WESTERN CAROLINA UNIVERSITY’S

Research and Scholarship Celebration

A Combined Event including the Undergraduate Expo and the Graduate Research Symposium

March 30 and 31, 2016
Part of Western Carolina University’s Research and Scholarship Celebration
Schedule At-A-Glance

Wednesday 3.30.16

Across Campus

All Day                              Oral Undergraduate EXPO Presentations

Ramsey Arena

3:00 PM                             Poster Preview
4:00 PM                             Opening Remarks
4:05 – 5:00 PM                      Keynote Speaker
5:00 – 6:00 PM                      Featured Faculty Research
6:00 – 7:30 PM                      Student Poster/Exhibit Presentations & Reception

Thursday 3.31.16

University Center & Across Cullowhee Campus

All Day                              Oral Undergraduate EXPO Presentations

Across Campus

11:00 AM – 5:00 PM                  Graduate Symposium with Featured Undergraduate Speakers

University Center
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Welcome

Welcome to the inaugural Research and Scholarship Celebration. RASC 2016 is a collaboration between The Honors College, Graduate School, and Office of the Provost that brings together the Graduate Symposium and the Undergraduate EXPO to highlight scholarship and creative activities across the university in a two-day event.

On Wednesday, March 30th, the RASC includes 27 undergraduate oral presentations at various campus locations throughout the day. At 3:00 pm, the RASC poster session begins in the Ramsey Center arena. The session includes 24 posters presented by graduate students along with 135 undergraduate poster presentations. Additional highlights include oral presentations by WCU faculty and a keynote address: “The Evolution of Goodness, Empathy and Justice” by Dr. Lee Alan Dugatkin, Professor and Distinguished University Scholar in the Department of Biology at the University of Louisville. Dr. Dugatkin’s presentation is partially sponsored by the WCU chapter of Sigma Xi, a scientific research society and Alpha Lambda Delta, a national honors society for first year students.

On Thursday, March 31st, 55 oral presentations by graduate students take place 11:00 am - 4:45 pm in the University Center. Along with the graduate student presentations, 11 talks from featured undergraduate students are part of the oral presentations in the University Center.

We are glad you are part of RASC 2016. The presentations shared over the two day event not only represent countless hours of student effort, but also would not be possible without the tireless efforts of more than 64 faculty sponsors across more than 18 departments and programs. Thanks to all of the faculty, staff, and students, as well as our sponsors, who worked to make this event possible. Enjoy!
Keynote Speaker
Dr. Lee Dugatkin

LEE DUGATKIN is a Professor of Biology and holds the rank of Distinguished University Scholar at The University of Louisville, Louisville, KY.

He is the author of nine books that have been translated into German, Spanish, Japanese, Chinese and Korean, including two widely adopted textbooks. In addition to publishing over 150 papers in such journals as Nature and The Proceedings of the National Academy of Sciences, he has published numerous articles in more popular magazines such as Scientific American, The New Scientist, and Slate. He has spoken about his work at more than 100 universities around the world including National University of Mongolia, Harvard University, Babes-Bolyai University (Romania), Bogazici University (Turkey), The University of Chicago, Oxford University, Cambridge University, The London School of Economics, The University of Copenhagen, Charles University (Czech Republic), The University of Oslo, The University of Zurich, The National University of Taiwan and many others.

Cryptologists, security specialists and many others in various fields are trying to cope with the increasing number of security breaches generated across the globe. With new vulnerabilities and exploits to systems being discovered daily, the privacy of computer users is becoming more and more of a challenge. One method to improve information security is through encryption. Most individuals and even some companies find the idea of encryption daunting. This attitude can leave the individual to rely on third party services for their data to be secured. However, sometimes those parties offer no real protection. This work presents P.E.P., a simple security application offering multiple tools that allow a user protection. P.E.P. takes a layered approach by offering simple encryption methods, steganography and compression algorithms. The algorithms included are a Caesar cipher, a book cipher, one use pad and a variation of the Enigma. Having different encryption methods can be useful by allowing an individual to choose the level of protection desired, either for learning purposes with the Caesar cipher or for stronger encryption like the one use pad. These encryption methods are complemented with a steganographic tool for further protection and compression tools, such as run length encoding and the Huffman algorithm, to allow the user to more easily store and send data. With these features and a simple and easy to use dual functioning interface, P.E.P. is designed for use with text messages between a sender and receiver. Testing the software for functional correctness can be accomplished by comparing the message before and after encryption; and usability testing will be performed by parties who are given a copy of the software during development. Future work includes adding network capabilities which will allow users to communicate directly with each other.

**Insidious Foot Pain in a Collegiate Female Basketball Player**

**Student Presenter:** Brooke Donaker  
**Faculty Sponsor:** Melissa Snyder

**Objective:** The objective of this case is to educate athletic trainers regarding the evaluation and treatment of insidious foot pain in a collegiate female basketball player. **Background:** The patient is an 18 year-old, collegiate basketball player complaining of insidious onset, left foot pain. The only finding in the patient’s past medical history is a surgical reconstruction consisting of accessory navicular and posterior tibial tendon transfer. The initial symptoms included sharp pain and the inability to weight bear on her left foot. Palpation and visual inspection revealed minimal swelling and point tenderness over the medical calcaneal tubercle and navicular. Range of motion was within normal limits. The only positive special test was tuning fork and tap test, which increased pain. All strengthening tests of the foot and ankle increased pain. **Differential Diagnosis:** Navicular fracture, posterior tibial tendonitis. **Treatment:** The patient was placed in a short cam boot and referred to a foot specialist. Diagnostic testing was positive for navicular fracture and inflammation of the posterior tibial tendon due to incorrect placement of the screws from the previous surgery. Surgical reconstruction consisted of revision of medial displacement calcaneal osteotomy with gastroc recession, excision of the accessory navicular with flexor digitorum longus tendon transfer to the navicular bone and advancement of the posterior tibial tendon to the navicular bone. **Initial treatment after surgery included rest. One month following surgical repair, the patient began thermotherapy, light exercise and range of motion in the pool. Month two, the patient saw the doctor and was told to start partial weight bearing in a CAM boot. **Uniqueness:** The patient denied
any mechanism of injury. Conclusion: This case demonstrates the importance of obtaining a thorough past medical history in order to determine possible uncommon, underlying causes of orthopedic dysfunction.

**Discovery, Isolation, Characterization and Genome Annotation of Unique Bacteriophage Species**

**Student Presenters:** Lindsey, Farris, Morgan Stanley, Paige Wright, ReLiza McGinnis  
**Faculty Sponsors:** Maria Gainey, Jamie Wallen, Megan Eckardt

Bacteriophages (viruses that infect bacteria) are the most genetically diverse biologic entities on the planet. Because of this diversity, it is common to find hundreds of different species contained even within a single location. In the fall we discovered, isolated, and characterized individual bacteriophage species. The characterization process consisted of electron microscopy, bacteriophage titer calculations, restriction enzyme digests, and DNA purification. The purpose of the fall semester’s research was to isolate our own bacteriophage species and archive this information and the bacteriophages discovered for later use by the scientific community. For our bacteriophages, Serendipitous, Mowgli829 and Ringtails15, we found each phage to be very different from the others. This was evident when examining tail and head sizes using electron microscopy images, as well as plaque morphologies and restriction enzyme digest profiles. A particularly striking example of this was found when comparing tail lengths. Both bacteriophage Serendipitous and Ringtails15 had exceptionally long tails as compared to all other bacteriophages discovered by the class (>300nm), while Mowlgi829 had an average tail length (~100nm). Out of these three bacteriophages, Serendipitous was chosen for full genome sequencing. This semester we are working toward annotating the genome of bacteriophage Serendipitous and are focusing specifically on the first 50 genes of this genome. By examining the auto-annotated genes of Serendipitous we can see that many of the bacteriophages genes code for proteins with unknown function. Of the first 50 genes, only 8 had blast hits with genes of known function. Our findings supports the fact that 80% of phage genomes code for proteins of unknown function. By the end of this semester we hope to have a better understanding of the gene products of the first 50 genes of mycobacteriophage Serendipitous.

**Harriet Powers’ Applique Quilts**

**Student Presenter:** Kimberly G. Holt  
**Faculty Sponsor:** Betty Torrell

The ideal project topic was to relate the Afro-American craftsman traditions to the culture of the Southern Appalachia. Thus, the project would align with the surrounding area and the Western Carolina University campus theme “Africa-More than a Continent.” African and Appalachian cultures will be analyzed and the effects on one another considered. This presentation explores the life and contributions of Harriet Powers (1837-1910). She was born and raised in slavery in Northern Georgia, just off the cusp of the Appalachian Mountains. Throughout her life, she created two known quilts. Quilting is a long respected craft in which Powers was most certainly gifted. Her two known quilts are done in the appliqué style. They reflect powerful deep rooted traditions of Africa, yet also reflect Appalachian traditions, giving the artistry of her fabric canvases a beautiful exclusiveness. The connections between Africa and Southern Appalachia, seen through the craft of Harriet Powers, is clear. The Appalachia culture is relevant to all residents. Skills and crafts are threatened with forgetfulness or negligence. In the past, many products done by African Americans were left unrecorded. It is with great luck that Harriet Powers' appliqué quilts can be viewed and studied today. One quilt now resides in the Smithsonian Institution and the other in the Museum of Fine Arts in Boston.
Veteran Intake Variables Predicting Elevated Scores on the Suicidality Scale of the MMPI-2-RF
Student Presenter: James Houston
Sponsor: David McCord

This study examined the associations between the suicidality scale (SUI) of the MMPI-2-RF and eight variables from the intake questionnaire administered at the time of admission to a Department of Veterans Affairs Medical Clinic. Subjects (n=1010) were selected from a VAMC in Minnesota and participated voluntarily. The objective of the study was to explore potential differences in scores on the suicidality scale as a function of several variables assessed on intake, including homelessness, depression, increase in PTSD symptoms, stress from marital conflict, illness or death in family, suicidal ideation, suicide attempts, and suicide plans. The MMPI-2-RF has a proven validity in the suicidality score and by determining the possible correlation between this scale and the particular stressors we hoped to expand understanding of some of the specific issues that could correlate to a higher score on the suicidality scale of the MMPI-2-RF. The results showed statistically significant mean differences on the SUI scale as a function of the presence/absence of some of these intake variables. Individuals who responded that they were experiencing some of these issues at present in their lives also scored highly on the suicidality scale of the MMPI-2-RF. This study also aims to verify the validity of the suicide questions on the Mental Status Exam given during admission to a VAMC. The three questions involve Suicidal Ideation, Suicide Attempts, and Suicide Plans. These three scores on the MSE have been determined to have a high validity when compared to the MMPI. Due to the correlation of the MMPI suicide scale and the MSE there is evidence that these eight variables predict higher scores with the highest being in regard to Suicide Plans (x = 86.9974) with this in mind possible preventative methods are discussed.

SketchCad: A Web-based 3D Modeling Tool
Student Presenters: Charlie Hreha, Cody Pero
Faculty Sponsor: Scott Barlowe

With the rise of 3D printers, video games, and other software in both engineering and entertainment, 3D modeling has become increasingly important. Often times, modeling or creating a 3D object requires the user to install a complex and perhaps expensive arrangement of software and plugins for basic functionality. We present an application called SketchCad. SketchCad is a web-based 3D modeling application that can be used on any device with commonly used software and platforms. SketchCad can create and manipulate 3D shapes and their attributes, such as color, scale, and position. SketchCad also allows users to place and select multiple shapes from either the shape selector menu or by clicking on them directly. Because the application runs on commonly installed software, it can be used on a multitude of devices ranging from laptops to mobile phones and tablets. With the ability to save and Export 3D models to other modeling programs, SketchCad can fit well within the modeling pipeline. GUI development is currently driven by behavioral testing, but we also have plans to implement back-end unit testing to ensure correct functionality. Future work includes increasing our functionality to include more shapes and options and to optimize SketchCad across more devices.
The Effects of Caffeine on Hydration Status: A Review  
Student Presenters: Erin Mullens, Fabiola Jimenez  
Sponsor: Brenda Marques

In the United States, more than half of the population (about 54%) drink coffee every day. On an average day, 3.1 cups (9 ounces) are consumed by individuals. Many people perceive that the consumption of coffee or other caffeinated products results in a loss of fluid and ultimately has an influence on overall fluid status. An investigation of the relationship between hydration status and drinking coffee or other caffeinated products in moderation (400-700mg or 4-7 cups of coffee) was conducted using a systematic review to evaluate primary research on the relationship between the two variables. Four databases (Academic Search Complete, SPORTDiscuss). In the United States, more than half of the population (about 54%) drink coffee every day. On an average day, 3 cups (about 24 ounces) are consumed by individuals. Many people perceive that the consumption of coffee or other caffeinated products results in a loss of fluid and ultimately has an influence on overall fluid status. An investigation of the relationship between hydration status and average coffee consumption or other caffeinated products (400-700mg of caffeine or 4-7 cups of coffee) was conducted using an evidence analysis review to evaluate primary research on the relationship between the two variables. Search criteria were established and four databases were utilized to find double blind and cross-over study designs published between 2000-2015. A total of four primary research articles met the inclusion criteria. These articles were evaluated using the Academy of Nutrition and Dietetics Quality Criteria Checklist. The Quality Criteria Checklists indicated that all reviewed articles were positive and showed evidence to support that caffeine has no impact on hydration status during exercise or non-exercise periods in both healthy men and women between the ages of 18-49. Multiple biochemical measures including serum osmolality, urine specific gravity, BUN, and creatinine, revealed no significant changes between control group and the intervention group. In conclusion, there is little evidence to suggest that the use of caffeinated beverages or caffeine capsules during exercise or non-exercise adversely effects hydration status. In relation to health care, practitioners should not discourage clients from consuming caffeine on the basis that caffeine will have adverse effects on hydration status. Additional studies with larger samples, varying health status and demographics should be conducted to further investigate the research question.


2. Fiala KA, Casa DJ, Roti MW. Rehydration with a caffeinated beverage during the nonexercise periods of 3 consecutive days of a 2-a-day practices. Int J of Sport Nutr and Exc Metab. 2004 (14)419-429.


**H.D.’s Trilogy and the Language Within: Palimpsest of Identity**  
*Student Presenter: Anna Oates*  
*Faculty Sponsor: Annette Debo*

In the midst of the Second World War, devastating the people of London and all around Europe, Hilda Doolittle, who went by the penname H.D., began the first section to her epic poem, The Walls Do Not Fall, and she continued her work, developing two more sections to create Trilogy. Throughout each section of Trilogy, H.D. interweaves histories, people, and religions with her use of language. In layering meanings of words, H.D. has created new wor(l)ds that have the ability to affix association between meanings. While many critics take note of the palimpsestic elements within Trilogy, few look at the palimpsest of language. Oxford English Dictionary defines palimpsest as “a thing likened to such a writing surface, esp[ecially] in having been reused or altered while still retaining traces of its earlier form; a multilayered record.” In layering words (and religion), H.D. has created, not a new meaning but a broader meaning, a meaning only understood and defined by its derivations or its preceding meanings. She is “the poet-alchemist,” expressed through her use of language and how she layers it. H.D. simply begs for all boundaries to be removed, as her use of words comprises one intrinsic being or concept. In Trilogy, H.D. uses the palimpsest of language to create a larger understanding of the wor(l)d, particularly in the images of Mary, the Lady, water, Venice, and Venus, which are all interwoven. H.D.’s epic parallels the Second World War and attempts to alleviate its pressure upon people by bringing them together through hope and detaching them from religious differences. By connecting multi-faceted images, H.D. has created a new sense of identity for people who lived under the pressures of WWII.

**Septic Arthritis in a Collegiate Male Wrestler Following TFCC Repair**  
*Student Presenter: Christine Poole*  
*Faculty Sponsor: Jill Manners*

Objective: The objective of this case study is to inform athletic trainers regarding the clinical care of septic arthritis following a triangular fibrocartilage complex (TFCC) repair in a collegiate wrestler. *Staphylococcus aureus* and septic arthritis. Treatment: Aspiration of the edema and radiographic images ordered by the surgeon revealed a joint infection. The patient was admitted into the hospital for an arthrotomy. Surgical intervention included debridement of the arthroscopic portals, removal of suture materials and drainage of the radiocarpal and mid-carpal joints. Cultures of the drainage revealed *staphylococcus aureus* as the cause of septic arthritis. Two days following arthrotomy, the patient underwent another procedure involving irrigation of the area. One week of intravenous Ancef was initially used to treat the infection. Rehabilitation was re-initiated following discharge. Uniqueness: The presentation of post-operative infection following TFCC repair makes this case unique. For every 10,000 arthroscopic procedures, 14 cases of septic arthritis arise, with seven percent of cases involving the wrist. Conclusion: Four months following surgery, the patient was cleared to begin wrestling. The patient still experiences pain. The latest follow-up revealed narrowing of the radiocarpal joint, indicating arthritic changes. Failure to recognize and appropriately treat septic arthritis may result in permanent damage. It is essential for healthcare professionals to understand the symptoms of post-operative infections. Background: The patient is a nineteen year-old collegiate wrestler complaining of wrist pain four weeks post-operative TFCC repair. Upon initial evaluation, the patient presented with isolated edema around the incision. The patient was referred to his surgeon to rule out infection following the initial increase in pain.  
Differential Diagnosis: Differential diagnosis in this patient included post-operative edema, *staphylococcus aureus*, *methicillin-resistant staphylococcus*
A Windigo is a monster of folklore among Algonquin Native American tribes and is described as a demonic spirit that possesses a human body, turning them into cannibals, and giving the human body what is defined as “Windigo Psychosis.” Windigo Psychosis is described by Charles Hughes as “prodromal depression; nausea, distaste for usual food; feelings of being bewitched and possessed by a cannibalistic monster; homicidal (sometimes suicidal) impulses; reported cannibalistic ideation” (C. Hughes., R. Simons., 1985). Windigo Psychosis is known as a culture-bound syndrome that affects mostly the Northern Algonquin Indians in the northern United States and into Canada and is only specific to that culture and in only those locations. A culture-bound syndrome is defined as “a combination of psychiatric and somatic symptoms that are considered to be a recognizable disease only within a specific society or culture” (C. Hughes., R. Simons., 1985). The purpose of this project is to explore library literature, review the research, and to inform the public of what the re-evaluated research shows, as well as how it changed the current outlook on Windigo Psychosis, and the argument of how Windigo Psychosis may not be a culture-bound syndrome, but instead an isolated case of trauma. The patterns and research about Windigo Psychosis within the Algonkian tribes was investigated and re-evaluated through the 1980’s by Charles Hughes, Richard Simmons, Lou Marano, and other commenters and show that Windigo Psychosis may have in some cases been connected to psychological dysfunction, but most likely never resulted in the state of murder or cannibalism to satisfy an intense craving and hunger for human flesh. Marano hypothesized there was a misbalance between thought and behavior, as well as a confusion between etic approach and emic approaches. The results of the literature analysis is that culture-bound syndromes are an enduring interest in psychological anthropology, but recent research on Windigo Psychosis points out that care should be taken in distinguishing ‘emic’ cultural beliefs and folklore from ‘etic’ manifestations of behavior.


**Featured Faculty Speakers**

*The Hearth as Machine: The Role of the Stove in 19th Century Domestic Architecture*
Berry Torrell, Visiting Assistant Professor, School of Art and Design

Since time immemorial fire as an element of nature has occupied a privileged place in the house. (Handlin, 1979)

The development of the cast-iron stove in the 19th Century was the most significant advance in the technology of the hearth since the evolution of the chimney in northern Europe during the Middle Ages. With the utilization of the developing technology of the Industrial Revolution to increase thermal efficiency and the availability of mass produced products for the middle class, the central hearth became contained as a mechanical contrivance, and fragmented into two specialized uses of cooking and heating. The heating stove, invented in the 1700’s, but not extensively utilized until the Industrial Revolution, became the thermal devise of choice for the Victorian middle-class residing in the parlor separate from the cook stove in the kitchen. The open fireplace was transformed by the newly developing technology of thermodynamics into thermal machine, and the open flame as an ancient symbol of man’s connection with nature was transformed into a unit of caloric energy. This transformation signaled a change in the social function of the hearth as well with the hearth’s mythical, ritual, psychological, emotional, and spiritual relevance morphing to reflect the new culture of the Victorian middle-class in American where the parlor stove becomes a symbol of the home owner’s virtue and status.

*Using Bacteriophages as Model Systems to Understand the Fundamental Process of DNA Replication*
Jamie Wallen, Assistant Professor, Chemistry & Physics
Brittni M. Foster, Jenny Collins, Lindsey Farris, Aaron Stevens, (students)
Maria D. Gainey, and Jamie R. Wallen (faculty)

DNA replication is the process by which genetic material is copied so that it can be passed on from generation to generation. Bacteriophage T7, a virus that infects the bacterium Escherichia coli, has long served as a model system to study the processes of DNA replication because only four proteins are required to accurately copy the viral DNA as opposed to the more than fifty proteins that are required in humans. Our laboratory is interested in understanding how these four proteins interact to efficiently copy both strands of DNA. Our recently determined X-ray crystal structures have provided the first three-dimensional images showing the interactions of these proteins at the molecular level. Our structures provide the first clues as to where the C-terminal tail of the primase-helicase enzyme contacts the DNA polymerase. Current efforts in our laboratory are focused on generating point mutations in these proteins to attempt to disrupt interactions observed in the structures. Mutations are then tested using a combination of biochemical approaches and in vivo complementation assays. Our complementation results show that some of these mutations are detrimental to bacteriophage survival in its host, indicating that the interactions observed are essential for DNA replication. In addition to our T7 work we are expanding our research efforts to replication in mycobacteriophages, which are viruses that infect the bacterium Mycobacterium smegmatis. Two new mycobacteriophages were recently discovered here at Western Carolina University during the project-based undergraduate research course named Phage Hunters. Twenty undergraduate students are currently using computational tools to annotate the sequenced genomes of our two new viruses, and we have already discovered that these viruses contain unique mechanisms of DNA replication as compared to T7. Future work will focus on understanding both
the similarities and differences in strategies of DNA replication in viruses that infect different bacterial hosts.

Building and Controlling Micro-Robotic Swarm
Yanjun Yan, Assistant Professor, Engineering and Technology

Funded by WCU Hunter Scholar Award, my team aims to design an optimal control algorithm for micro-robot swarm. A micro-robot is a small robot that can be as tiny as a penny. Despite its simple structure and a limited range of sensing, when many micro-robots are coordinated in a swarm, they can accomplish complex tasks. For instance, a swarm of micro-robots can coordinate to move objects that are larger than themselves. They can also assemble into different shapes, to light up with different colors (using on-board multi-color LEDs) to display words and patterns. A very useful application of swarm of robots is to detect and track events, such as fires, bombs, earthquakes, and other disasters, to help with rescue efforts. We chose Kilobots, originally designed by Harvard, to be the agents of our swarm robotics, because the design files were publicly available, and such robots were claimed to be low-cost albeit highly functional. However, when we started building them, we found quite a few issues in the documentation and we had to debug strenuously. We reached out to multiple research groups in US, UK and China, to find out that most groups purchased their Kilobots from K-team at a very high price, defeating the purpose of Kilobots being inexpensive swarm robots. We could borrow several K-team Kilobots and see the improvements done by the K-team. We were motivated to redesign the Kilobots to make them truly bug-free so that the researchers and educators from around the world can take our design and build the Kilobots without issues. Our first batch of Kilobots after fixing the issues in the Harvard designs could perform various tasks, such as orbiting, dispersing, and aggregating, proving that our interpretation was correct. We are now building the second batch of Kilobots using our new design. Meanwhile, we have been simulating the Particle Swarm Optimization algorithms in source discovery under noisy conditions, mimicking the practical environment. We are very excited to experiment with the algorithm in the physical swarm of Kilobots soon.

“In the lowest deep a lower deep”: The Utility of Evil in Milton’s Paradise Lost
Mimi Fenton, Professor, Department of English

Satan’s opening soliloquy of Book IV has been analyzed largely for what it reveals about Satan’s intentions as God’s adversary, his unwillingness to repent, and his seductively contorted rhetoric which exposes both his heroism and narcissistic rage. The grand speech, however, also serves for Milton a broad, public function: by exploring the complexity of Satan’s evil, Milton can illustrate for his readers how and why to have compassion for any enemy. The experience of reading Satan’s soliloquy demands readers to absorb Satan’s hatred, the better to feel pathos for one who would choose to destroy others and in turn destroy his own soul. Milton’s goes yet one step beyond the chastening and refining of the audience’s experience of pity for and fear of such a character. Cultivating an empathetic reader would serve an essential civic function in developing a citizenry better capable of making judicious and circumspect decisions. Pathos is crucial to genuine intellectual debate, the aim of which is deliberative, productive consideration of an idea or belief to inform a choice. For Milton, “reason is but choosing,” and choice is the essence of freedom. Thus for Milton, empathy stands at the heart of individual freedom and civil liberty.
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<td>Belk Building 308B</td>
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<tr>
<td>2:20 PM</td>
<td>Grace Overby</td>
<td>Elizabeth Sexton</td>
<td>Women Helping Women: Teaching of Women's Health Topics at the Steadfast House</td>
<td>Health &amp; Human Sciences Building 204</td>
</tr>
<tr>
<td></td>
<td>Alyssa Sorrells</td>
<td>Cheryl Clark</td>
<td></td>
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<tr>
<td>2:30 PM</td>
<td>Breana Steele</td>
<td>John Whitmire</td>
<td>The Fate of the Damned: The Role of Predetermination in Augustine's Model of the Good Life</td>
<td>Stillwell Science Building 225</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Anna Oates</td>
<td>Annette Debo</td>
<td>H.D.'s Trilogy and the Language Within: Palimpsest of Identity</td>
<td>Coulter Building 204</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Crystal Plemons</td>
<td>Annette Debo</td>
<td>A Caged Singer: The Social Construction of Disability in The Heart is a Lonely Hunter by Carson McCullers</td>
<td>Coulter Building 204</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Anna Oates</td>
<td>Brent Kinser</td>
<td>Abandonment in Charles Dickens’s Bleak House: Immobility and Identity</td>
<td>Coulter Building 204</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Lauren Stepp</td>
<td>Brent Kinser</td>
<td>From Aristotle to Contemporary Philanthropy: Analyzing the Rhetoric of Nonprofit Grant Proposals</td>
<td>Coulter Building 204</td>
</tr>
<tr>
<td>2:40 PM</td>
<td>Marisa Beatty</td>
<td>Cheryl Clark</td>
<td>Leading the Homeless Population from Hopeless to Hope</td>
<td>Health &amp; Human Sciences Building 204</td>
</tr>
<tr>
<td></td>
<td>Samantha Hartz</td>
<td>Elizabeth Sexton</td>
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</tr>
<tr>
<td>3:00 PM</td>
<td>Alexandria Case</td>
<td>Cheryl Clark</td>
<td>Rural Opioid Overdose Reversal Grant Program</td>
<td>Health &amp; Human Sciences Building 204</td>
</tr>
<tr>
<td></td>
<td>Larissa Capps</td>
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<tr>
<td>3:00 PM</td>
<td>Kiara Hines</td>
<td>Robert Ferguson</td>
<td>Breaking New Ground: A Deeper Look into Two of North Carolina’s Earliest Public Universities</td>
<td>McKee Building 209</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>Kaitlyn Wright</td>
<td>Daryl Hale</td>
<td>Justice and Human Nature: Comparing Plato and Thucydides</td>
<td>Stillwell Science Building 225</td>
</tr>
<tr>
<td>3:30 PM</td>
<td>Kevin Bryson</td>
<td>John Whitmire</td>
<td>The Journeyman: A Dedication to Self and Society</td>
<td>Stillwell Science Building 225</td>
</tr>
<tr>
<td>4:00 PM</td>
<td>Marian Hough</td>
<td>Gael Graham</td>
<td>Betty Ford: Becoming a Controversial First Lady</td>
<td>McKee Building 209</td>
</tr>
<tr>
<td>4:00 PM</td>
<td>Lauren Reiff</td>
<td>Elizabeth Sexton</td>
<td>Assisting Homeless Women on their Journey through Health Education</td>
<td>Health &amp; Human Sciences Building 204</td>
</tr>
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<td></td>
<td>Abigail Hall</td>
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<td>Sarah Johnson</td>
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Thursday, March 31st

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<thead>
<tr>
<th>Time</th>
<th>Presenter</th>
<th>Faculty Sponsor</th>
<th>Title</th>
<th>Location</th>
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</thead>
<tbody>
<tr>
<td>2:00 PM</td>
<td>Josh Childers</td>
<td>Richard Starnes</td>
<td>Davis’ General Orders No.111 and the Slippery Slope of Retaliation in the American Civil War</td>
<td>McKee Building 220</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>John McCarson</td>
<td>Gael Graham</td>
<td>&quot;The Martin We Forgot: &quot;I Have a Dream' and 'Beyond Vietnam.&quot;&quot;</td>
<td>McKee Building 220</td>
</tr>
<tr>
<td>3:30 PM</td>
<td>Hannah Cantrell</td>
<td>Christopher Hoyt</td>
<td>Dickie's Artworld Applied to Banksy</td>
<td>John W. Bardo Fine and Performing Arts Center 130</td>
</tr>
</tbody>
</table>

Other

<table>
<thead>
<tr>
<th>Time</th>
<th>Presenter</th>
<th>Faculty Sponsor</th>
<th>Title</th>
<th>Location</th>
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<tbody>
<tr>
<td>6:00 PM</td>
<td>Nadzeya Heller</td>
<td>Scott Rader</td>
<td>21st Century “Pharma Talk”: Taking Social Media from Talk to Action</td>
<td>Biltmore Park 344</td>
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<td>4/27/16</td>
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</table>
# Featured Undergraduate Speakers

Selected as exemplary by abstract reviewers

<table>
<thead>
<tr>
<th>Time</th>
<th>Presenter</th>
<th>Faculty Sponsor</th>
<th>Title</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:00-11:15 AM</td>
<td>Lindsey Farris</td>
<td>Maria Gainey</td>
<td>Discovery, Isolation, Characterization and Genome Annotation of Unique Bacteriophage Species</td>
<td>UC Multipurpose Room</td>
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<tr>
<td></td>
<td>Morgan Stanley</td>
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<td></td>
<td>Paige Wright</td>
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<tr>
<td></td>
<td>ReLiza McGinnis</td>
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<tr>
<td>12:30-12:45 PM</td>
<td>Kimberly Holt</td>
<td>Betty Torrell</td>
<td>Harriet Powers' Applique Quilts</td>
<td>UC Cardinal Room</td>
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<tr>
<td>12:30-12:45 PM</td>
<td>Anna Oates</td>
<td>Annette Debo</td>
<td>H.D.’s Trilogy and the Language within: Palimpsest of Identity</td>
<td>UC Catamount Room</td>
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<tr>
<td>12:30-12:45 PM</td>
<td>Erin Mullens</td>
<td>Brenda Marques</td>
<td>Impact of Caffeine on Hydration Status: A Systematic Review</td>
<td>UC Catamount Room</td>
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<tr>
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<td>Fibiola Jimenez</td>
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<tr>
<td>12:45-1:00 PM</td>
<td>Gianna White</td>
<td>Ted Coyle</td>
<td>Windigo Psychosis and Culture-Bound Syndromes</td>
<td>UC Catamount Room</td>
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<tr>
<td>1:00-1:15 PM</td>
<td>Christine Poole</td>
<td>Jill Manners</td>
<td>Septic Arthritis in a Collegiate Male Wrestler Following TFCC Repair</td>
<td>UC Catamount Room</td>
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<tr>
<td>1:15-1:30 PM</td>
<td>Brooke Donaker</td>
<td>Melissa Snyder</td>
<td>Insidious Foot Pain in a Collegiate Female Basketball Player</td>
<td>UC Catamount Room</td>
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<tr>
<td>2:00-2:15 PM</td>
<td>Charlie Hreha</td>
<td>Scott Barlowe</td>
<td>SketchCad: A Web-based 3D Modeling</td>
<td>UC Dogwood Room</td>
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<td>Cody Pedro</td>
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<tr>
<td>3:30-3:45 PM</td>
<td>James Houston</td>
<td>David McCord</td>
<td>Veteran Intake Variables Predicting Elevated Scores on the Suicidality Scale of the MMPI-2-RF</td>
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<tr>
<td>3:30-3:45 PM</td>
<td>Clinton Bryson</td>
<td>Scott Barlowe</td>
<td>P.E.P.: Towards a Multipurpose Suite of Encryption Technique</td>
<td>UC Dogwood Room</td>
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<tr>
<td>3:30 – 3:45 PM</td>
<td>Joseph Kennedy</td>
<td>Joseph Pechmann</td>
<td>Differences in Surface Activity Behavior in Two Terrestrial Salamanders</td>
<td>UC Multipurpose Room</td>
</tr>
</tbody>
</table>
Undergraduate EXPO Poster and Oral Presentations

Poster presentations will be held at Western Carolina University, March 30th at Ramsey Arena, 6:00-7:30 PM. Oral presentations will be held across campus March 30th & 31st at various times. Below are project titles, presenters, and sponsors by College and Department.

† Denotes oral presentation. All others are posters.
*Denotes a presentation accepted for National Conference on Undergraduate Research.
◊ Denotes a project that was funded by Undergraduate Research Project Grants.

121 abstracts were accepted to NCUR for the April 7-9, 2016 conference in Asheville, NC. Slightly more than 30 undergraduate research grants were funded in the 2015-2016 academic year.

College of Arts & Sciences

Anthropology and Sociology

Bone Cracking in High Humidity/High Temperature Environment *
Lauren Stogner, presenter
John Williams, sponsor

The Ease of Observation of Saw Cut Marks on Atypical Bones *
Madeline Ormand, presenter
John Williams, sponsor

Windigo Psychosis and Culture-Bound Syndromes
Gianna White, presenter
Ted Coyle, sponsor

Biology

Benefits of Bacteriophage Research
Matthew McDonough, Johnny Hodge, Kenneth Campbell, presenters
Maria Gainey, Megan Eckardt, Jamie Wallen, sponsors

Classification of 21 Novel Mycobacteriophages Isolated at Western Carolina University *
Aaron Stevens, Mary Edwards, presenters
Maria Gainey, Megan Eckardt, Jamie Wallen, sponsors

Correlation of Stem Cell Marker Presence and Severity of Osteoarthritis in Knee Joints of Baboons
James Grissom, presenter
Heather Coan, sponsor

Differences in Surface Activity Behaviors in Two Terrestrial Salamanders † *
Joseph Kennedy, presenter
Joseph Pechmann, sponsor

Discovery and Classification of 2 Temperate Bacteriophages via Viral Immunity Testing *
ReLiza McGinnis, Brooke Burns, presenters
Maria Gainey, Jamie Wallen, Megan Eckardt, sponsors

Discovery, Isolation, Characterization and Genome Annotation of Unique Bacteriophage Species
Lindsey Farris, Morgan Stanley, Paige Wright, ReLiza McGinnis, presenters
Maria Gainey, Jamie Wallen, Megan Eckardt, sponsors

Elucidating the Microbial Diversity in Two Commercial Brands of Kombucha † *◊
Chequita Brooks, presenter
Sean O’Connell, sponsor
Examining the Feeding Preferences of Dermestes Maculatus on a Variety of Different Animal Soft Tissue † *
Emily Ashe, presenter
Sean O’Connell, sponsor

Localization of Tps1 and Tps2 Proteins Involved in Trehalose Biosynthesis in the Pathogenic Yeast Cryptococcus Neoformans *
Breana Steele, presenter
Indi Bose, sponsor

Mycobacteriophages: From Discovery to Gene Calling
Kasie Stephens, Tierra McDaniel, Aliyah Hastings, Amber Mason, presenters
Maria Gainey, Jamie Wallen, Megan Eckardt, sponsors

Using RNA Interference to Identify Virulence Related Genes in the Basidiomycetous Yeast, Cryptococcus Neoformans * ◊
Rebecca Sargent, presenter
Indrani Bose, sponsor

Visual Assessment of Cullowhee Creek and Richland Creek to Assess Habitat Quality *
Wayne Ryan, presenter
Thomas Martin, sponsor

Chemistry and Physics

Adsorption of Cu(II) to Unmodified and Modified Peanut Hulls *
Melisa Glatte, presenter
Carmen Huffman, sponsor

Catalytic Dihydroxylation of Alkenes by Means of Recoverable Osmium Catalyst for Use in Assembling Covalent Organic Frameworks *
Nancy Wiebelhaus, presenter
William Kwochka, sponsor

Development of Europium-doped Gadolinium Fluoride Nanoparticles for Potential Biomedical Imaging *
Laney Browder, presenter
Channa De Silva, sponsor

Investigation of Amino Acid Residues in the C-terminal Tail of Bacteriophage T7 Single-Stranded Binding Protein Predicted to Bind DNA Polymerase
Jenny Collins, Brittni Foster, presenters
Jamie Wallen, sponsor

Optimization of the Fabrication Parameters for SERS-active Forensic Evidence Swabs Used in the Serological Screening of Human Bodily Fluids * ◊
Katarina Ruehl, presenter
David Evanoff, sponsor

Oxidation of Peanut Hulls via Alkaline Peroxide Bleaching *
Holly Truluck, presenter
Carmen Huffman, sponsor

Substituent Effects on Europium Metal-Centered Luminescence *
Rachel Downing, presenter
Channa De Silva, sponsor

Synthesis of Crystalline Molecular Gyroscopes using Phenyl Boronic Acids
Ryan Archer, Emily Pounds, presenters
William Kwochka, sponsor

Synthesis, Characterization, and Luminescent Properties of Lanthanide Dipyridophenazine Functionalized Complexes for Potential Bio-Imaging Applications * ◊
Alexander Lillie, presenter
Brian Dinkelmeyer, Channa De Silva, sponsors

Synthesis, Characterization, and Luminescent Studies of Europium-doped Zinc Oxide Nanoparticles for potential Biomedical Applications * ◊
Joseph Lee, Nicole Dragan, Rachel Downing, presenters
Channa De Silva, sponsor
The Effects of Adding Trifluoromethyl Groups to Tris (Acetylacetonate) - 2,2’-Bipyridinyl -Terbium (III) Analyzed Using Density Functional Theory and Time-domain Density Functional Theory
Joshua Rickard, presenter
Channa De Silva, sponsor

Validation of the Alpha-Glycerophosphate Oxidase Catalytic Mechanism via Site-Directed Mutagenesis *
Alma Plaza-Rodriguez, C.M. Crowley, Aric Butler, presenters
Jamie Wallen, sponsor

Criminology and Criminal Justice

A Comparative Study of the Effect of Active Shooter Training on First Responder Response to Mass Casualty Events
Jeremiah Underwood, presenter
Thomas Johnson, sponsor

A Comparison of Law Enforcement Agencies in NC
Shelby Stephens, presenter
Jamie Vaske, sponsor

A Comparison of Wilkes County Crime Data
Marley Lee, Bradford Johnson, Marina Ropalo, Alexander Bennett, presenters
Jamie Vaske, sponsor

A Decade of Crime in Yancey County
Kelli Stewart, Daniel Pritchard, Dominick LeSerra, Hugo Santos, presenters
Jamie Vaske, sponsor

An Assessment of the Lexington (NC) Water Treatment Plant
John Bentley, presenter
Thomas Johnson, sponsor

An Assessment of Trenton Psychiatric Hospital (NJ): Their Ability to Respond to Emergencies and Terrorist Attacks in a Timely Manner
Samantha Cameron, presenter
Thomas Johnson, sponsor

Asn107Ile Polymorphism on the NPSR1
Travis Ellington, Jetter Phillips, Lauren Saxby, Haley McKnight, presenters
Jamie Vaske, sponsor

Asn107lle Polymorphism on the Neuropeptide S Receptor (NPSR1) Gene
Emily Jaynes, Zach Kierstead, Chrislynn Daugherty, Chelsea Reavis, presenters
Jamie Vaske, sponsor

COMT Val158 Met & Implications
Halie Kervaski, Rosalyn Jaramillo, Annie Cameron, Kajlie Kennedy, presenters
Jamie Vaske, sponsor

Crime and Poverty: A Critical Perspective
Paige Phillips, presenter
Stephen Brown, sponsor

Crime Data in Avery County from 2003 to 2012
Tyler Harrison, David Abril, Taylor Speagle, London Richardson, presenters
Jamie Vaske, sponsor

Crime Data in Mitchell County from 2003 to 2012
Tyler Palmer, Tequira Monk, Tanya Arrasola, Hunter Kirby, presenters
Jamie Vaske, sponsor

Crime Data of Madison County
Jared Franks, Hope Nobles, Ben Charles, Jessica Palermo, presenters
Jamie Vaske, sponsor

Crime in Buncombe
Alex Zeigler, David Fifer, Shannon Welch, Katelyn Dilts, presenters
Jamie Vaske, sponsor

Crime Trends in Ashe County
Kim Mitchell, Caleb Duyck, Kaitlyn Sizemore, Gabriel Cosenza, presenters
Jamie Vaske, sponsor

Crime Trends in Buncombe County from 2003 to 2012
Laura Robinson, Veronica Castro, Robert Wiltcher, Trisha Mitchell, Matt Davis, presenters
Jamie Vaske, sponsor
Crime Trends in Yadkin County
George Stiak, Shelby Stephens, Dalton Trantham, Lindsey Cale, Caleb Moore, presenters
Jamie Vaske, sponsor

Crime Trends within Alleghany County
Samantha Baker, Kaitlyn Sheter, Adam Sparks, Wendy Frye, Cassie Scott, presenters
Jamie Vaske, sponsor

Oxytocin Receptor RS53576
Tyler Harrison, John McBeth, presenters
Jamie Vaske, sponsor

Polymorphism rs2513281
Samantha Cameron, Kathy Yurchak, Eric Feldman, Kaitlyn Norton, presenters
Jamie Vaske, sponsor

Role of Volunteer Groups in Disaster Situations
Sutton Atha, presenter
Thomas Johnson, sponsor

Statistical Analysis of Watauga County from 2003 to 2012
Vanessa Williams, Renee Manzini, Marcus Hartsell, Neha Patel, presenters
Jamie Vaske, sponsor

TaqIA Polymorphism on ANKK1 gene
Jordan Dye, Neha Patel, Lincoln Caliri, Keana Lowe, presenters
Jamie Vaske, sponsor

The Athlete as Ambassador: Surveillance, Social Media, and the Evolving Demands of Athlete Sponsorship.
Tyler Thompson, presenter
Ophir Sefiha, sponsor

The His452tyr Polymorphism and Antisocial Behavior
Jillian Brown, Hannah Cantrell, Quanteria Sitton, Tyler Thompson, presenters
Jamie Vaske, sponsor

The rs2513280 Single Nucleotide Polymorphism
Kimberly Russell, Tommy Henry, Patrick Petty, Dustin McEntire, presenters
Jamie Vaske, sponsor

Why Some People are More Compelled to be Popular
Kiersten Johnson, Gibson Morrow, Samantha Spain, presenters
Jamie Vaske, sponsor

English

A Caged Singer: The Social Construction of Disability in The Heart is a Lonely Hunter by Carson McCullers†*
Crystal Plemmons, presenter
Annette Debo, sponsor

Abandonment in Charles Dickens’s Bleak House: Immobility and Identity †*
Anna Oates, presenter
Brent Kinser, sponsor

From Aristotle to Contemporary Philanthropy: Analyzing the Rhetoric of Nonprofit Grant Proposals †*
Lauren Stepp, presenter
Brent Kinser, sponsor

H.D.’s Trilogy and the Language Within: Palimpsest of Identity †
Anna Oates, presenter
Annette Debo, sponsor

History

"The Martin We Forgot: "I Have a Dream' and 'Beyond Vietnam.'”†
John McCarson, presenter
Gael Graham, sponsor

Betty Ford: Becoming a Controversial First Lady†
Marian Hough, presenter
Gael Graham, sponsor

Breaking New Ground: A Deeper Look into Two of North Carolina's Earliest Public Universities †
Kiara Hines, presenter
Robert Ferguson, sponsor

Davis' General Orders No.111 and the Slippery Slope of Retaliation in the American Civil War †
Josh Childers, presenter
Richard Starnes, sponsor
Interdisciplinary Programs

An Assessment of DMORT Operations
Megan Sweeney, presenter
Thomas Johnson, sponsor

Sustainability Audit of Highlands Biological Station *
Katherine Eddings, Jessica Floyd, Zackary Waldroup, Tanner Stamey, presenters
Laura DeWald, sponsor

Mathematics and Computer Science

A Distributed Mandelbrot Set Application
James Key, presenter
William Kreahling, sponsor

Android Framework for Social and Geospatial Interaction
Richard Haut, Jameson Burchette, presenters
Andrew Scott, sponsor

API and User Interface for Touch Screen Terminal
Clifton West, presenter
Andrew Scott, sponsor

Beach Nourishment with Node and Express
Tommy Ho, Paul Raiche, presenters
Mark Holliday, sponsor

Humans VS Zombies: A Mobile Application
Nicholas Widener, Trent Weatherman, presenters
Andrew Scott, sponsor

Manhunt Android Application
Dylan Foster, presenter
William Kreahling, sponsor

MIPS Sound Sequencer
Michael King, Bradford Westley, Michael King, presenters
William Kreahling, sponsor

PEP: Towards a Multipurpose Suite of Encryption Techniques
Clinton Bryson, presenter
Scott Barlowe, sponsor

Research Project Lynx - Linking Users and Their Data
Michael Bruce, Max Kernchen, presenters
William Kreahling, sponsor

ShadeIT: An Interactive Tool for Developing Shader Programs
Robert Anger, presenter
Scott Barlowe, sponsor

SketchCad: A Web-based 3D Modeling Tool
Charlie Hreha, Cody Pero, presenters
Scott Barlowe, sponsor

Swarm Intelligence Optimization Methods and Applications
Alan Winchester, presenter
Mark Holliday, sponsor

Swarm Intelligence Simulation Framework
Dana Butrick, presenter
Mark Holliday, sponsor

Teaching Cryptography with the Lock and Key Encryption Tool
Timothy White, presenter
Scott Barlowe, sponsor

Modern Foreign Languages

Japanese Calligraphy: Past, Current and Future Vol 4
Robert Meikle, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current and Future Vol. 4
Stephanie Tucker, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current and Future Vol. 4
Amanda Sharpe, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current and Future Vol. 4
Andrew Goodman, presenter
Megumi Otake, sponsor
Japanese Calligraphy: Past, Current and Future
Vol. 4
Gavin Nelson, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current and Future
Vol. 4
Jacob Hedrick, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current and Future
Vol. 4
Joshua Jolly, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current and Future
Vol. 4
Joshua Stump Rudd, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current and Future
Vol. 4
Kylie Thornburg, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current and Future
Vol. 4
Mason Montgomery, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current and Future
Vol. 4
Robert Fox, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current and Future
Vol. 4
Samantha Spain, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current and Future
Vol. 4
Zindy Cruz, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current, and Future
Vol. 4
Kristin Pflug, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current, and Future
Vol. 4
Raymond Luna, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current, and Future
Vol. 4
Kalei Canter, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current, and Future
Vol. 4
Sara Lamm, presenter
Megumi Otake, sponsor

Japanese Calligraphy: Past, Current, and Future
Vol. 4
Spenser Willis, presenter
Megumi Otake, sponsor

Philosophy and Religion
Dickie's Artworld Applied to Banksy †
Hannah Cantrell, presenter
Christopher Hoyt, sponsor

Justice and Human Nature: Comparing Plato and Thucydides † *
Kaitlyn Wright, presenter
Daryl Hale, sponsor

The Fate of the Damned: The Role of Predetermination in Augustine's Model of the Good Life † *
Breana Steele, presenter
John Whitmire, sponsor

The Journeyman: A Dedication to Self and Society † *
Kevin Bryson, presenter
John Whitmire, sponsor
College of Business

Entrepreneurship, Sales and Marketing, and Hospitality and Tourism

21st Century “Pharma Talk”: Taking Social Media from Talk to Action †
Nadzeya Heller, presenter
Scott Rader, sponsor

College of Education and Allied Professions

Psychology

Knowledge of Asexuality *
Alexis Austin, Kristen Metcalf, Aidan Carey, Taylor Wootten, Ashley Holland, presenters
Mickey Randolph, Candace Boan-Lenzo, sponsors

Perceptions of Asexuality *
Kristen Metcalf
Alexis Austin, Aidan Carey, Taylor Wootten, Ashley Holland, presenters
Mickey Randolph, Candace Boan-Lenzo, sponsors

Veteran Intake Variables Predicting Elevated Scores on the Suicidality Scale of the MMPI-2-RF
James Houston, presenter
David McCord, sponsor

Human Services

An Outdoor Experience & Community Connections
Krista LaPlante, Adam Berry, Fian McCabe, presenters
Andrew Bobilya, Debby Singleton, sponsors

An Outdoor Experience and Community Connections †
Krista LaPlante, Adam Berry, Fian McCabe, presenters
Andrew Bobilya, sponsor

Extreme Sports Research †
Ethan Monte-Parker, Erin Baker, Caitlin Morgan, Dominic Cosenza, presenters
Ben Tholkes, sponsor

Trail Maintenance and Remapping †
Clayton Johansen, presenter
Maurice Phipps, sponsor

WCU Trail System Research †
Brandon Davis, Cory Lindner, Joseph Guseman, Tommy Connell, presenters
Ben Tholkes, sponsor
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School of Art and Design

Harriet Powers' Applique Quilts
Kimberly Holt, presenter
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Communication Sciences and Disorders

Western Carolina Interdisciplinary Collaboration: Communication Sciences and Disorders and Nursing
Ashley Horak, Kylie Leek, presenters
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School of Health Sciences

Avocado: A Better Butter?
Heather O'Hearn, Christina Shupe, presenters
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Carry-Over Effects of Continuous Shortwave Diathermy and Stretching in Developing Hamstring Flexibility
Erin Grimsley, Kelcey Holcomb, presenters
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Comparison of Four Common Taping Procedures
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Congenital Cervical Spine Fusion in a High School Football Player
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Constrictive Pericarditis in a Collegiate Football Player
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Effectiveness of Pre-Participation Physical Exams in Screening for Female Athlete Triad in Secondary School Athletes
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Effectiveness of Pre-Participation Physical Exams in Screening for Mental Health Disorders in Secondary School Athletes
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Evidence Analysis Review: Effectiveness of Type II Diabetes Self-Management Programs
Jacob Martin, Preston Jackson, Anthony Walker, presenters
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Feasibility of Incorporating Locally Grown Fruits and Vegetables in School Foodservices
Matthew Impagliatelli, presenter
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Finger Foods
Julia Savoy, Brady Johnson, Kaitlyn Hutzel, presenters
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Genome Annotation of Bacteriophage Serendipitous: An Unknown Threat to Bacteria
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Hazard Analysis of Consumer Grade 3D Printers *
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Insidious Foot Pain in a Collegiate Female Basketball Player
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Os Trigonum and Posterior Impingement in Collegiate Football Player *
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Parameniscal Cyst Rupture in a Collegiate Football Player *
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Physical Education Intervention in School Aged Children and How it Affects Overweight and Obesity: An Evidence Analysis Review
Alyssa Bassett, Jasmine Johnson, presenters
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RISA’s Hands-On Nutrition Experience
Maggie Robinson, Alaina Demeree, presenters
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Scapular Fracture in a Collegiate Football Player *
Whittney Correll, presenter
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Sensory Analysis of Strawberry Fruit Roll-ups vs. Strawberry Lemonade Fruit Leather
Victoria Trammell, Haley King, Elyssa Mulheron, Kendall Bolin, presenters
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Sensory Evaluation of Cookies Prepared Four Ways
Caitlyn Akins, Kimberly Williams, presenters
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Septic Arthritis in a Collegiate Male Wrestler Following TFCC Repair
Christine Poole, presenter
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Strategies to Increase the Nutritional Quality of Food Assistance in Western North Carolina
Caitlyn Lance, Maria Diprima, presenters
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The Effect of the Thermostim Probe on Triceps Surae Flexibility *
Dalton Greer, Levi Cales, Greylin Cleary, presenters
Melissa Snyder, sponsor

The Effects of C7-T1 Mobilization on Pain, Pain-Pressure Threshold and Shoulder Strength *
Whittney Correll, presenter
Jill Manners, sponsor

The Effects of Caffeine on Hydration Status: A Review
Erin Mullens, Fabiola Jimenez, presenters
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The Relationship between Transportation and Food Insecurity in Elderly Americans: An Evidence-Analysis Review *
Julia Harrill, Katherine Austin, presenters
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School of Nursing

“Wait… What Did You Say?” A Focused Review of Memory, Factors that Affect It, and Potential Research Studies
Katelyn Hesselberg, presenter
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A HOPE Health Fair Impact on Community Health †
Matt Elledge, Tony Natoli, Jessica Robison, presenters
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Assisting Homeless Women on their Journey through Health Education †
Lauren Reiff, Abigail Hall, Sarah Johnson, presenters
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Council on Aging: Encouraging Healthy Living for a Lifetime
Claire Lippy, Claire Minch, Corey Sexton, presenters
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Enabling Western North Carolina Senior Citizen Independence†
Christy Barker, Kate Campbell, Kelia Kale, Kimberly Sullivan, presenters
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Leading the Homeless Population from Hopeless to Hope†
Marisa Beatty, Samantha Hartz, presenters
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Nursing Students Engaging in Health Fair for Homeless
Courtney Rosu, Bri Willingham, Kaitlyn Speer, presenters
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Rural Opioid Overdose Reversal Grant Program†
Alexandria Case, Larissa Capps, presenters
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Women Helping Women: Teaching of Women’s Health Topics at the Steadfast House†
Grace Overby, Alyssa Sorrells, Meagan Williams, presenters
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Kimmel School of Construction Management and Technology

Engineering and Technology

Development of a Computer System for Teaching American Sign Language
Taylor Andrews, presenter
Robert Adams, Chip Ferguson, sponsors

Double Wishbone Suspension Systems
Jordan Hardwick, presenter
Sudhir Kaul, sponsor

Feasibility Study of Prototyped Proton Radiation Compensators
Dylan Shook, presenter
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Gesture Controlled Robotic Arm
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Innovating the Post Process in Selective Laser Melting
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Measuring Vibrations Using a Laser Vibrometer and Accelerometer
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MR Fluids in Relation to Temperature
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Charles Detweiler, presenter
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Power Output of Flexible Solar Panels
Bryson Shannon, presenter
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Using the reinforcement learning method to solve a Rubik’s Cube
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Wave Energy Converter: Buoy Optimization
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Sigma Xi

Sigma Xi, the Scientific Research Society, actively promotes the promise of science and technology. Sigma Xi’s goals are to foster worldwide interactions among science, technology and society; to encourage the appreciation and support of original work in science and technology; and to honor scientific research accomplishments.

Since its founding in 1886, Sigma Xi members and chapters have enriched scientific discussion and nurtured networking between young and established scientists and engineers from diverse research disciplines. With approximately 60,000 members in over 500 chapters around the world, Sigma Xi chapters are found wherever scientific research is undertaken. Sigma Xi’s motto, Spoudon xynones, or “Companions in Zealous Research,” makes the Undergraduate EXPO a particularly natural opportunity for Sigma Xi to partner in facilitating.

Alpha Lambda Delta

Alpha Lambda Delta is a national honor society founded in 1924 by Maria Leonard at the University of Illinois. Since then, the purpose of ALD has been to recognize academic excellence in Freshmen students. Consequently members of ALD must be inducted after the first semester of their Freshmen year. The process of academic excellence is continued through ALD’s concept of “passing the torch,” which translates into sharing the love of learning from others. In 2014, Alpha Lambda Delta celebrated its 90th anniversary.

Western Carolina University’s ALD chapter is currently in its 4th year after reinstating in 2012. In that time, Alpha Lambda Delta is active on campus and in service. We are pleased to support the Research and Scholarship Celebration (RASC) and the Undergraduate EXPO for a second year in a row. It is our pleasure to be a part of a scholarly event and support the keynote speaker, Dr. Lee Dugatkin.
Acknowledgements

Western Carolina University, the Office of the Provost, the Graduate School, and the Honors College would like to thank all student participants who shared their work at the 2016 Undergraduate EXPO as part of the first annual Research and Scholarship Celebration; thank you to the faculty and staff who sponsored and supported the student participants – and thank you to all faculty and staff for your support in encouraging participation in the eighteenth annual Undergraduate EXPO and first annual Research and Scholarship Celebration.

We are particularly thankful that Dr. Lee Alan Dugatkin, our expert keynote speaker, could join us during the Undergraduate EXPO this year.

Thanks are likewise in order for the help offered by The Honors College Board members, Honors College Ambassadors, Sigma Xi members, Alpha Lambda Delta and faculty and staff who volunteered their time to help with all things EXPO.

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Student Press Releases

WCU’s Office of Communications and Public Relations routinely sends news releases about student activities and honors to the hometown or local newspapers of the students involved. Students participating in the Undergraduate EXPO who wish to take advantage of that service should visit the website http://studentawards.wcu.edu to complete an online form and submit it via email to the Office of Communications and Public Relations.