Email: Kim.Bennett@gpc.edu  

**Susan Cody-Rydzewski, Ph.D.**  
Campus Dean of Academic Services, Alpharetta Center, Georgia Perimeter College  
Office: 3705 Brookside Parkway, Alpharetta, GA 30022  
Phone #: (678) 240-6000  
Email: Susan.Cody@gpc.edu  

**Alan Craig**  
Director, Learning and Tutoring Centers, Georgia Perimeter College  
Office: NLR 3350, 2101 Womack Road, Dunwoody, GA 30338-4435  
Phone #: (770) 274-5242  
Email: Alan.Craig@gpc.edu  

**Markus Schmidmeier**  
Associate Professor, Mathematical Sciences, Florida Atlantic University  
Office: SE 230, 777 Glades Road, Boca Raton, FL 33431-0991  
Phone #: (561) 297-0275  
Email: mschmidm@fau.edu  

**Lee Klingler**  
Chair & Professor, Mathematical Sciences, Florida Atlantic University  
Office: SE 228, 777 Glades Road, Boca Raton, FL 33431-0991  
Phone #: (561) 297-3257  
Email: klingler@fau.edu
Erin K. McNelis  
P.O. Box 1424  
Cullowhee, NC 28723  
Home: (828) 586-6733  
Office: (828) 227-3947  
E-Mail: emcnelis@email.wcu.edu

Education

Ph.D., Mathematical Sciences  
Clemson University, Clemson, SC  
Concentration: Mathematical Biology, Numerical Methods.  
Dissertation: “Using a Circadian Rhythms Model to Identify Optimal Shift Work Schedules”  
Advisor: Dr. Michael M. Kostreva

M.S., Mathematical Sciences  
Clemson University, Clemson, SC  
Concentration: Analysis.  
Project: “A Look into the Pumping Action of the Heart: The Physiological and Mathematical Aspects”  
Advisor: Dr. James K. Peterson

B.S., Mathematics, magna cum laude  
College of Charleston, Charleston, SC

Experience

Associate Professor  
Western Carolina University, Cullowhee, NC  
August 2008 - present

Assistant Professor  
Western Carolina University, Cullowhee, NC  
August 2002 - July 2008

Courses taught:  
• College Algebra  
• Statistics, Functions, and Rates of Change  
• Introductory Calculus  
• Precalculus  
• Applied Statistics  
• Mathematical Models of Population Growth  
• Introduction to Logic and Proof  
• Calculus II  
• Calculus III  
• Ordinary Differential Equations  
• Introduction to Scientific Computing  
• Probability and Statistics I  
• Introduction to Numerical Analysis  

• Linear Optimization  
• Linear Algebra  
• Problem Solving for Actuarial Exam P  
• Introduction to Functional Analysis  
• Numerical Analysis  
• Numerical Linear Algebra  
• Matrix Analysis  
• Matrix Theory  
• Topics in Teaching AP Calculus  
• Topics in Mathematical Modeling  
• Advanced Topics in Numerical Analysis  
• Topics in Mathematics Education

Teaching Assistant  
Clemson University, Clemson, SC  
August 1994 - May 2002

Taught primarily freshman and sophomore level classes in the Mathematical Sciences. Responsibilities included preparation and delivery of all lectures; development of supplementary materials; design and grading of daily assignments, quizzes, tests, and projects; service on test writing committees; design of course syllabus; maintenance of course web-sites; instruction in use of technology; assistance in general calculus lab. Courses taught: Precalculus, Introduction to Math Analysis, Calculus of One Variable, and Calculus of Several Variables.
**Instructor**  
Tri-County Technical College, Pendleton, SC  
May 2001 - August 2001  
Taught Analytical Geometry and Calculus I. Responsibilities included preparation and delivery of all lectures; design and grading of daily assignments, quizzes, and tests; instruction in the use of technology.

**Instructor**  
Greenville Technical College, Greenville, SC  
May 1998 - August 1998  
Taught Analytical Geometry and Calculus II. Responsibilities included preparation and delivery of all lectures; design and grading of daily assignments, quizzes, and tests; instruction in the use of technology.

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**Teaching Honors and Awards**

- **College of Arts and Sciences Teaching Award Finalist**  
  Western Carolina University, Cullowhee, NC  

- **College of Engineering and Science Outstanding Graduate Teaching Assistant Award**  
  Clemson University, Clemson, SC  
  1999 - 2000

- **Outstanding Graduate Teaching Assistant Award**  
  Mathematical Sciences Department, Clemson University, Clemson, SC  

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**Professional Memberships**

- North Carolina Council of Teachers of Mathematics
- Society for Industrial and Applied Mathematics
- Society for Mathematical Biology
- Mathematical Association of America
- The Consortium for Mathematics and Its Applications

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**Research Interests**

- **Mathematical Biology**  
  Use of mathematics in modeling biological processes such as circadian rhythms, angiogenesis (development of new blood vessels and vasculature), cardiac rhythms, and neural signal conduction.

- **Mathematical and Computational Ecology**  
  Use of mathematics in modeling ecological processes such population growth (single species, interacting species, stochastic populations, metapopulations) and modeling spread of disease.

- **Computational Science**  
  Effective use of models and computational tools in teaching to stimulate student interest both visually and technologically; enhance student observation, analysis, and evaluation skills; promote interdisciplinary collaboration and curricular synthesis; and facilitate experimentation otherwise limited by issues of time, size, complexity, funding, or practicality.

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**Selected Professional Grants, Honors and Awards**

- Western Carolina University Chancellor’s Travel Fund to attend the 2013 Joint Mathematics Meetings in San Diego, California to give a presentation. Fall 2012. ($1,200.00)

- Western Carolina University Micro-Grant to attend the AMS-MER Workshop on Excellence in Undergraduate Mathematics in Phoenix, AZ as part of a team (with Dr. Jeffrey Lawson) for the Department of Mathematics
and Computer Science. Fall 2005. ($409.79)

Western Carolina University Provost’s Instructional Improvement Grant to purchase the statistical software package, Fathom, and develop instructional guides and teaching modules for use in a variety of statistics courses (with Nicholas Norgaard). April 2005. ($1,176.95)


EdGrid Subgrant through The Shodor Education Foundation to develop stand-alone modules that promote the use of computational modeling and visualization that can be incorporated in the pre-service mathematics and science education classes, as well as used in entry-level college classes. Fall 2003. ($10,000).

Western Carolina University Micro-Grant to attend the Teaching Contemporary Mathematics Conference in Durham, NC. Spring 2003. ($408.00)

Western Carolina University Micro-Grant to attend the 2003 Joint Mathematics Meetings in Baltimore, MD participate in the “Getting Students Interested in Undergraduate Research” workshop. Fall 2002. ($570.00)

SIAM-SEAS Student Presentation Award (2nd Place) at the 2002 SIAM - SEAS Student Conference, Western Carolina University, Cullowhee, NC, 2002

**Refereed Publications**


**Non-Refereed Publications**


Selected Conference, Seminar and Workshop Presentations


“H1N1 and Mathematics? Modeling the Spread of Disease.” North Buncombe Middle School, Weaverville, NC, December 2012. (Also presented at the following locations and dates: Hayesville Middle School, February 2011, Rutherford Early College High School, December 2010; Swain High School, February 2010; Sonya Kovalevsky Day, WCU, February 2010.)

“Individual (Agent) - Based Models in Mathematical Modeling.” Mathematical Association of America (MAA) - Southern Atlantic Section (SEAS) Conference, March 2012.


“Discovering the Mathematics in Computational Biology” Mathematics Seminar, Stetson University, October 19, 2006.

“Dissemination of Quantitative Biology.” The Institute for Mathematical Biology Education and Research (TIMBER), Appalachian State University, November 5, 2005.

“Sleep and the Shift Worker: A Mathematical Biology Approach to an Age-Old Problem.” Georgia Vigre Seminar, University of Georgia, Athens, GA, October 25, 2005.


“Using a Circadian Rhythms Model to Develop Optimal Shift Work Scheduling.” Biology Seminar, Western Carolina University, NC November 2004.


“Population Modeling in the Classroom.” North Carolina Council of Teachers of Mathematics Conference (NCCTM), Greensboro, NC, October 8, 2004 (with Robin Franklin, Jennifer Hanson, and Rebecca Horton).


“Using a Circadian Rhythms Models to Identify Optimal Shift Work Schedules” presented at the SIAM-SEAS Student Conference, Western Carolina University, Cullowhee, NC, April 2002.

Workshops Lead

National Computational Science Institute (NCSI) Introduction to Computational Thinking Workshop at Louisiana State University, July 31 - August 6, 2011.


M4M Technology Workshop for In-Service Teachers on Using Technology to Facilitate Discovery in Statistics Courses at Western Carolina University, October 11, 2009.


National Computational Science Institute (NCSI)/ Mathematical Association of America (MAA) Prep Workshop on Computational and Theoretical Biology for Biology and Mathematics Educators at Sweet Briar College, June 18 - 23, 2006.

NCSI/MAA Prep Workshop on Computational and Theoretical Biology for Biology and Mathematics Educators at Harvey Mudd College, July 31 - August 6, 2005.

NCSI First Look Workshop at Union College, June 26 - July 2, 2005.


NCSI First Look Workshop at University of Illinois and NCSA, July 6 - 12, 2003.
Student Research Directed


“Matrix Decomposition with Applications.” Megan Cavanah Master’s Project, M.S. in Applied Mathematics, Spring 2011.


Selected Professional Leadership Positions

**Member, Search Committee for Senior Vice President of Academic Affairs**

July 2014 - present
University of North Carolina System, Reporting to President Tom Ross, Chapel Hill, North Carolina

**Member, Search Committee for Associate Provost**

February 2014 - June 2014
Western Carolina University, Cullowhee, NC

**Member, General Education Council**

December 2013 - present
University of North Carolina System, Reporting to Senior Vice President of Academic Affairs Suzanne Ortega, Chapel Hill, NC

**Past Chair of the Faculty**

July 2013 - June 2014
Western Carolina University, Cullowhee, NC

**Co-Chair, General Education Council**

April 2013 - November 2013
University of North Carolina System, Reporting to Senior Vice President of Academic Affairs Suzanne Ortega Chapel Hill, NC

**Member, Faculty Advisory Council**

September 2012 - present
Reporting to the University of North Carolina Strategic Planning Committee, Chapel Hill, NC

**Vice Chair of the Faculty**

July 2012 - June 2013
Western Carolina University, Cullowhee, NC

**Member, Chancellor’s Leadership Council**

August 2011 - June 2013
Western Carolina University, Cullowhee, NC
Chair of the Faculty  
Western Carolina University, Cullowhee, NC  
July 2010 - June 2012

Faculty Assembly Delegate  
Western Carolina University, Cullowhee, NC  
July 2010 - June 2012

Graduate Program Director, M.S. in Applied Mathematics  
Western Carolina University, Cullowhee, NC  
July 2009 - July 2012

Secretary of the Faculty  
Western Carolina University, Cullowhee, NC  
July 2008 - June 2010

Senator, College of Arts & Science  
Western Carolina University, Cullowhee, NC  
Education

2013  **Master of Science, Applied Mathematics, Western Carolina University.**  
Program GPA: 3.700.

2011  **Bachelor Science, Mathematics, Western Carolina University.**

2011  **Bachelor Science, Business Administration & Law, Western Carolina University.**  
Undergraduate GPA: 3.671 (*cum laude*). Honors College graduate.

Experience

2014-15  **Lecturer, Western Carolina University, Cullowhee, NC.**  
Taught MATH 146 (Precalculus) and MATH 153 (Calculus I).

2014  **Adjunct instructor, AB Tech Community College, Asheville, NC.**  
Taught MAT 140 (Survey of Mathematics) and MAT 171 (Precalculus Algebra).

2012-13  **Graduate assistant, Western Carolina University, Cullowhee, NC.**  
Taught Math 130 (College Algebra). Worked in Mathematics Tutoring Center, which provides drop-in tutoring services for undergraduate mathematics courses.

2010  **Tutor, Western Carolina University, Cullowhee, NC.**  
Worked in CAT Center, tutoring undergraduate business courses.

Master Thesis

**Title**  *Covering & Partition Numbers*

**Supervisor**  Tuval Foguel

**Description**  Defined the partition number of a group analogously to the covering number, and derived various results connecting the two.

Publications

2014  Partition Numbers of the Dihedral Groups.  (under review after revision)

Awards

2013  Dean’s Outstanding Scholar  
Received annually by one graduate student in the math department

Conferences Attended

2013  SERMON 2013, High Point University, High Point, NC.

2013  UNCG RMSC, University of North Carolina - Greensboro, Greensboro, NC.

2013  MAA Southeastern Section Annual Meeting, Winthrop University, Rock Hill, SC (Presentation given)

124B Halycon Hill Rd. – Swannanoa, NC 28778  
 (704) 778-7926  •  ¤ ncsizemore1@catamount.wcu.edu
2012 UNCG RMSC University of North Carolina - Greensboro, Greensboro, NC. (Presentation given)

2012 SERMON 2012, Western Carolina University, Cullowhee NC.

**Computer skills**

**Basic**  R, Mathematica

**Intermediate**  HTML, Matlab, PHP, \LaTeX

**Tools**  GAP (Groups, Algorithms, Programming)

**Miscellaneous**  Windows, Mac OS, Linux
A Curriculum Vitae

John C. Wagaman
Western Carolina University
Department of Mathematics and Computer Science
426 Stillwell Science, Cullowhee, NC 28723
(828) 227-3945
jcwagaman@wcu.edu

Education

Ph.D., Statistics, Texas A&M University 2003-2009
  Dissertation Title: “Model-based Pre-processing in Protein Mass Spectrometry”
  Advisors: Jianhua Huang and Webster West
M.S., Statistical Computing, University of Central Florida 2001-2003
B.S., Mathematics, Millersville University 1997-2001

Academic Experience

Assistant Professor, Western Carolina University 2009-Present
Graduate Teaching Assistant, Texas A&M University 2003-2009
Graduate Non-Teaching Assistant, Texas A&M University 2008
Graduate Teaching Assistant, University of Central Florida 2001-2003

Teaching

Courses Taught at Western Carolina University

  Calculus I (MATH 153)
  Applied Statistics (MATH 170)
  Statistical Methods I (MATH 270)
  Probability and Statistics I (MATH 370)
  Theory of Interest for Actuarial Exam FM (MATH 373)
  Statistical Methods II (MATH 375)
  Probability and Statistics II/Statistical Theory II (MATH 470/570)
Problem Solving for Actuarial Exam P (MATH 471/571)
Design of Experiments (MATH 672)
Applied Linear Regression (MATH 674)
Master’s Project (MATH 679)
Thesis (MATH 699)

Courses Taught at Texas A&M University

Elementary Statistical Inference (STAT 201)
Statistical Methods (STAT 302) (for biological sciences)
Statistical Methods (STAT 303) (for social sciences)
Sample Survey Techniques (STAT 307)

Courses Taught at University of Central Florida

Basic Statistics Using Microsoft Excel (STA 1060) (as a lab instructor)
Statistical Methods I (STA 2023)

Scholarship

Refereed Journal Articles

Published/Accepted


Under Review


In Preparation/Revision

M. Chockla and J. Wagaman. Statistical Analysis of Student Performance in Redesigned Developmental Mathematics Courses.


Refereed Conference Proceedings


Invited Presentations


Conference Presentations


J. Wagaman. Bored with the Board: Collecting Data in Introductory Statistics. Presented at the Annual Meeting of the Mathematical Association of America, Southeastern Section, Clayton State University. Atlanta, GA. March 2012.


Service

Service to the University

Service to the Department (At Western Carolina University)

Chair. Awards Committee. August 2014–Present

Member. Graduate Committee. August 2009–Present

Advisor. Student Affiliate Chapter of the Mathematical Association of America (Math Club). August 2010–Present

Member. High School Math Contest Committee. August 2011–Present

Member. Mathematics Curriculum Committee. August 2013–May 2014

Member. Math Placement Test Committee. August 2010–May 2011

Member. Brochure and Display Committee. January 2010–May 2010

Member. QEP Committee. August 2009–May 2011

Service to the Institution (At Western Carolina University)

Statistical Consultant. I have served as a statistical consultant (both formally and informally) for a large number of people at Western Carolina including faculty, staff and students.

· I provided statistical consultation for Cory Howk, Assistant Professor of Mathematics (and undergraduate student Michelle Coker) with analysis of weather balloon data.

· I provided (and am providing) statistical consultation for the Office of Institutional Planning and Effectiveness for redesigning mathematics placement criteria and identifying students at highest risk of earning DWF in undergraduate mathematics courses.

· I provided (and am providing) statistical consultation for two graduate students in the Nurse Anesthesia Program under the guidance of Mark Kossick, Associate Professor of Nurse Anesthesiology, in July 2014.

· I provided statistical consultation and SPSS computing support for WCU Office of Equal Opportunity towards NCAA compliance in October 2012.

· I provided statistical consultation for professor Hal Herzog, Professor of Psychology, for his blog on Huffington Post in July 2012.
· I provided statistical consultation in support of WCU Construction Management professor Jack Patterson in April 2012.


*Member.* Academic and Admissions Appeals Board. November 2009–Present

*Member.* Chancellor’s Travel Fund Committee. August 2013–Present

**Service to the Department** (At Texas A&M University)

*Organizer.* Graduate Student Tutoring Directory. August 2007–August 2009

*Representative.* Graduate Student Council. August 2006–May 2009

**Service to the Institution** (At Texas A&M University)

*Member.* Transportation Services Bicycle Sub-committee. January–May 2009


*Judge.* Student Research Week. March 27, 2008


**Service to the Department** (At University of Central Florida)

*President.* Actuarial Science Club. August 2002–May 2003

**Service to External Constituencies**

I refereed “The Effect of Project-Based Learning on Students’ Statistical Literacy Levels for Data Representation” for International Journal of Mathematics Education in Science and Technology in August 2014.

I provided statistical consultation for Penn State graduate student and Pennsylvania public educator Eric Narkiewicz in helping him analyze his survey results in November 2013.

I refereed “A Multi-class, Interdisciplinary Project Using Elementary Statistics” and “Including an Exam P/1 Prep Course in a Growing Actuarial Science Program” for PRIMUS (Problems, Resources and Investigations in Mathematics Undergraduate Studies) in May 2011 and September 2013, respectively.

**Service to Students**

*Advisor.* Thesis Committee for Jamie Rowell. August 2014–Present

*Advisor.* Master’s Project Committee for Vicki Todd. August 2014–Present


I provided statistical consultation for undergraduate student Jared Wheatley towards analysis of economic data in October 2012.

I provided statistical consultation for undergraduate student Peyton Flinchum towards analysis of transthyretin data in August 2012.
Advisor. Master’s Project Committee for Brandi Fox. January-May 2013

Member. Master’s Project Committee for Adam Flaherty. January-May 2012

Member. Master’s Project Committee for Brittany Burch. January-May 2012


I provided statistical consultation in the support of M.S. Nursing thesis student Victoria Harlan-Allison in April 2012.

I provided statistical consultation in the support of Graduate Research Symposium presenters Susannah Genz and Katie Reisinger and in the support of paper submission at 2012 ASHA (American Speech and Hearing Association) Convention in January 2012.

I provided statistical consultation in the support of Ed. D. Educational Leadership student Elizabeth Younce in March 2011.


Advisee Listing (Fall 2010-Present): Christopher Beasley, Dorian Barrier, Miranda Caffee, Adam Gropp, Jacqulin Karam, Jarvis Kitson-Mills, Cynthia Lundy, Michelle McDuffie, Christopher Meade, Jade Moses, Kody Murray, Alex Oberhofer, Corvin Parker, Alison Parnther, Jamie Rowell, Kyle Smith

Awards

AFS Distinguished Graduate Student Award for Teaching Excellence, Texas A&M University, 2006

College of Science AUF Fellowship, Texas A&M University, 2003

Graduate Incentive Fellowship, University of Central Florida, 2001
# Deborah F. Walters
251 Henderson Blvd  
Zirconia, NC 28790  
828-696-2186

## Education

<table>
<thead>
<tr>
<th>Institution</th>
<th>Location</th>
<th>Degree</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Carolina University</td>
<td>Cullowhee, NC</td>
<td>Master of Science in Applied Mathematics</td>
<td>August, 2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Cumulative GPA: 4.0</em></td>
<td></td>
</tr>
<tr>
<td>University of North Carolina at Asheville</td>
<td>Asheville, NC</td>
<td>North Carolina Teaching Certification</td>
<td>May, 1982</td>
</tr>
<tr>
<td>North Carolina State University</td>
<td>Raleigh, NC</td>
<td><em>18 graduate hours in statistics</em></td>
<td>August, 1980-May, 1981</td>
</tr>
<tr>
<td>Bryan College</td>
<td>Dayton, TN</td>
<td>Bachelor of Arts in Mathematics</td>
<td>May, 1980</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Graduated Summa Cum Laude</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Received Senior Mathematics Award</em></td>
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</tr>
</tbody>
</table>

## Teaching Experience

<table>
<thead>
<tr>
<th>Institution</th>
<th>Location</th>
<th>Position</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Carolina University</td>
<td>Cullowhee, NC</td>
<td>Mathematics Instructor</td>
<td>August, 2004- present</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Taught 4-5 sections per semester with average of 33 students per section</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Responsible for preparing presentation of material, grading, and assisting students outside of class</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Courses taught: Mathematical Concepts, Statistics Functions and Rates of Change, College Algebra, Applied Statistics</td>
<td></td>
</tr>
<tr>
<td>Western Carolina University</td>
<td>Cullowhee, NC</td>
<td>Graduate Teaching Assistant</td>
<td>August, 2003-May,2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Taught 1 section of Mathematical Concepts per semester with average of 32 students per class</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Responsible for preparing presentation of material, grading, and assisting students outside of class</td>
<td></td>
</tr>
<tr>
<td>Faith Christian School</td>
<td>Hendersonville, NC</td>
<td>Interim Principal</td>
<td>August, 2000-May, 2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Taught AP Calculus and Plane Geometry</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mentored faculty in their classroom teaching</td>
<td></td>
</tr>
</tbody>
</table>
Faith Christian School                     Hendersonville, NC
  High School Math Teacher                     August, 1982 – May, 2000
  • Taught AP Calculus, Pre-Calculus, Algebra II, Plane Geometry, Algebra I, PreAlgebra
  • Coached Girls Basketball and Volleyball

Departmental Service

Member of the Mathematics Department Graduate Committee, Fall 2004 – Spring 2005

Member of the Mathematics Curriculum Committee, Fall 2005 – Spring 2006

Member of the Mathematics Education Committee, Fall 2006 – Spring 2007
  • Responsible for collection of materials used as evidence for accreditation guidelines
  • Responsible for documentation of evidence in compliance with accreditation standards

Mentored graduate teaching assistants, Fall 2006 – Spring 2014
  • Advised as to the pacing of their course
  • Critiqued their evaluation procedures and tests
  • Observed their classroom instruction
  • Completed written evaluation of the observations
I. Overview – The Department of Mathematics and Computer Science establish the following policies, procedures, and criteria for faculty evaluation for the purposes of 1) informing faculty members how their work is being evaluated, 2) encouraging faculty members to bring their work to a high level of professional quality, 3) promoting continuing professional development of faculty members; 4) providing a consistent, professional basis for assessments when decisions regarding the status of the faculty member are being made. The document is guided first and foremost by The Code of the UNC system and secondly by the Faculty Handbook of Western Carolina University. While this document is intended to be comprehensive and precise with regard to department-level criteria and procedures, the faculty member should have familiarity with The Code and with the WCU Faculty Handbook (Section 4.0).

II. Domains of Evaluation
Although the domains of evaluation speak directly to teaching, scholarship, and service, the department recognizes the importance of integration and values holistic activities that exhibit components of teaching, scholarship, and service which cannot be separated easily. It is at the discretion of the faculty member to determine the most appropriate domain(s) to document the components of the integrative activities. Peer review of materials will be conducted as indicated in Section III of this document.

A. Teaching (Faculty Handbook Section 4.04 & 4.05)
   1. Teaching effectiveness is evaluated according to the following three areas:
      a. Pedagogical Content Knowledge – This area includes content expertise and instructional design skills. Content expertise includes the skills, competencies, and knowledge in a specific subject area in which the faculty member has received advanced experience, training, or education. Instructional design refers to the design of course objectives, syllabi, materials, activities, and experiences that are conducive to learning.
         i. Evidence may include but is not limited to:
            • Professional preparation and experience
            • Competence in course content
            • Currency in scholarship
            • Currency in pedagogical design
• Course development
• Organization of course and syllabus
• Appropriate course workload
• Preparation for class

ii. Documentation may include but is not limited to:
(required documentation is denoted by a *)
• Self evaluation*
• Peer review of course materials*
• Sample course materials

b. Professional Aspects of Teaching - This area includes instructional delivery skills, course management skills, and evaluation of students. Instructional delivery skills refer to communicating information clearly, creating environments conducive to learning, and using an appropriate variety of teaching methods. Course management skills refer to giving timely feedback to students, making efficient use of class time, and handling classroom dynamics, interactions, and problematic situations (e.g., academic dishonesty, tardiness, etc.) appropriately. Evaluation of students refers to designing assessment procedures appropriate to course objectives, ensuring fairness in student evaluation and grading, and providing constructive feedback on student work.

i. Evidence may include but is not limited to:
• Classroom presentation
• Organization of class time
• Efficient use of class time
• Grading and general fairness
• Timely feedback given to students

ii. Documentation may include but is not limited to:
(required documentation is denoted by a *)
• Self evaluation*
• Peer observation
• Peer review of course materials*
• Sample course materials
• University student assessment of instruction (SAI) and Departmental student evaluations.*

c. Student Response to Instruction -- This area includes facilitation of student learning and faculty/student relationships. Facilitation of student learning refers to maintaining high academic standards, preparing students for professional work and development, facilitating student achievement, and providing audiences for student work. Faculty/student relationships refers to displaying a positive
attitude toward students, showing concern for students by being approachable and available, presenting an appropriate level of intellectual challenge, supporting student learning, and respecting diversity.

i. Evidence may include but is not limited to:
   • Demonstrating interest in student learning
   • Encouragement of classroom participation
   • Availability to students and effective student guidance
   • Maintenance of rapport with students
   • Fostering student interest in subject

ii. Documentation may include but is not limited to:
   (required documentation is denoted by a *)
   • Self evaluation
   • Peer observation
   • Peer review of course materials
   • Sample course materials
   • University student assessment of instruction (SAI) and Departmental student evaluations.

2. Possible sources of evidence for evaluation of teaching (4.05.B.2)
   • Self evaluation
   • Sample teaching materials
   • Peer review of course materials
   • Peer observation of classroom teaching
   • Student assessment of instruction (SAI) and Departmental Student Evaluations

3. General comments – Professional development activities in the area of teaching are also positively valued and should be described and documented as appropriate for the specific review event.
Overview: Evaluation of Teaching – 3 Areas with Evidence and Documentation

<table>
<thead>
<tr>
<th>Evaluative Measures</th>
<th>Pedagogical Content Knowledge</th>
<th>Professional Aspects of Teaching</th>
<th>Student Response to Instruction</th>
</tr>
</thead>
</table>
| Evidence (may include but is not limited to) | • Professional preparation and experience  
• Competence in course content  
• Currency in scholarship  
• Currency in pedagogical design  
• Course development  
• Organization of course and syllabus  
• Appropriate course workload  
• Preparation for class | • Classroom presentation  
• Organization of class time  
• Efficient use of class time  
• Grading and general fairness  
• Timely feedback given to students | • Demonstrating interest in student learning  
• Encouragement of classroom participation  
• Availability to students and effective student guidance  
• Maintenance of rapport with students  
• Fostering student interest in subject |
| Artifacts (may include but is not limited to) (Required documentation is denoted with a *) | • Self evaluation*  
• Peer review of course materials  
• Sample course materials | • Self evaluation*  
• Peer observation  
• Peer review of course materials  
• Sample course materials  
• University SAI and Departmental student evaluations.* | • Self evaluation*  
• Peer observation  
• Peer review of course materials  
• Sample course materials  
• University SAI and Departmental student evaluations.* |

A. Scholarship and Creative Works (4.05C) WCU recognizes as legitimate forms of scholarly activity the four 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.

Scholarship of discovery – Original research that advances knowledge.
Scholarship of integration – Synthesis of information across disciplines, across topics, or across time.
Scholarship of application – Application of disciplinary expertise with results that can be shared with and/or evaluated by peers.
Scholarship of teaching and learning – Systematic study of teaching and learning processes.

Sources of evidence for evaluation of scholarship—The department values a variety of types of scholarship, and
Scholarship must be externally peer reviewed by a recognized organization and be disseminated. Forms of evidence of scholarship can include but are not restricted to the following:

Modified from: Boyer's Model of Scholarship by Marta Nibert, Educational Consultant for Occupational Therapy (http://www.perest.com/PC/FGB/BoyerModel.pdf)

<table>
<thead>
<tr>
<th>Type of Scholarship</th>
<th>Purpose</th>
<th>Measures of Performance</th>
</tr>
</thead>
</table>
| Discovery           | Build new knowledge through traditional research. | • Publishing in peer-reviewed forums  
• Presenting in professional forums  
• Designing original projects and investigations, including work in progress |
| Integration         | Interpret the use of knowledge within or across disciplines | • Publishing in peer-reviewed forums  
• Presenting in professional forums  
• Preparing a comprehensive literature review  
• Writing a textbook  
• Creating a substantive body of original content material, educational tools, and/or applications  
• Directing undergraduate and graduate student research that results in professional presentations or publications  
• Presenting in non-professional forums  
• Writing grant applications to fund original projects and investigations; successful grant proposals are valued most highly. |
| Application         | Aid society or discipline in addressing problems. | • Publishing in peer-reviewed forums  
• Presenting in professional forums  
• Serving as an external consultant  
• Editing, peer reviewing, and other scholarly contributions to professional organizations  
• Designing and/or delivering an extended seminar or workshop  
• Implementing original projects and investigations, including work in progress  
• Writing grant applications to fund society or disciplinary initiatives; successful grant proposals are valued most highly. |
| Teaching and Learning | Enhance knowledge of | • Publishing in peer-reviewed forums  
• Presenting in professional forums |
| discipline, teaching models, and teaching practices. | • Advancing learning theory through classroom research  
• Developing and testing instructional materials that results in professional presentations or publications  
• Designing and implementing a research-based program-level assessment system that results in professional presentations or publications  
• Directing undergraduate and graduate student research that results in professional presentations or publications  
• Writing grant applications to fund curriculum research and development; successful grant proposals are valued most highly. |

General comments – Professional development activities in the area of scholarship are also positively valued and should be described and documented as appropriate for the specific review event. Examples include  
- Participating in short courses, seminars, workshops, and professional meetings  
- Participating in activities to maintain currency in the discipline

B. Service (4.04C3 & 4.05D)  
1. Service is any activity that provides support, based on an individual’s expertise and/or interests, to the program areas, department, college, university, profession, or community. Forms of service include but are not restricted to the following:  
   • Institutional service  
   • Community engagement  
   • Special expertise, unusual time commitments, or exceptional leadership  
   • Advising

2. Sources of evidence for evaluation of service –  
Forms of evidence of service can include but are not restricted to the following:  
   a) Institutional service –  
      • Serving on departmental, college, and university committees  
      • Instructing for Western off campus  
      • Working with student organizations inside or outside of the
disciplinary
- Working with students in disciplinary or interdisciplinary extracurricular activities
- Mentoring new faculty members
- Mentoring pre-service and graduate student teachers
- Conducting peer observations
- Arranging colloquium talks
- Arranging panel discussions
- Serving as a Liaison with other programs/departments/colleges

b) Community engagement –
- Public school assistance
- Consulting
- Other regional service activities
- Membership in professional organizations

c) Special expertise, unusual time commitments, or exceptional leadership –
- Service to professional organizations
- Service to departmental, college, or university committees with unusually extensive time commitments (e.g. TPR, AFE, PTR, accreditation, faculty recruitment, faculty governance, program review)
- Leadership roles in university affairs or professional organizations

d) Advising – The department values academic advising. Quality advising requires familiarity with curriculum and related processes, availability to advisees, and assistance with academic and career planning.

Curriculum advising serves groups such as:
- Undergraduate majors,
- Undergraduate minors,
- Undergraduate second academic concentrations,
- Licensure-only students, and
- Graduate students

Also included in academic advising are the managerial duties associated with student activities such as:
- Thesis/dissertation advising and
- Coordination of and arrangements for students to attend and/or present work at professional meetings.
3. General comments—Professional development activities in the area of service are also positively valued and should be described and documented as appropriate for the specific review event.

III. Specific Procedures for Review Events
   A. Annual Faculty Evaluation (4.05)
      Overview—In evaluating the performance of faculty members in the Department of Mathematics and Computer Science of Western Carolina University, the area of contribution considered most important is teaching, followed by scholarship and service, and then special talents and skills.

      Composition of review committee—AFE Committee: The Annual Faculty Evaluation Committee will consist of four members and an alternate elected from the department’s tenured faculty or persons participating in the University of North Carolina System Phased Retirement program from the department. The members and alternate will be elected annually in the spring semester preceding the academic year in which they are to serve. They will be elected by the department’s faculty who are subject to evaluation by the AFE committee after members of the Advisory Committee on Reappointment, Promotion and Tenure have been elected. Immediately after this election, the members of the newly formed AFE committee will elect a secretary. The secretary will be responsible for arranging committee meetings, and submitting AFE reports to the Department Head.

      Preparation of documentation and procedures
      All full-time faculty members must prepare an AFE document that includes:

      The Departmental Annual Faculty Data Form

      The Instructor's Self-Report and Assessment that addresses each of the three areas of teaching (as outlined in Section II.A.1. above). The report should include items such as a statement of a teaching philosophy and a description of goals, methods, and strategies used. This report should be limited to 2 pages maximum.

      The Course Materials Packet that includes
      • copies of course syllabi (with details of grading and attendance policies) and
      • major assessments (e.g. examinations, projects, papers) for all classes (exclusive of individualized instruction) taught during the evaluation period. Daily handouts, worksheets, and quizzes are not routinely included with this material.

      The Departmental Classroom Observation Form(s) (if
observations are required).

- Mandatory classroom observation of non-tenured faculty—Each tenure-track faculty member will be observed at least once each semester by a member of the departmental tenured faculty. Fixed-term faculty will be observed at least once each semester by a member of the department. The observer will be selected by the Department Head after the Department Head consults with the non-tenured faculty member. Copies of the completed Observation Forms will be given to the Department Head, the faculty member and to the AFE Committee for use in the annual evaluation.

- Mandatory classroom observation of a non-tenured Department Head - Each member of the AFE Committee shall observe the classroom teaching of a non-tenured Department Head at least once each semester. Copies of the completed Observation Forms will be given to the Department Head, the Dean, and the AFE Committee for use in the annual review.

- Optional classroom observations of faculty—Any faculty member may request to be observed by members of the AFE Committee and by at most one additional faculty member. Such a request must be submitted to the Department Head in the first two weeks of the term in which the observation is to be made. In such cases the faculty member will be observed by each AFE Committee member, and possibly by one other faculty member. Copies of the completed Observation Forms will be given to the Department Head, faculty member and to the AFE committee for use in the annual evaluation.

Student Assessment of Instruction—Course evaluations are required of all course sections taught in the Department of Mathematics and Computer Science and will be attached to the AFE documents by the Department Head.

The Departmental Student Evaluation Forms will be used during the two weeks of a
semester before the final exam period begins. The forms are to be filled out in class in the absence of the instructor; a student volunteer will immediately deliver them in an envelope to the department secretary where they will be filed. After semester grades have been turned in, a legible copy of the instructor's evaluations will be returned to the instructor.

The University Student Evaluations will be available for all courses and results will be available to instructors after semester grades have been turned in.

The AFE Committee will consider the submitted materials and write a review that addresses teaching, scholarship, and service for each faculty member. This review will be provided to the Department Head and the faculty member.

In the area of teaching, the AFE Committee will

- Summarize the Departmental Student Evaluation Forms for each faculty member
- Consider each faculty member's
  - Teaching Portion of the Annual AFE Data Form
  - Submitted Course Materials Packet;
  - Summarized Departmental Student Evaluation Forms and University Student Evaluations
  - Instructors Self-Report
  - Departmental Classroom Observations Forms (when applicable)

- Discuss the extent to which the faculty member meets the teaching criteria in Section IV.A.1. If more than half of the AFE committee members designate the faculty member's teaching as "exceeds expectations," then the final designation will be "exceeds expectations". In a similar manner, if more than half of the AFE committee members designate the faculty member's teaching as "unsatisfactory," then the final designation will be "unsatisfactory". Otherwise, the final designation will be "meets expectations".
- Provide feedback in the written review addressing the three areas of teaching.

In the area of scholarship and creative works, for tenured and tenure-track faculty the AFE
Committee will
  • Consider each faculty member’s Scholarship Portion of the Annual AFE Data Form and
  • Discuss the extent to which the faculty member meets the scholarship criteria in Section IV.A.2. If more than half of the AFE committee members designate the faculty member’s scholarly activity as “exceeds expectations,” then the final designation will be “exceeds expectations.” In a similar manner, if more than half of the AFE committee members designate the faculty member’s scholarly activity as “unsatisfactory,” then the final designation will be “unsatisfactory.” Otherwise, the final designation will be “meets expectations”
  • Provide feedback in the written review addressing the faculty member’s scholarship and creative works.

For faculty with expectations in the area of service, the AFE Committee will
  • Consider each faculty member’s Service Portion of the Annual AFE Data Form
  • Discuss the extent to which the faculty member meets the service criteria in Section IV.A.3. If more than half of the AFE committee members designate the faculty member’s service as “exceeds expectations,” then the final designation will be “exceeds expectations.” In a similar manner, if more than half of the AFE committee members designate the faculty member’s service as “unsatisfactory,” then the final designation will be “unsatisfactory.” Otherwise, the final designation will be “meets expectations”.
  • Provide feedback in the written review addressing the faculty member’s service.

B. Reappointment, Tenure and Promotion (4.06 & 4.07)
  1. Overview - In evaluating the performance of faculty members in the Department of Mathematics and Computer Science of Western Carolina University, the area of contribution considered most important is teaching, followed by scholarship and service, and then special talents and skills; each faculty member will be evaluated on all criteria.
2. Composition of review committee (4.07D1) -- TPR Committee

In the event that the Department of Mathematics and Computer Science has seven or more tenured faculty members, the tenure and promotion advisory committee shall consist of the department head and six tenured faculty members elected by the department’s tenured and tenure track faculty. When the department has six or fewer tenured faculty members, the committee shall be composed of the department’s head and tenured faculty provided the resultant committee shall consist of at least three tenured faculty members, exclusive of the head.

Whenever the department finds it impossible to form a committee containing at least three tenured faculty, the Department Head, in consultations with the department and the dean, will, by selecting sufficient tenured faculty from similar departments, form a committee of three tenured faculty for the department.

Committee memberships shall be determined by elections that shall be conducted during the spring term of each year. When there are more than six tenured faculty members, two members will be elected to two-year terms and two members will be elected to one-year terms each year with two continuing members from the previous year. Vacancies will be filled by election. Each committee member who is a candidate for promotion will be replaced by an elected alternate tenured faculty member. The alternate member(s) will participate in all promotion deliberations and promotion appeals for the same promotion action sought by the candidate, but will have no other committee duties. The department head shall be the chair of the committee and shall not vote.

When the department head is the person being considered by the committee, the department head shall excuse himself/herself, and the committee shall elect a pro-term chair (voting) from its membership. The pro-term chair shall submit the committee’s recommendations directly to the appropriate dean. The department head (or any other member of the committee being considered) shall absent himself/herself during the deliberations concerning the department head.

3. Preparation of documentation and procedures – 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 when decisions are made at the various review levels. The department student course evaluation forms for the last five years or since initial appointment, whichever is shorter, are to be included in a separate two inch binder.

C. Post-Tenure Review (4.08)

1. Overview - In evaluating the performance of faculty members in the Department of Mathematics and Computer Science of Western Carolina University, the area of contribution considered most important is teaching, followed by scholarship and service, and then special talents and skills; each faculty member will be evaluated on all criteria.

2. Composition of review committee

PTR Committee:

Each departmental PTR review committee will consist of three tenured faculty members. The department will elect at large two tenured faculty to serve on the PTR committees (each to serve staggered two-year terms), and the individual being reviewed will select one additional tenured faculty to complete his or her individual review committee. A tenured faculty who is up for review the following year may not be newly elected to a PTR committee, and a sitting committee member must step down (a one-year replacement being voted on by the department) during the year in which he or she is reviewed. However, a faculty member under review shall be eligible to serve as one of the “selected” members of another individual’s PTR committee. The department head will not be eligible to serve on any PTR committees.

“Staggered two-year terms” above means: During the initial election of faculty to the PTR Committees, one individual will be elected to a two-year term and another to a one-year term. Thereafter, those elected will serve two-year terms. During the spring semester the department will vote for the elected members of the PTR committee whose terms begin during the following academic year. The PTR elections will take place after the TPR and AFE elections.

3. Preparation of documentation and procedures

a. Performance to be reviewed is limited to the five years preceding review or to the period subsequent to the prior review event, whichever is less. Items to be considered include:

- The four (4) most recent Annual Faculty Evaluations (including supporting materials such as Annual Review
Data Forms) will be obtained from department files.

- The faculty member being reviewed will provide a current Curriculum Vita and may include other supporting materials.

b. Considerable justification must be given if the tone of the PTR differs from that of the four (4) most recent AFE’s.

c. During the academic year under which the review shall take place, the reviewee shall designate his/her “selected” member of the committee no later than October 15.

d. Each PTR Committee shall complete its review and submit its evaluation to the Department Head no later than March 15 of that same academic year. Each PTR committee shall present its written evaluation to the department head; individual reports may be included. The department head shall provide a copy of this evaluation to the faculty member and an initial draft of his/her evaluation. The department head shall meet with the faculty member to discuss the review. The department head shall then append his/her final evaluation. After examining the complete evaluation, the faculty member then has the option of attaching a written response. In the event that the reviewee is the Department Head, the Dean will serve in the Department Head’s role.

e. Each PTR committee evaluation shall carry the designation of satisfactory or unsatisfactory with respect to the majority opinion. The department head’s final evaluation shall carry the designation of satisfactory or unsatisfactory.

f. In the case of an unsatisfactory review, the department head will, in consultation with the faculty member, the reviewee’s PTR committee, and the Dean of the College of Arts and Sciences, develop a three-year improvement plan within one month of the review. The plan shall include (1) specific areas for improvement; (2) resources available for that improvement; and (3) administrative support provided. The plan will also include consequences for failure to make adequate progress by the third year.

g. The department head will monitor the progress of that plan and provide oral and written assessments of that progress to the faculty member semi-annually.
Criteria for Annual Faculty Evaluation, Reappointment, Tenure, Promotion, and Post Tenure Review

IV. The criteria for meeting expectations in the Department of Mathematics and Computer Science
   A. Annual Faculty Evaluation

   1. Teaching – In order to “meet expectations” in the area of teaching the faculty member must:

      • Submit required documents in a timely fashion
      • Demonstrate competence in each of the three areas of teaching
      • Have student evaluation feedback that is primarily non-negative in nature
      • Provide course materials that meet the course description and objectives in a suitably rigorous fashion.
      • Exhibit evidence of maintaining currency in one’s teaching, or furthering one’s professional development in teaching.

   When faculty members demonstrate exceptional quality of teaching, they will be rated as “exceeds expectations”.

   If a faculty member does not meet expectations the rating will be “unsatisfactory” and the specific area(s) will be noted with specific actions outlined to address the area(s).

   2. Scholarship – In order to “meet expectations” in the area of scholarship the faculty member must:

      • Submit required documents in a timely fashion.
      • Demonstrate at least one piece of externally reviewed scholarship OR a collection of evidence of continuing scholarship from any category of the Boyer Model in Section II.B.2.
      • Exhibit evidence of maintaining currency in one’s discipline, sustained problem solving, or furthering one’s professional development.
      • The Department Head will consider progress over multiyear period toward promotion/tenure.

   When faculty members demonstrate exceptional scholarship, they will be rated as “exceeds expectations”.

   If a faculty member does not meet expectations the rating will be “unsatisfactory” and the specific area(s) will be noted with specific actions outlined to address the area(s).
If a faculty member’s position does not include scholarship expectations the rating will be “not applicable”.

3. Service – In order to “meet expectations” in the area of service

- All faculty must submit required documents in a timely fashion.
- All tenured and tenure-track faculty, after their first year of service, are expected to advise students in the Mathematics and Computer Science majors.
- Phased retirees are to continue advising, but will not be given new advisees.
- All advisors are expected to maintain up-to-date check sheets and four year plans on their advisees.
- In addition, all faculty members are expected to demonstrate a variety of forms of service at a level appropriate to their academic rank and/or contractual obligations.

When faculty members demonstrate exceptional quantity or quality of service, they will be rated as “exceeds expectations”.

If a faculty member does not meet expectations the rating will be “unsatisfactory” and the specific area(s) will be noted with specific actions outlined to address the area(s).

If a faculty member’s position does not include service expectations the rating will be “not applicable”.

4. General comments – For the purposes of moving from one level of collegial review to the next, the ratings will be “meets expectations” or “unsatisfactory”. However, the Department of Mathematics and Computer Science ratings are: “unsatisfactory”, “meets expectations”, and “exceeds expectations”.

B. Reappointment (4.06) In order to be recommended for reappointment without conditions the faculty member must:

Teaching –
- meet or exceed expectations in teaching in each year’s AFE review
- demonstrate evidence of continued and sustained growth in teaching
- demonstrate adequate progress towards meeting teaching requirements for tenure

Scholarship –
- meet or exceed expectations in scholarship in each year’s AFE review
• demonstrate evidence of continued and sustained scholarship
• demonstrate adequate progress towards meeting scholarship requirements for tenure

Service –
• meet or exceed expectations in service in each year’s AFE review
• demonstrate evidence of continued and sustained service
• demonstrate adequate progress towards meeting service requirements for tenure

General comments – If the faculty member fails to meet expectations in any of these areas in an AFE review, the candidate must demonstrate evidence of actions taken to address the area(s) identified as “unsatisfactory” by the AFE committee. The TPR committee will review the results of those actions to determine if reappointment with conditions is warranted.

First year reappointment is based largely on academic degrees, professional preparation and experience, promise for sustained future professional achievement, and institutional needs and resources.

Procedures for Feedback:
The TPR Committee will provide feedback to the Department Head and the faculty member addressing the faculty member’s progress toward tenure.

C. Tenure (4.07) In order to be recommended for tenure the faculty member must:

1. Teaching –
   demonstrate evidence of continued and sustained growth in teaching throughout a significant portion of the probationary period
   demonstrate effective teaching and promise for continued growth

2. Scholarship –
• demonstrate evidence of continued and sustained scholarship throughout a significant portion of the probationary period
• demonstrate evidence of authoring or co-authoring peer reviewed scholarly publications that are national or international in scope.
  Examples of these scholarly publications include but are not limited to the following:
  • Journal articles
  • Book chapters in edited, peer-reviewed volumes

1 A candidate may submit evidence that a publication is peer reviewed and national or international in scope.
• Research monographs
• Peer-reviewed, full articles in conference proceedings\(^2\)
• demonstrate promise for continued scholarship

3. Service –
• demonstrate evidence of continued and sustained service throughout a significant portion of the probationary period
• demonstrate promise for continued service

D. Promotion to Associate Professor (4.07) In order to be recommended for promotion to Associate Professor the faculty member must:

1. Teaching –
• possess at least five years of teaching experience at the college level at the rank of assistant professor
• demonstrate evidence of continued and sustained growth in teaching throughout a significant portion of the probationary period
• demonstrate effective teaching and promise for continued growth

2. Scholarship –
• demonstrate evidence of continued and sustained scholarship throughout a significant portion of the probationary period
• demonstrate evidence of authoring or co-authoring peer reviewed scholarly publications that are national or international in scope\(^3\).
Examples of these scholarly publications include but are not limited to the following:
• Journal articles
• Book chapters in edited, peer-reviewed volumes
• Research monographs
• Peer-reviewed, full articles in conference proceedings
• demonstrate achievement in scholarship and promise for scholarly work of distinguished quality

3. Service –
• demonstrate evidence of continued and sustained service throughout a significant portion of the probationary period
• demonstrate achievement in and promise for continued service

E. Promotion to Professor (4.07). In order to be recommended for promotion to

\(^2\) In mathematics education and computer science the accepted disciplinary norms place a strong value on peer-review conference proceedings as evidence of active scholarship. See Appendices A and B.

\(^3\) A candidate may submit evidence that a publication is peer reviewed and national or international in scope.
Professor the faculty member must:

1. Teaching –
   • possess at least ten years of teaching experience at the college level, at least five at the rank of associate professor
   • demonstrate evidence of continued and sustained growth in teaching throughout a significant portion of the career
   • demonstrate excellence and promise for continued achievement of distinguished quality in teaching

2. Scholarship –
   • demonstrate evidence of continued and sustained scholarship throughout a significant portion of the career, including the most recent five years
   • demonstrate regional, national, or international recognition of scholarly achievement by an appropriate community of peers
   • demonstrate excellence and promise for continued achievement of distinguished quality in scholarship

3. Service –
   • demonstrate evidence of continued and sustained service throughout a significant portion of the career, including the most recent five years
   • demonstrate recognition of achievement in service by appropriate peers
   • demonstrate excellence and promise for continued achievement of distinguished quality in service
   • demonstrate leadership in university affairs

F. Post-Tenure Review (4.08) In order to receive a satisfactory post-tenure review the faculty member must:

1. Teaching –
   • demonstrate evidence of continued and sustained growth in teaching since the last review event
   • demonstrate effective teaching and promise for continued growth

2. Scholarship –
   • demonstrate evidence of continued and sustained scholarship since the last review event
   • demonstrate promise for continued scholarship

3. Service –
   • demonstrate evidence of continued and sustained service since the last review event
• demonstrate promise for continued service

Approved by:
Teresa Aguel
Department Head

Dean

Provost

Date
5/28/12
6/8/12

Date
6/15/12
6-8-12
## Course summary by Academic Year and Instructor

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## Course summary by Academic Year and Instructor

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Prepared by Office of Institutional Planning and Effectiveness (OIP&E)
## Number of sections and average class size by type

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### Masters

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Prepared by Office of Institutional Planning and Effectiveness [pAtQeK]
The Graduate Committee, in collaboration with Risto Atanasov, Tuval Foguel, and Kathy Jaqua, would like to suggest the following proposal for “banking credit” for independent studies, student research, and other activities that are typically carried out by faculty without any credit towards their teaching load, scholarship, or service.

We acknowledge there there are several types of the aforementioned work that faculty typically conduct that have been treated as overload/volunteer work, work that can generate course credits:

- Independent studies in courses we do offer, but for some reason the student wasn’t/isn’t able to take during the regular offering;
- Independent studies in special topics courses that we do not typically offer;
- Undergraduate research that could be treated as a special topics course;
- Master’s project or thesis work which is handled as overloads by the faculty mentors; and
- Problem solving sessions that can be treated as a special topics course for students participating in mathematics contests (e.g. Putnam Exam, Virginia Tech Mathematics Exam, MAA Jeopardy, etc.).

We suggest a means by which these types of activities can be associated with Student Credit Hours (SCH) generated and can be added together and “banked” until they can be counted as one three-hour course release:

Proposal:
Once a person has accrued a total of 36 weighted student credit hours through approved overload/volunteer work they will receive one three-credit hour course release. Calculation of the Weighted SCH’s a faculty member has earned will be determined as follows:

\[
\text{Weighted SCH from Courses} = \left( \frac{\# \text{ of Undergraduate SCH Generated}}{\text{SCH Generated}} \right) + 1.5 \left( \frac{\text{Non-Master's Project Graduate SCH Generated}}{\text{SCH Generated}} \right) + 2.5 \left( \frac{\text{Master's Project Graduate SCH Generated}}{\text{SCH Generated}} \right)
\]

NOTES:
- Faculty are to indicate the reason why an independent study course was granted and get department head approval for offering the courses.
- It is the responsibility of the individual faculty member to keep track of their accrued weighted student credit hours.
- These credit hours should be noted annually in the faculty members Annual Faculty Evaluation.

\[\text{1The Master’s Project Course is only 1 credit hour, and entails much more work than this single credit hour implies}\]
### Diversity of Student Population – Mathematics Program

#### Proportion of Men and Women -- WCU Math Majors

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#### Proportion of Men and Women -- WCU Undergraduates

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#### Diversity of WCU Math Majors

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#### Diversity of WCU undergraduate population

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Enrollment Patterns – Mathematics Program

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<td>WCU Total</td>
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Percent Change in Enrollment


-25.4, -7.7, 2.7, 5.259

Legend:
- WCU Math
- WCU Total
- WCU UG
- National
### Academic Qualifications of Full-time First-year (FTFY) majors – MATH

#### Academic Qualifications of FTFY WCU Math majors

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#### Academic Qualifications of FTFY WCU general undergraduates

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## Degrees Conferred

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Source: Banner report Number of minors accessed 02 December 2014
Undergraduate Student Research

Publications

• Andrew Kimball, “A simplified and generalized treatment of DES related ciphers” (joint with L.Babinkostova, A.M.Bowden, K.Williams), accepted for publication in Cryptology.


• Melody Bruce, “Analyzing Melatiah Nash and The Ladies and Gentlemen’s Diary”, accepted by “International Journal of Undergraduate Research and Creative Activities”.

• Four of our students papers from the SMURCHOM 2010 were published online as part of the online article “SMURCHOM: Providing Opportunities for Undergraduate Research in the History of Mathematics - Selected Student Papers (2010),” Loci (January 2011), DOI:10.4169/loci003549.
  – “Thomas Harriot: Father of Modern Notation,” by Layla Biddix
  – “Reading in Context: The Reception of Gerolamo Cardanos Liber De Ludo Aleae,” by Nathan Bowman
  – “Maria Agnesi: Female Mathematician of 18th-Century Italy,” by Hannah Watson

Presentations/Posters

• Academic Year 2009–2010

  – Stephen Nanney “Factoring Polynomials of Type \((x - a_1)(x - a_2) \cdots (x - a_n) \pm 1\)”, presented at the Mathematical Association of America Southeastern Section Meeting (MAA-SE) in Elon, NC, March 2010 (received award for outstanding undergraduate student presentation).

  – Benjamin Casses “Graph Lineage and Graph Generation”, Benjamin Casses, poster presentation at MAA-SE in Elon, NC, March 2010 (received award for outstanding student poster presentation).


  – Sal Frontauria “E. T. Bell - Now That’s Entertainment”, presentation at the Smokey Mountain Undergraduate Conference on the History of Mathematics (SMURCHOM), Western Carolina University (WCU), NC, March 2010

  – Caitlin Yencha “What is the Suan shu shu and how has its discovery impacted historian’s views”, presentation at the SMURCHOM, WCU, NC, March 2010

  – Craig DeFelice “Constructions of Regular Polygons”, presentation at SMURCHOM, WCU, NC, March 2010
– Jennifer Annas “Napier’s Logarithms and the Public”, poster at SMURCHOM, WCU, NC, March 2010

– Layla Biddix “Harriot: Father of Modern Notation”, poster at SMURCHOM, WCU, NC, March 2010


– Nathan Bowman “Cardano’s Liber de Ludo Aleae”, poster at SMURCHOM, WCU, NC, March 2010

– Darci Brush “How did Robert Recorde change the way mathematics was taught in England?”, poster at SMURCHOM, WCU, NC, March 2010

– Erica Byrd “Alice’s Adventures in Wonderland”, poster at SMURCHOM, WCU, NC, March 2010

– Melody McDaniel “Kepler’s Harmonice Mundi”, poster at SMURCHOM, WCU, NC, March 2010

– Lindsay Robinson “Hilbert’s Axioms”, poster at SMURCHOM, WCU, NC, March 2010

– Sarah Swartzel “The Treatment of Women in Flatland”, poster at SMURCHOM, WCU, NC, March 2010

– Hannah Watson “Maria Agnesi: Female Mathematician of 18th-Century Italy”, poster at SMURCHOM, WCU, NC, March 2010

– Elizabeth Witt “How did the use of mathematics in navigation aid the age of discovery?”, poster at SMURCHOM, WCU, NC, March 2010

• Academic Year 2011–2012

– Andrew Kimball “On the Design of Simplified DES Based on Elliptic Curves”, presentation at MAA-SE, Clayton State University, GA, March 2012. (received an award for outstanding student presentation)

– Andrew Kimball “Data Encryption Standard-the History and New Directions”, presentation at SMURCHOM, WCU, NC, March 2012


– Greg Ferrin “Closed-form Generation and Analysis of Independence Polynomials for $d$-Regular Caterpillars ”, poster at the Joint Mathematics Meetings (JMM), Boston,
January 2012.


- Stephen Nanney “Modifying Scoring Functions For RNA Secondary Structures”, poster presentation at the 2011 NIMBios Undergraduate Research Conference at the University of Tennessee, Knoxville 2011.

- Dalton Tedder “Journey to Thomas Harriots Algebraic Contribution”, presentation at SMURCHOM, WCU, NC, March 2012

- Cristina Korb “The History of International Mathematical Olympiads”, presentation at SMURCHOM, WCU, NC, March 2012

- Sarah Martin “The Euclids Elements Controversy and the AIGT”, presentation at SMURCHOM, WCU, NC, March 2012

- Candance Dillin “Georg Cantor and the Infinite”, poster at SMURCHOM, WCU, NC, March 2012

- Cristian Gosnell “Metric System”, poster at SMURCHOM, WCU, NC, March 2012


- Michelle McDuffie “The Universe of Archimedes”, poster at SMURCHOM, WCU, NC, March 2012

- Adam Schrum “The Archimedes Palimpsest”, poster at SMURCHOM, WCU, NC, March 2012

- Zac Wallace “Blaise Pascal”, poster at SMURCHOM, WCU, NC, March 2012

- Colby White “Cayley’s Group Theory”, poster at SMURCHOM, WCU, NC, March 2012

- Cody Williams “Edwin Abbott and Flatland”, poster at SMURCHOM, WCU, NC, March 2012

**Academic Year 2013–2014**


- Michelle McDuffie “A Hormone Therapy Model for Breast Cancer Linear Cancer Networks”, poster presentation at MAA-SE in Cookeville, TN, March 2014 (received award
for outstanding student poster presentation).


- Melody MacDonald “Exploring Melatiah Nash and The Ladies and Gentlemen’s Diary Melody MacDonald”, presentation at SMURCHOM, WCU, NC, March 2014


- Kathy Duckworth “The American Mathematical Monthly-Unique Among Other Periodicals”, poster at SMURCHOM, WCU, NC, March 2014

- Heather Ervin “The Mathematical Visitor”, poster at SMURCHOM, WCU, NC, March 2014


- Courtney Swink “Robert Adrain and The Mathematical Diary”, poster at SMURCHOM, WCU, NC, March 2014

**Academic Year 2014–2015**


- Andrew Latham and Aaron Moose “Risk Taking Behavior in Epidemiology”, poster, JMM, San Antonio, TX, January 2015
## MATH program - recent graduates

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<th>Year</th>
<th>Additional education</th>
<th>Title/Job</th>
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<td>Credit Risk Analytics Consultant at Wells Fargo</td>
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<td>Burch</td>
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<td>Annas</td>
<td>Jennifer</td>
<td>2012</td>
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<td>Mathematics Teacher, Iredell County Schools</td>
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<tr>
<td>Baldwin</td>
<td>Carol</td>
<td>2013</td>
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<td>James Curtis</td>
<td>2014</td>
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<td>Chemistry Graduate Student, Univ. Co. Boulder</td>
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<td>Berryhill</td>
<td>Price</td>
<td>2011</td>
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<td>Network Admin at Haywood County School</td>
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<td>Blake</td>
<td>Benjamin John Michael</td>
<td>2013</td>
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<td>Actuarial Associate, Assurant Solutions</td>
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<td>David</td>
<td>2007</td>
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<td>Robert Ben</td>
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<td>MS CS UNC-CH</td>
<td>Software Developer at Lawrence Livermore National Laboratory</td>
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<td>Cavanah</td>
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<td>Clara</td>
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<td>2007</td>
<td>Simulation Consultant at Dematic North America</td>
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<td>Lead Advisory Consultant at Quaero</td>
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<td>Penland</td>
<td>Andrew</td>
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<td>Katelan</td>
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<td>2010</td>
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<td>Suzanne</td>
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<tr>
<td>Queen Blake</td>
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<td>2005, DPT, WCU 2006</td>
<td>Doctor of Physical Therapy, Med West</td>
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<td>Ray Steven</td>
<td>BS Math</td>
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<td>2009</td>
<td>PhD student, Georgia Tech</td>
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<td>Rudoff Polly</td>
<td>BS Math</td>
<td>2007</td>
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<td>2013</td>
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<td>BS Math, MS Appl Math</td>
<td>2013, 2014</td>
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<td>Sizemore Nicholas</td>
<td>BS Math, MS App Math</td>
<td>2012, 2013</td>
<td>Instructor, WCU</td>
<td></td>
</tr>
<tr>
<td>Stepp April Ray</td>
<td>MS Appl Math</td>
<td>2006</td>
<td>Actuarial Associate, Assurant Solutions</td>
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<tr>
<td>Swanson Ray</td>
<td>BS Math; MS Appl Math</td>
<td>2010, 2014</td>
<td>Instructor, Tri-County Tech CC</td>
<td></td>
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<tr>
<td>Thomas Patrick</td>
<td>MAT</td>
<td>2010</td>
<td>Mathematics Teacher, Spartanburg County Schools, SC</td>
<td></td>
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<tr>
<td>Tingen Larry</td>
<td>BS Math</td>
<td>2006</td>
<td>Assistant Developmental Math Coordinator and Math Instructor at CFCC</td>
<td></td>
</tr>
<tr>
<td>Uter Simone</td>
<td>MS Appl Math</td>
<td>2004</td>
<td>Lecturer of mathematics at College of agriculture science and education</td>
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<tr>
<td>Vimi McKeithan</td>
<td>MAT</td>
<td>2011</td>
<td>8th Grade Math and Algebra 1 Teacher at Buncombe County Schools</td>
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<tr>
<td>Vinayagam Murugan</td>
<td>MS Appl Math</td>
<td>2010</td>
<td>Graduate Student at UBC</td>
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<td>Walters Deborah</td>
<td>MS Appl Math</td>
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<td>Instructor, WCU</td>
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<tr>
<td>Weiland Travis</td>
<td>MA Math Ed</td>
<td>2013</td>
<td>PhD student in Mathematics Education, U Mass Dartmouth</td>
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<tr>
<td>White Colby</td>
<td>BS Math, BSEd Math Ed</td>
<td>2014</td>
<td>Middle School Math Teacher, Robbinsville</td>
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<tr>
<td>Wilson James</td>
<td>MS Appl Math</td>
<td>2008</td>
<td>Instructor, AB Tech CC</td>
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<tr>
<td>Wooten Ethan</td>
<td>BS Math</td>
<td>2011</td>
<td>General manager, Wolf Creek Golf Club, Atlanta GA</td>
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Undergraduate and transfer students admitted to Western Carolina University are placed according to the WCU Mathematics Placement Criteria. This appears in the prerequisites for MATH 146 and MATH 153 in the WCU Undergraduate Catalog.

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<td>Calculus III</td>
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*Students intending to take MATH 101 Mathematical Concepts, MATH 130 College Algebra or MATH 170 Applied Statistics, will not need a placement.
Seven enrolled in Math 479 during Fall 2010 participated in the senior exit interview with Dr. Despeaux. The following comments are a summary of that meeting.

1. Does our curriculum have an appropriate balance between theory and computation?
   - Yeah. Real Analysis tipped scale towards more proof (back towards the center)
   - Four said more computation needed.

2. Did your lower level math (250, calculus, etc.) courses prepare you for your upper level math courses?
   - No.
   - By the time we got to the proof intensive courses, we had forgotten MATH 250. Idea: divide 250 into two parts. One-hour refresher proof course.

3. Did our curriculum challenge you appropriately?
   - Really difficult; asked a lot of us; it was good for us. Appreciates lack of busywork.
   - Didn’t feel challenged until last semester. A big gap. All downhill from ODE, CS 340, MATH 361, MATH 424. All liked numerical.

4. What are your future plans?
   - Five 4+1. One will get MBA afterwards. One will be actuary or management. One will teach at college level (maybe get PhD); One maybe masters physics, teaching research.
   - Bankings.
   - Grad school in CS.
   - 2 traditional, 1 actuary, 5 applied.

5. Do you feel ready for those plans?
   - Yes, in general.

About advising:

6. Was your advisor well organized and prepared for your advisement sessions?
   - Yes.
   - Yes, and it was really helpful. Everything laid out for them.

7. Did you feel well informed about university requirements, department requirements, and the courses being offered every semester?
   - For the most part. Yes

8. Was your advisor open to and patient with all of your questions, answering them satisfactorily?
   - Above and beyond.
   - Checksheets are sometimes different from Banner.

9. Did the advisor create an atmosphere of trust, confidence and student support?
   - Yes.

10. In general, how could we improve advising in the department?
    - No complaints. Everyone will help, advisor or not. Don’t need an appointment. Other majors in other colleges must have appointments, must make appointments.

11. Other comments:
    - Courses offered every other year are difficult for transfer students to schedule.
Review of Mathematics Senior Exit interview
Fall 2011

14 enrolled in Math 479-01 during Fall 2011 participated in the senior exit interview with Dr. Risto Atanasov. The following comments are a summary of that meeting.

1. Does our curriculum have an appropriate balance between theory and computation?
   - Majority of the students would have liked to see more theoretical classes—they impression is that the program is heavier on computation
   - The math education students would like the education classes to be more focused on “how to teach” and they would also like to practice teaching in lower level math classes at WCU.
   - Few students suggested that it would be nice if we integrate the education students in tutoring.
   - Math Ed students think that they don’t need to know any programing, so their impression is that MATH 340 does not fit well into their major.

2. Did your lower level math (250, calculus, etc.) courses prepare you for your upper level math courses?
   - The students noted that MATH 250 did not prepare them well for the other upper level classes for which this course is a prerequisite. The students think that often the proofs in MATH 250 were very trivial and they would liked to see their proofs being critiqued more so they will improve.
   - For some students the jump from Calculus to Differential so too big. Even though they all took gateway tests in Calc I and Calc II, they still did not feel comfortable with derivatives and integrals; the students did not see the point of having gateway tests in Calc I and Calc II because, often, the questions on these tests are of same type (usually only the numbers change), so they focused only memorizing the “tricks” on these type of integrals.

3. Did our curriculum challenge you appropriately?
   - Some classes did challenge the students, and some were not particular challenging. All students pointed out that they want to be challenged in the “proper” way.
   - Traditional and Applied math students would like more math classes to be required.

4. What are your future plans?
   - All 9 math ed students plan to teach in high school. The other 5 students (4 traditional concentration, 1 applied) plan to go to graduate schools.

5. Do you feel ready for those plans?
   - Yes (all of them)

About advising:

6. Was your advisor well organized and prepared for your advisement sessions?
   - Yes. The students are very satisfied with the attention they received from their academic advisors.

7. Did you feel well informed about university requirements, department requirements, and the courses being offered every semester?
   - Yes.

8. Was your advisor open to and patient with all of your questions, answering them satisfactorily?
   - Yes (all of them). Some made the comment “above and beyond”.

9. Did the advisor create an atmosphere of trust, confidence and student support?
   - Yes.

10. In general, how could we improve advising in the department?
    - No suggestions provided. They all seem happy with advising.
Review of Mathematics Senior Exit interview  
Fall 2012

12 enrolled in Math 479-01 during Fall 2012 participated in the senior exit interview with Dr. Risto Atanasov. The following comments are a summary of that meeting.

1. Does our curriculum have an appropriate balance between theory and computation?
   - Four of the students would have liked to see more proof-oriented classes
   - Two students would like more classes like Abstract Algebra and Real Analysis.

2. Did your lower level math (250, calculus, etc.) courses prepare you for your upper level math courses?
   - Majority of the students think that MATH 250 did not prepare them well for the upper level math proof-oriented courses. They did not feel ready when they start doing proofs in Linear Algebra, Discrete Structures, or Abstract Algebra.

3. Did our curriculum challenge you appropriately?
   - To some extend for a half of the students, and yes for the other half.

4. What are your future plans?
   All 6 students plan to teach in high school, 4 plan to go to grad school, and two don’t know yet.

Do you feel ready for those plans?
   Yes (all of them)

About advising:
5. Was your advisor well organized and prepared for your advisement sessions?
   Yes they are very happy with their advisors.

6. Did you feel well informed about university requirements, department requirements, and the courses being offered every semester?
   Yes.

7. Was your advisor open to and patient with all of your questions, answering them satisfactorily?
   Yes (all of them).

8. Did the advisor create an atmosphere of trust, confidence and student support?
   Yes.

9. In general, how could we improve advising in the department?
   No suggestions provided. They all seem happy with advising.

10. Other comments:
    No further comments.
Six students in Math 479-01 (Despeaux) during Fall 2013 participated in the senior exit interview with Dr. Budden. The following comments are a summary of that meeting.

1. Does our curriculum have an appropriate balance between theory and computation?
   - Yes, although I was limited to higher level courses since I transferred in. I would have liked more higher comp. classes.
   - Yes (unfortunately).
   - Yes, in the majority of our math courses.
   - I feel like there was more theory than computation.
   - Other students said “yes”.

2. Did your lower level math (250, calculus, etc.) courses prepare you for your upper level math courses?
   - Math 250 – yes. I did not take other lower level classes since I transferred in.
   - Yes, I would not have understood some proofs and theorems if not for taking Math 340.
   - Yes, some more than others.
   - I did feel like my lower math studies have helped me overall in my upper level math classes.
   - Other students said “yes”.

3. Did our curriculum challenge you appropriately?
   - Yes, however I feel as if the challenging courses were not high-level. I had more challenging 300-level courses than I did 400-level.
   - Yes, I would say that learning a new proof by yourself is not an easy task.
   - Very much at times. Trying to take 4 different math classes a semester was challenging enough for me.
   - Yes, I was challenged, but not so challenged that I could not do it.
   - Other students said “yes”.

4. What are your future plans?
   - I don’t know at this point.
   - Right now, it is to graduate. I might try to create my own company if I can.
   - To teach high school math in N.C.
   - To teach high school math (2 students).
   - I hope to be pursuing a career within a few months after graduation. Hopefully, something within the actuarial field.

5. Do you feel ready for those plans?
   - Yes, I feel a little more confident in presenting my plans or ideas to others.
   - I feel somewhat read, having that I’ve taken certain classes to prepare me.
   - Yes (3 students).
About advising:

6. Was your advisor well organized and prepared for your advisement sessions?
   
   • Yes, always had my degree paper ready.
   • Yes, everything was set up from day 1.
   • Yes (4 students).

7. Did you feel well informed about university requirements, department requirements, and the courses being offered every semester?
   
   • MyCat helped with degree requirements as well as the courses being offered each semester.
   • I think I would have liked to be a little more informed, but I guess I didn’t ask questions.
   • Yes (4 students).

8. Was your advisor open to and patient with all of your questions, answering them satisfactorily?
   
   • Yes, even with summer courses at SCC.
   • Yes he was – always gave feedback.
   • Yes (4 students).

9. Did the advisor create an atmosphere of trust, confidence and student support?
   
   • Yes (all students).

10. In general, how could we improve advising in the department?
    
    • For me, advising was great.
    • I think it is great the way it is.
    • Maybe more visits.
    • Wouldn’t know, since I really enjoyed my advisor.
    • I thought advising was great throughout my time here and I wouldn’t change anything.

11. Other comments:
    
    • I felt very supported by the math department and received any help that I needed.
Six students in Math 479-02 (Barnes) during Fall 2013 participated in the senior exit interview with Dr. Budden. Five of the students were on the Math Education track and one was on the Applied Math track. The following comments are a summary of that meeting.

1. Does our curriculum have an appropriate balance between theory and computation?
   
   - *For Math Education, the balance was mostly good.*
   - *We learned lots of math to blow kids’ minds with (Math Education students).*
   - *Statistics, ODEs, and the Calculus sequence were sufficiently computational.*

2. Did your lower level math (250, calculus, etc.) courses prepare you for your upper level math courses?
   
   - *Yes, we were glad we had to take Calculus II and III.*
   - *It depended on the professor we had for Math 250. It needs to be someone that is very nurturing and provides a lot of guidance. The professor needs to make sure that all of the basics are understood.*
   - *In Math 250, we were not always prepared for exams by the homework we were assigned.*
   - *We think it should be recommended that students take Linear Algebra before Abstract Algebra. Abstract Algebra is very hard, especially for those of us in Math Education.*
   - *Maybe consider introducing some Abstract Algebra in Math 250 to help prepare students for Abstract Algebra.*

3. Did our curriculum challenge you appropriately?
   
   - *It was sleep-depriving.*
   - *For those of us in Math Education, the math was significantly more challenging than the education. Perhaps beef-up the education side more.*
   - *It is hard to keep up with the common core.*
   - *We don’t like that student teaching comes during a Math Education student’s last semester. We don’t feel prepared to deal with issues that arise with our students.*
   - *I don’t want to be a math major, I want to be a math educator. The math that I learned is not really connected with the math that I will teach.*
   - *I got through Abstract Algebra, but don’t feel like I really learned it.*
   - *My professor’s approach (working in groups and using his new syllabus) worked really well in Abstract Algebra.*
   - *Abstract Algebra classes are too big. It is not conducive to learning that level of material.*

4. What are your future plans?
   
   - *Teach (5 students)*
   - *Become an actuary (1 student). I plan to take the actuarial preparation course next semester.*
   - *I want to teach so I can get my freedom back (regarding the Teaching Fellowship).*

5. Do you feel ready for those plans?
   
   - *Damn straight!*
   - *No, because of lack of experience. I am comfortable with the math, but not as comfortable with the teaching side of things.*
• I am not sure about dealing with certain classroom situations. For example, I don’t know how to deal with students whose first language isn’t English.
• I know that I will have a student next semester that has seizures and I am concerned about how to handle them.
• Middle grades education students are better prepared than we are.
• It would help with student teaching if we knew what the students have already been taught.
• Math 321 should be required for us.

About advising:
6. Was your advisor well organized and prepared for your advisement sessions?
   • Yes (all were in agreement).
   • All the time!
   • I had several different advisors, but they all did a good job.
   • My advisor had everything carefully spelled out. She was really good about knowing when courses would be offered.

7. Did you feel well informed about university requirements, department requirements, and the courses being offered every semester?
   • Yes, my advisor and I looked over my degree audit every semester.
   • Professors are really good about helping you get overrides. I only had to send an e-mail.
   • It would be good to recommend to the Math Education students to take a heavy load during their first two years.

8. Was your advisor open to and patient with all of your questions, answering them satisfactorily?
   • Yes (all were in agreement).
   • Even if my advisor did not know something, they found the answer.
   • It was nice having ________ as an advisor as I did not have a chance to have her as a teacher.
   • I liked that I could tell my advisor anything. She also let me take her candy.
   • I cried many times in my advisor’s office and she was always very supportive.

9. Did the advisor create an atmosphere of trust, confidence and student support?
   • Yes (all were in agreement).
   • The professors in Math and C.S. always want students to succeed.
   • The professors were always there to help. If my teacher couldn’t meet, I could find someone that could.

10. In general, how could we improve advising in the department?
    • Compared to other departments, it is great!
    • Recommend that students take Linear Algebra before Abstract Algebra.
    • Math Education students need advisors that are in the Math and C.S. department, not Education.
    • Honors College advisors should be avoided, we need advisors in Math.
    • In Math Education, it takes staying on the 8-semester plan to graduate in 4 years.

11. Other comments:
• Regarding the Math Tutoring Center:
  - The tutoring center struggled to help me, so I had to go to my professor.
  - Some tutors would not admit that they did not know how to do a problem.
  - Having a specific tutor identified to tutor Abstract Algebra was great! More focused course tutoring is preferred. Then be sure to let students know this is available.
  - The tutoring center does not do one-on-one tutoring.
  - The process for getting help at the tutoring center isn’t clear the first time.
• You can go to anyone in the department for help.
• The department get-togethers are fun.
• The NCCTM talks are a great engagement activity for students.
• I like the professors’ open-door policy.
• Students can be comfortable speaking their minds.
Department of Mathematics and Computer Science
Organizational Structure 2014-2015

**Department Head** – Jeff Lawson
**Administrative Support Associate** – Laura Hendrickson

**Associate Department Head** – Mark Budden

**Program Directors and Curricular Committee Chairs**
  - Computer Science – William Kreahling
  - Mathematics (Chair of Math Curriculum Committee) – Julia Barnes
  - Mathematics Education – Kathy Jaqua
  - Graduate Program (expires Spring 2015) - Risto Atanasov

**Standing Committees – Elected**
  - Annual Faculty Evaluation
  - Tenure, Promotion and Reappointment
  - Post-tenure Review
  - Colloquiums

**Standing Committees – Appointed by Head**
  - Steering Committee: DH, ADH, PDs
  - High School Mathematics Contest Awards
Computer Science | Graduate | AFE
---|---|---
Bill Kreahling, Chair (PD) | Risto Atanasov, Chair (PD) | Risto Atanasov
Scott Barlowe | Mark Budden | Julie Barnes
Geoff Goehle | Erin McNelis | Nathan Borchelt
Mark Holliday | John Wagaman | Bill Kreahling
Andrew Scott

Mathematics

Bill Kreahling, Chair (PD) | Risto Atanasov, Chair (PD) | Risto Atanasov
Scott Barlowe | Mark Budden | Julie Barnes
Geoff Goehle | Erin McNelis | Nathan Borchelt
Mark Holliday | John Wagaman | Bill Kreahling
Andrew Scott

Graduate

Risto Atanasov, Chair (PD)
Mark Budden
Erin McNelis
John Wagaman

AFE

Risto Atanasov
Julie Barnes
Nathan Borchelt
Bill Kreahling
Sloan Despeaux (alternate)

Mathematics Education

Julie Barnes, Chair (PD)
Nathan Borchelt
Sloan Despeaux
Cory Howk
Erin McNelis
Nory Prochaska

Steering

Risto Atanasov (MS AM PD)
Kathy Jaqua (Math Ed PD)
Bill Kreahling (CS PD)
Mark Budden (Assoc DH)

TPR

Risto Atanasov (continuing)
Axelle Faughn (continuing)
Julia Barnes (1 year term)
Sloan Despeaux (1 year term)
Nathan Borchelt (2 year term)
William Kreahling (2 year term)
Mark Budden (alternate)

Colloquium

Scott Barlowe | John Wagaman, chair
Geoff Goehle | Mark Budden
Cory Howk | Sloan Despeaux
Andrew Scott

Awards

John Wagaman

Vacant: unfilled (continuing)
Vacant: unfilled (1 year term)
Risto Atanasov (2 year term)

High School and Undergraduate Computer Science Contests - Mark Holliday
Commencement Receptions – Julie Barnes and Nathan Borchelt
Computer Science Club – Scott Barlowe and Bill Kreahling
Computer Lab and Servers Supervisor – Bill Kreahling and Andrew Scott
Department Mentoring – John/Sloan, Geoff/Erin, Cory/Risto, Andrew/Bill, Scott/Mark, Laura/Nathan,
Daniel/Julie, Nick/Julie
Department Graduate Teaching Assistant Mentor – Debbie Walters
Department Website – Laura Hendrickson, Bill Kreahling, Erin McNelis
Library Liaison – Risto Atanasov
Career Services Liaison: Mark Holliday
MAA Liaison – Sloan Despeaux
Math Social Club – Geoff Goehle and John Wagaman
National Scholarships – Risto Atanasov
NCCTM Beta Chapter – Kate Best
Professional Education Council – Kathy Jaqua
Public Relations/Alumni Relations – Sloan Despeaux and John Wagaman
Undergraduate Math Contests – Risto Atanasov, Mark Budden, and Erin McNelis
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| Mathematics Advancement Fund | Balance | 9,038 | 9,024 | 8,409 | 8,074 |
| Computer Science Advancement Fund | Balance | 14,994 | 13,986 | 5,397 | 3,387 |

* expenditures as of 11/2014  
** E&T funds may roll over to next FY if a spending plan is approved
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Other Resources for Mathematics

Major Facilities

The Department of Mathematics and Computer Science occupies one wing of the Stillwell Science Building. This wing houses

- The department main office 426 Stillwell
- All departmental faculty offices
- The Mathematics Tutoring Center, 455 Stillwell.
- Departmental computer labs in 434 Stillwell (with an additional lab in 116 Stillwell)
- Study areas with whiteboards and chalkboards as well as seating for both small and large study groups

Hunter Library Resources for Mathematics

- **Holdings:** In addition to access to holdings in Hunter Library, members of the university community also have borrowing privileges at UNC-Asheville and Appalachian State University. A courier service, ABC Express, provides next day delivery of titles from these two libraries.
- **New acquisitions:** Mathematics and Computer Science is allocated $3500 each year to purchase new holdings. Additionally, each new tenure-track faculty member is allocated an additional $500.
- **Databases relevant to mathematics:** MathSciNet (Mathematical Reviews), JSTOR, Science Citation Index, ScienceDirect (Elsevier), SpringerLink, ERIC, ETS TestLink, Project MUSE, Academic Search Complete.
- **Interlibrary loan:** Delivery of both print and electronic resources is available through our ILL provider, Loan Shark.

Mathematics Support Personnel

- Laura Hendrickson, Administrative Support Associate, full time
- Eleanor Prochaska, Director of Mathematics Tutoring Center, full time
- Student workers
  - Department office: Six hours per week
  - Instructional assistance: Three hours per week for MATH 340