PROGRAM SCHEDULE WITH ABSTRACTS

APRIL 26, 2013
University of Mary Washington
Fredericksburg, Virginia

Financial Support for Research and Creativity Day generously provided by the Class of 1959 Endowment

University of Mary Washington is an institutional member of the Council on Undergraduate Research
Learning Through Research

Schedule of Events

April 26, 2013

Researcher Registration/Poster and Art Work Set-up
8:30 am - 9:30 am in the Great Hall and Meeting Room 4

Oral Sessions **9:30 am-5:15 pm**

Woodard Meeting Rooms 1, 2, 4 & Red Room

Poster Sessions **12:00– 12:45pm**

The Great Hall *refreshments served for all*

Original Music Performance **12:45-1:25pm**

The Great Hall

Researcher Registration, continued **12:00 noon – 1:15pm**

The Great Hall

Additional Exhibits and Sessions

Melchers Hall **10:00 am – 4:00 pm**

Poster Pick-up starting at 4:30 pm

Sessions in Melchers Hall

1:30 – 3:30, Room 207
Session Chair: Drs. Marjorie Och and Joseph Dreiss (Art and Art History)

Individual Studies in Art History

Anne R. Grasselli, "Looking Out, Looking In: The Window Motif in Impressionist Depictions of Paris", (Marjorie Och)

Chelsea L. Neal, "Renaissance Self-Fashioning and the Antiquities Collection of Isabella d'Este", (Marjorie Och)

Michael P. Nolan, "Napoleon Bonaparte and the Art of an Empire", (Joseph Dreiss)

Kristine S. Woeckener, "The Influence of Titian and Rubens on the Equestrian Portraits of Velazquez", (Marjorie Och)

Oral Sessions – Woodard Campus Center

9:30-10:30

Meeting Room 1
Session Chair: Dr. Hai Nguyen (Physics)
Emily J. Brenton, "Exploring the Relationship Between Race, Body Image and Risky Sexual Behavior of Teenage Girls in Caroline County," (Debra Schleef)

Luke M. Mendelsohn, "How Economies Recover: A Closer Look at the Role of Federal Funds Rate in Influencing Economic Recoveries," (Steve Greenlaw and Margaret Ray)

Charlotte A. Johnson, "US and EU Food Security Policy," (Jason Davidson and Marcel Rotter)

Red Room
Session Chair: Dr. Janet Asper (Chemistry)
Emily Scheuer, "Don Junipero and El Moro Muza: Anti-Independence As Shown in Pro-Spanish Media in the 1860s," (Ana Chichester)

Ethan M. Bottone, " 'Virginia is for Writers' High School Writing Center Initiative," (Gwendolyn Hale)

Russell D. Michelson, "Communication Center Consultation Methods," (Esther Yook)

10:45 – 11:45

Meeting Room 1
Session Chair: Dr. Warren Rochelle (English)
Panel: Stories and Storytellers: English 470B Fiction Seminar Students Read their Creative Work
Danny Ryer, "The King's Game"

Bryanne Salazar, "Hula Hoop"

Faye Haymond, "Season Four Behind Closed Doors"

Anna Joppich, "Inside the Wall"

Margaret Murphy, "His and Hers"

Meeting Room 2
Session Chair: Dr. Debra Schleef (Sociology and Anthropology)
Bethany M. Akers, "Agent-Based Modeling of Human Trafficking," (Stephen Davies)

Thikiri L. Yee, "A Greener Earth: The Latest Advancements in Green Polymer Chemistry," (Janet Asper)

Thomas Pacheco, "Overcoming the Theory-Practice Problem of Empowerment in Speaking Centers," (Esther Yook)

Danielle C. DeVille and Mariah A. Young, "Achieving the Unachievable: The Effectiveness of a Communication Center in the Absence of a Communication Department," (Esther Yook)

Meeting Room 4
Session Chair: Dr. Mindy Erchull (Psychology)
Kate L. Miceli, "The Role of Republican Women Senators in the 112th Senate," (Rosalyn Cooperman)

Morgan E. Downing, "Who Would Help? Factors Influencing Bystander Efficacy in Three Categories of Rape," (Miriam Liss)

Aissata Traore, "Women's Experiences in the American Legal Field," (Kristin Marsh)

Jesse B. Vanous, Claire Growney, Melissa Peters, "The Effect of Arousing Emotional Facial Expressions on the Positivity Bias in Older Adults" (Hilary Stebbins)

11:00 – 12:15

Red Room
Session Chair: Dr. Nora Kim (Sociology)
Panel: Race and Higher Education

Hannah Walker, Virginia L. King and Alexa Faraone, "Campus Racial Climate at University of Mary Washington: Choosing Mary Washington"

James Moore, Nick Eghtessad and Christina Gaul, "Campus Racial Climate at University of Mary Washington: Interacting with Professors"

Jennifer Sherba, Andrew Moeller and Aisha Martin, "Campus Racial Climate at University of Mary Washington: Interacting with Administrators and Staff Members"

Paul Crowley, Ashley Rowles and Katherine Mayo, "Campus Racial Climate at University of Mary Washington: Interaction with Students"

Poster Sessions – Great Hall and Room 4
12:00 noon – 12:45 pm

- Shannon M. Ball, Katherine Branum, Khamani Williamson, "Game-based Learning" (Mary Kayler)
- Kathie A. Belrose-Ramey, "Learning Molecular Techniques Necessary to Locate the Binding Sequence of RAI1 within the CLOCK Regulatory Region" (Deborah Zies)
- Victoria E. Bennett, Della N. Gibson, "How the Framing of Metaphors Affects Public Policy Toward the Mentally Ill" (Denis Nissim-Sabat)
- Abbygail S. Brooks, Sara L. Murphy, Cameron L. Stewart, Stephen M. Wist, Erin Humphreys, "Bomb Calor" (Ray Scott)
- Daniel E. Browne, "Nematology as Vehicle for Undergraduate Education" (Theresa Grana)
- Christopher J. Burgess, "An Examination of the Loss of Pharyngealization in Maltese" (Paul Fallon)
- Molly Burns, Virginia Tittermary, "UMW Students' Perception of Scientists", (Leanna Giancarlo)
- Michael A. Carlo, Abigail A. Kimmitt, "Evaluating the Effects of Capture and Handling Time on Three Physiological Stress Indicators in the Tufted Titmouse (*Baeolophus bicolor*)" (Andrew Dolby)

- Rossanna M. Catahan, Keelin E. Haw, Brennan W. Miller, "UMW EagleICE (Internet Computing Experience)" (Stephen Davies and Karen Anewalt)
- Elyse V. Clark, "Comparative Analysis of Watershed Erosion, Reservoir Sedimentation and Sediment Trace Metals in two Virginia Lakes", (Ben Odhiambo Kisila)
- Robert P. Clark, "Comparative Spatial Erosional Analysis Using RUSLE and USPED Models" (Ben Odhiambo Kisila)
- Jeff Davidson, "An Adsorption Phenomena: Analyzing Carboxylic Acid Molecules Via STM" (Leanna Giancarlo)
- Jessica A. Dochney, Thy N. Mai, "Describing Nematode Diversity" (Theresa Grana)
- Thomas J. Eldridge, Arsela Hameed, "Validating Adsorption theory in Light of Langmuir and Freundlich Models: A Comparative Study between a Theoretical and Experimental Model of Adsorption" (Leanna Giancarlo)
- Ashley T. Elliot, Holly Richters, Erin E. Stewart, "A Comparative Analysis of the Health of the Ni River and Massaponax Creek in Spotsylvania County" (Michael Bass)
- Patrick Emsley, Kristina Southern, Mae A. Carpenter, "Spectroscopic Analysis of Solvent Composition Using a Solvatochromic Probe Dye" (Leanna Giancarlo)
- Erica L. Falvey, Kelly Sanborn, Alison Litvin, " 'Real Life' and Gaming" (Mary Kayler)
- Darren M. Getts, "An Acousto-Optical Modulated Mach Zehnder Interferometer" (Hai Nguyen)
- Rachel A. Goldsmith, Charlea A. Kimbleton, "Styrofoam vs. Cornstarch" (Janet Asper)
- Zachary C. Goodwyn, "CPU Monitoring Software for the LittleFe Compute Cluster" (David Toth)
- Amanda M. Halprin, Carisa Chaplin, Cameron Kostyack, "Stereotypes, Gamers, and Violence" (Mary Kayler)
- Dana C. Bargh, Brittany S. Harris, Rachel M. Cote, "The Effect of Acid on the Synthesis of Chlorapentaaminecobalt(III) Chloride" (Ray Scott)
- Lonnie A. Harris, William D. Davis, Jerome M. Mueller, "Synthesis and Analysis of Aspirin and its Copper Complex" (Ray Scott)
- Lonnie Harris, Jake Rieder, "Oppenheimer: Savior or Destroyer?" (Leanna Giancarlo)
- Robert F. Higgins, Mae A. Carpenter, "Poly(ethylene glycol) Tagged Guanidinylation Reagents Based on Thiourea and Guanylpyrazole" (Janet Asper)
- Robert F. Higgins, Jennifer Larson, Rafia Virk, "Viscosity of Sugar Solutions: Dependence on Concentration, Temperature and Chain Length" (Leanna Giancarlo)
- Andrew N. Hogan, "The Effects of Brain Derived Neurotrophic Factor on Y79 Retinoblastoma Cells" (Rosemary Barra)
- Ngoc Quyen Huynh, "Saturated Spectroscopy of Rubidium" (Hai Nguyen)
- Karmel James, Brooke A. Andrews, "Modification of Bipyridine Ligands for the Development of a Tethered Carbon Dioxide Reduction Catalyst" (Nicole Crowder)
- Karmel James, Monica Chiu, "Equilibrium Determination of Bromocresol-Green using Beer's Law and Ionic Strength" (Leanna Giancarlo)
- Yireda Jilili, Rohina Shafiq, Kristin Frye, "The Birth of the Mad, Bad and Evil" (Leanna Giancarlo)
- Eric M. Johnson, "Modifying Copper Surfaces with Azide-terminated Phosphonic Acids: A Platform for Surface Functionalization via Click Chemistry" (Nicole Crowder)

- Anna K. Kania, "Improving Efficiency of Genomic Sequencing from Nematode Species" (Theresa Grana)
- Virginia L. King, "Effects of Bisphenol A on Wnt Gene Expression in Developing Rats", (Deborah O'Dell)
- Susanna N. Kirschner, Jenna C. Stockton, Teresa E. Fenn, "Fractionation of Metal Contaminants in Acid Mine Drainage-Impacted Soil and the Effects on the Surrounding Ecosystem" (Melanie Szulczewski)
- William K. Langston, David Maguire, Raihana Sherdil, "Kinetic and Thermodynamic Investigation of Binding Between Lysozyme and Eosin-Y" (Leanna Giancarlo)
- Sarah R. Marzec, "Free-living Soil Nematode Population Dynamics at an *Asimina tiloba* site in Virginia" (Theresa Grana)
- Hannah J. Mills, Erin N. Keener, "The Effect of Stress on Children's Eating Behavior" (Chris McBride)
- Lauren Nelson, "Spectroscopic Experiments" (Hai Nguyen)
- Jacqueline H. Nova, "The Geospatial Analysis of the Marcellus Shale and Utica Shale Subsurface Geological Formations" (Brian Rizzo)
- Amanda L. Parker, "Paleoecological Succession of Reef and Lagoonal Deposits in the Dominican Republic Approaching the Middle Holocene Thermal Maximum" (Neil Tibert)
- Chris F. Petroff, Ian M. Barry, "Lower Cretaceous Nonmarine Ostracodes from the Cedar Mountain Formation, Utah" (Neil Tibert)
- Jessica A. Queitzsch, "Inducing Germination/Propagation in Mountain Laurel, Kalmia latifolia L." (Stephen Fuller)
- Shelby C. Sanders, "Age and Paleo-environmental Significance of Upper Paleozoic Ostracodes from the Appalachian and Eastern Illinois Basins" (Neil Tibert)
- Rebekah Selbrede, Sally Brown, "The Good, the Bad, and Everything in Between" (Leanna Giancarlo)
- Grace Sey, David R. Elliott, Chad Hatch, "The Solvolysis of 2-chloro-2-methylpropane: A Kinetic Study" (Leanna Giancarlo)
- Katherine E. Vanderpool, "Imbiber Beads – A Clean Environmentally Friendly Absorbent Polymer" (Janet Asper)
- Margaret F. Walker, "Effects of Dam Removal on Riparian Vegetation Abundance, Distribution, and Biodiversity" (Alan Griffith)
- Frank Womble, "How Polymer Chemistry Makes Us Safer" (Janet Asper)

Original Music Performance – Great Hall
12:45 noon – 1:25 pm

Prelude for piano — Stephen Hennessey

Christian Peabody, piano

Broken, then Mended — Paige Naylor

Paige Naylor, voice and electronics

Night-Time Glow — Alexandra Swords

fixed media

Rex — Becky Brown

Becky Brown, processed harp and voice

A Familiar Voice — Cara Wimberley

fixed media

Transitions — Zachary Clay Fichter

Paige Naylor and Katherine Preseren, soprano voices
Lindsay Bulls, flute
Christian Peabody, trumpet
Nate Masters, tenor saxophone
Becky Brown and John White, vibraphone
Lukas Chandler, piano
Stephen Hennessey, contrabass

Corbels — Katherine Preseren

Paige Naylor, soprano voice
Christian Peabody, piano

The Epic of Gilgamesh: The Forest Journey — Christian P. Peabody

Paige Naylor, soprano voice
Lindsay Bulls, flute
Nate Masters, tenor saxophone
John White, vibraphone
Zach Fichter, tam-tam
Becky Brown, harp
Lukas Chandler and Katherine Preseren, piano
Stephen Hennessey, contrabass

Sassy Sextet Choreographer: Roxann Morgan Rowley

Dancers: Randi Bryan, Haley Kane, Grace May, Kat Rios-Vargas, Leah Slaughter, Maggie Wilder

I. El Tango Ancioso Nate Masters

Lindsay Bulls, flute
Paul Rawlins, trombone
John White, crotales
Nate Masters, congas
Becky Brown, harp
Lavar Edmonds, cello
Jackson Wright, bass

II. Klango John White

Lindsay Bulls, flute
Paul Rawlins, trombone
Nate Masters, congas
John White, percussion
Becky Brown, harp
Lavar Edmonds, cello
Jackson Wright, bass

12:30 – 2:00

Red Room
Session Chair: Dr. Liane Houghtalin (Classics)
Panel: Leaders and Generals, Authors and Art: Current Studies in Ancient Civilization

Sebastian Langenberg, "Plutarch's Perceived Leadership of Pericles, as Read in the *Pericles*"

Kathryn Stiltz, "The Mystery of the Cult Statue of Artemis at Ephesus"

Catherine Anna Carbone, "Hellenistic Influence on Buddhist Thought and Artistic Tradition"

Matthew Meyer, "The Emperor Who Never Was: Flavius Aetius"

Lori W. Brown, "Bacchus and Ariadne: A Journey from Greek Myth to Italian Painting"

1:00-2:00

Meeting Room 1
Session Chair: Dr. Theresa Grana (Biology)
Matt Spaulding, Sam Clark and July Laszakovits, "Who's Really Behind the Lab Coat?," (Leanna Giancarlo)

Matthew Gaughan, Brittany Harris and Joe Fried, "Ozone vs Aerosol: The Ultimate Showdown," (Leanna Giancarlo)

Emily C. Pineiro and Justin E. Sahs, "How Polymer Chemistry has Revolutionized Medicine Since WWII," (Janet Asper)

Daniel E. Browne, "Polystyrene in Four Chords or Less," (Janet Asper)

Meeting Room 2
Session Chair: Dr. Chris McBride (Psychology)
Leanna Papp, Michelle Gnoleba, Charlotte Hagerman, Caitlin Robertson and Haley Miles-McLean, "Exploring the Sexual Double Standard through Slut-Shaming on Facebook," (Miriam Liss and Mindy Erchull)

Jessica L. Patterson, "The Integration of Moroccans in Spain," (Jose Sainz)

Susanna Parmelee, Rebecca McGillicuddy, Krysha Snyder, Rob Tsyzka, Melissa Arrowsmith, Emily DelRoss and Betsy Caulfield, "Bike|Ped|Fred, a Bicycle and Pedestrian Plan for the City of Fredericksburg," (Andrea Livi Smith)

2:15-3:15

Meeting Room 1
Session Chair: Dr. David Toth (Computer Science)
Kathryn E. Dillinger, "Analysis of the Heat Equation with a Heat Source Term," (Leo Lee)

Osatohanmwen I. Guobadia, "Advancing Research and Education for Drug Discovery," (David Toth)

Morgan M. Brown, "Numerical Approximations to the One- and Two-Dimensional Wave Equations," (Leo Lee)

Meeting Room 2
Session Chair: Dr. Stephen Davies
Jessica N. White, "A Computational Simulation to Study the Factors Impacting a College Student Body's Racial Diversity," (Stephen Davies)

Michael S. Crawford, "An Individual-Based GIS Driven Model of *Aeschynomene virginica* and its Tidal Marsh environment," (Stephen Davies)

Isabelle J. Malouf, "Plasticizers, Helpful or Harmful?," (Janet Asper)

Brooke A. Andrews, "Examining the Advantages and Applications of Synthetic Polymers by the Military," (Janet Asper)

Meeting Room 4
Session Chair: Dr. Jodie Hayob (Earth and Environmental Sciences)
Kelly M. Brown, "Mathematical Models of Honey Bee Populations: Rapid Population Decline," (Suzanne Sumner)

William S. Camp, "Nonlinear Dynamics – Applications of Duffing's Equation," (George King)

Orlando C. Stewart, Jr., "The Wonders of Superabsorbent Polymers," (Janet Asper)

Red Room
Session Chair: Dr. Richard Finkelstein (Dean of the College of Arts and Sciences)
Alexandra M. Hoenscheid, "Equally Human: On Whether Canonical Text Supports the Ordination of Women in the Roman Catholic Church," (Nina Mikhalevsky)

Haley Miles-McLean, Caitlin Robertson, Charlotte Hagerman, Michelle Gnoleba and Leanna Papp, "Conceptualizing Objectification as a Source of Insidious Trauma," (Miriam Liss and Mindy Erchull)

Katherine L. Casey, "Eight Children and Two Book Deals: Biblical Womanhood Blog Networks and Entrepreneurship," (Tracy Citeroni)

Ann Carroll, Rebecca Smith, Kathryn Callaghan, Molly Sullivan and Mara Rowcliffe, "Emerging Adulthood: A College Student, Middle-Class Perk?" (Debra Steckler)

3:30 – 4:30

Meeting Room 1
Session Chair: Dr. Jess Rigelhaupt (History)
Panel: Oral History Interviews of the World War II Homefront: Archived and Analyzed
Kelsey B. Matthews, "A Personal Perspective: Oral Histories of the World War II Homefront"

Kendall Simonpietri, "Not Everyone's Rosie: Different Reactions to the Interview Process"

Josephine Appiah, "Reevaluating Our Cultural Understanding of World War II"

Meeting Room 4
Session Chair: Dr. Grant Woodwell (Earth and Environmental Sciences)
Matt L. Cronin, "Performance Enhancing Drug Use in College Sports: What Factors Matter?" (Margaret Ray)

Taylor L. Knight, "Money, the Way to a High School Diploma," (Steve Greenlaw and Margaret Ray)

Shirley N. Martey, "Thirty Year Plan for Efficient use of Coal Energy in China," Elizabeth Larus)

Erica Christian, Andrea Fritch, Eric Knapp and Mercedes McWaters, "Facilitation versus Overshadowing: Does Multimodal Input Help or Hinder Object Recognition?" (Jennifer Mailloux and David Stahlman)

4:00 – 5:15

Meeting Room 2
Session Chair: Dr. Steve Greenlaw (Economics)
Panel: Economics Senior Thesis Presentations
Nicole Cochrane, "Repayment Incentives in Individual-liability Microfinance" (Shawn Humphrey)

Laura Dick, "Responses to Formal Institutional Reform: A Theoretical Framework and Case Study" (Shawn Humphrey)

Patrick Marek, "Behavior of Modern Unemployment: A Disaggregated Analysis of the Growing Disparity between Output Growth and Employment Growth" (Steve Greenlaw)

Chris Rieve, "Effects of State Welfare Spending on Violent Crime in the United States" (Bob Rycroft and Bill Lofquist)

Andrew Thomas, "North Dakota and the Effects of the Oil Boom" (Bob Rycroft)

Abstracts

Listed Alphabetically By Student Researcher

Student Researcher: Bethany M. Akers
Major: Computer Science
Research Mentor(s): Dr. Stephen Davies
Project Title: Agent-based modeling of human trafficking

Human Trafficking is a global phenomenon, encompassing both unskilled slave laborers and forced prostitution, which has often been overlooked and under-researched. With growing knowledge about the issue, many government and social organizations strive to produce useful information in order to illuminate the severity of the issue. Despite attempts on behalf of many of these groups, whose common goal is making

a difference in the wide-spread problem of human trafficking present today, there continues to be inaccurate and contradictory information about the subject. Ultimately, the goal of this project is to shed light on the areas of human trafficking which need to be clarified, allowing for the development of more meaningful and accurate information about how to alleviate some of the causes of this global phenomenon. Using simulation, a method of modeling the behavior of a system by including a variety of factors and scaling them to be manageable, this project will produce a model for human trafficking trends. Simulation allows a computer program to mimic a real-world phenomenon and allows us to learn valuable information about how that phenomenon would behave if some of its parameters were tweaked. This project models a series of unknown factors such as the victims' escape frequency, the rate at which they are reacquired into the system, the demand for victims at various locations, and the rate at which retirement probability increases. By exploring the impact of these factors on the simulation, it becomes apparent which areas of modern day human trafficking need to be further explored in order to address and resolve the issue. This is accomplished by using the Java programming language and the Mason agent-based modeling toolkit. The impact of this project will be presented with visuals elements including graphs and a map of the simulation.

Student Researchers: Brooke Andrews and Ariel M. Davati
Major: Chemistry
Research Mentor(s): Dr. Janet Asper
Project Title: Examining the Advantages and Applications of Synthetic Polymers by the Military

While polymers have seen a recent universal explosion in applications, a specific case study is the rapidly expanding field of polymers designed for use in the military. A survey of uses for polymers in the military will be presented, from plastic explosives to protective clothing and anti-tank armor and artillery. The respective structures and methods of production will be explored, lending themselves to a discussion of the versatility and extensive commercial applications for polymers. The history of plastic explosives will be discussed, beginning from the development of commercial explosives in the late nineteenth century and extending to modern formulations as military-grade weapons. Protective clothing, most notably that which is made from Kevlar® (produced by DuPont) will be explored, including a discussion of the synthetic fiber used to make the fabric and its other applications. Polymers are also used in conjunction with ceramics to reinforce tank exteriors and as a lightweight alternative for construction of anti-tank missiles. The benefits of both applications will be presented. Each specific polymer, for all applications will be compared to previous materials, and the benefits of the synthetic route will be highlighted. The presentation will end with a demonstration.

Student Researchers: Shannon M. Ball, Katherine Branum and Khamani Williamson
Major:
Research Mentor(s): Dr. Mary Kayler
Project Title: Game-based Learning

Because high school can often be a dull and unengaging place that undermines its mission of educating young people, the question of whether or not games should be in high school curriculums was studied, and this question required research into the effectiveness of games in an academic setting. This research was conducted through a survey of three students. The three survey participants were all teenage girls. Two were in high school, a sophomore and a senior, and the third was a college freshman. Each participant was asked 18 questions regarding how often they play games as well as their experiences with games in school and how those experiences affected their learning. The results were analyzed through thorough reading and coding. The students unanimously agreed that games played in their classrooms engaged them and helped them to learn the material they needed to know. Comparing these survey results with others conducted both

nationally and internationally, I have been led to conclude that high schools should involve games into their curriculums.

Student Researcher: Kathie A. Belrose-Ramey
Major: Biology
Research Mentor(s): Dr. Deborah Zies
Project Title: Learning Molecular Techniques Necessary to Locate the Binding Sequence of RAI1 within the CLOCK Regulatory Region

Smith-Magenis Syndrome (SMS) is a neurobehavioral disorder characterized by mental retardation, sleep disturbances, obesity and self- injurious / attention seeking behavior. The major symptoms of SMS are caused by haploinsufficiency of the retinoic acid-induced 1 (RAI1) gene, which is a transcription factor involved in the regulation of many other genes. Previously, a Chromatin Immunoprecipitation-microarray chip (ChIP-chip) experiment was conducted to determine genes regulated by RAI1. One of the genes identified was Circadian Locomotor Output Cycles Kaput (CLOCK). The region of CLOCK that was present in the chip was used to create a pGL3 luciferase reporter gene construct. Previous studies showed that transcription from this construct was increased when the plasmid is cotransfected with RAI1, suggesting that the RAI1 binding site was located within the cloned fragment. Furthermore, deletions to this construct were made and showed that the binding site is within a 50 bp region. Concerns about possible false positive results with the pGL3 reporter gene vector led to the decision to move the CLOCK regulatory region to an updated reporter system (pGL4-Clock(-)). The goals of my project have been to create some of the same constructs in the pGL4 system, compare the luciferase assay results of the new pGL4 constructs against the previous pGL3 constructs, while learning core molecular biology skills. Currently, I have two successful constructs and am in the process of completing a third. During the summer of 2013 I will begin luciferase assay testing to determine if either of these pGL4 constructs give similar results to the pGL3 constructs. From there, serial deletions will be made from the new constructs until the binding sequence of RAI1 is identified. The overall goal is to continue serial deletions of the CLOCK regulatory region until the smallest functioning region is identified, which should be the RAI1 binding site. The identification of the RAI1 binding site would enable researchers to identify other genes regulated by RAI1 and could lead to new treatments for Smith-Magenis Syndrome.

Student Researcher: Victoria E. Bennett
Major: Psychology
Research Mentor(s): Dr. Denis Nissim-Sabat
Project Title: How the Framing of Metaphors Affects Public Policy Toward the Mentally Ill

Metaphors have been shown to influence people decisions toward campaigns, ads, and politics. Specifically, studies have looked at how metaphors have influenced attitudes toward crime and obesity. We examined the effect of blaming and victimization metaphors on public policy attitudes toward the mentally ill. It was hypothesized that victimization metaphors, as compared to blaming metaphors, would lead to decreased institutionalization, increased government funding, as well as increased rights and opportunities. The results showed no significant differences between the three conditions. This may be explained by the recent Newtown, CT shooting and stigma associated with the mentally ill. Additionally, metaphors may not influence people with strongly held beliefs toward an issue.

Student Researcher: Ethan M. Bottone
Major/Sponsor: UMW Writing Center
Research Mentor(s): Dr. Gwendolyn Hale
Project Title: "Virginia Is for Writers" High School Writing Center Initiative

The "Virginia Is for Writers" Initiative is a project in which we are attempting to set up writing centers in high schools across the state, as well as bringing already existing writing centers into a network of centers that promote writing and tutoring in high schools in an effort to prepare students for life after graduation, be it college or work.

Student Researcher: Emily J. Brenton
Major: Sociology
Research Mentor(s): Dr. Debra Schleef
Project Title: Exploring the Relationship Between Race, Body Image and Risky Sexual Behavior of Teenage Girls in Caroline County

Existing sociological literature indicates that there is a complex relationship between BMI, perceived weight, race, and risky sexual behavior. Overall, the literature suggested that girls who are overweight or obese or perceive themselves to be so are less likely to engage in sexual activity, but if they do they are more likely to engage in risky sexual behaviors. Race also comes into play because the black community is traditionally more accepting of a variety of body types than the white community. I sought to untangle the relationship between these variables by using data from the Rappahannock Regional Youth Survey, specifically focused on Caroline County High School adolescent females. My goals were not only to determine what kind of a relationship existed between the variables, but also to use my findings to recommend sexual health or sexual education tactics specifically geared toward groups with different attitudes about sex and weight.

Student Researchers: Abbygail S. Brooks, Sara L. Murphy, Cameron L. Stewart, Stephen M. Wist and Erin Humphreys
Major: Chemistry
Research Mentor(s): Dr. Ray Scott
Project Title: Bomb Calor

Thermochemistry is the study of energy and work of chemical systems. It is used to determine nutritional information as well as energy both released and consumed in chemical reactions. Enthalpy and internal energy are both key concepts in the thermochemistry discipline. Enthalpy is defined as the total energy of a chemical system, where as Internal energy is defined as the total energy contained within specific substances. A 6200 Parr Bomb Calorimeter was used to calculate the internal energy and enthalpy values of various molecules [with an emphasis on biomolecules]. The heat capacity of the bomb calorimeter was calculated by combustion of benzoic acid to be 2372 cal/oC. The substances combusted were acetylsalicylic acid, benzoic acid, linolenic methyl ester, glycine, and sucrose. The internal energy and enthalpy change of the molecules were calculated from the data. Those values were then compared to standard internal energy and enthalpy values in order to determine the accuracy of the data collected from the bomb calorimeter. An M&M was also combusted to determine its caloric content which is 5.33Kcal/g.

Student Researcher: Kelly M. Brown
Major: Mathematics
Research Mentor(s): Dr. Suzanne Sumner
Project Title: Mathematical Models of Honey Bee Populations: Rapid Population Decline

Recent reports of honey bee colony deaths worldwide [vanEngelsdorp et al, 2009] have prompted interest in mathematical models to study the decrease of bees within a colony. Some factors contributing to the colony losses include Varroa mites, viruses, brood diseases, pesticides, inadequate nutrition, climate and seasonal changes, and the stresses of moving colonies for crop pollination. A new condition, Colony Collapse Disorder (CCD), describes mass colony deaths with no clear cause, and CCD features empty hives with dead brood and very few adult bees, yet adequate food stores, all signs of rapid depopulation. No one agent is thought to cause CCD [Watanabe, 2008], and CCD is blamed on a combination of multiple stressors.

Khoury et al [2011] derived a single-colony model with two differential equations describing the hive bee and forager bee populations. Labor tasks among honey bees differ by age: the younger hive bees H perform maintenance tasks within the hive and the older forager bees F perform more hazardous tasks outside the hive, such as collecting nectar, pollen, or water. The hive bees H change at a rate dependent on their emergence rate from pupae and the transition rate to foraging. The forager bees F change at a rate dependent on the transition rate from hive bees and their death rate. Khoury et al [2011] consider the hive bee death rate to be negligible. Brown has extended this model to refine some of the parameters and include a hive bee death rate. The model predicts the existence of a stable positive equilibrium in which both hive bees and forager bees persist when forager death rates are low. Past a threshold level when forager death rates are high, colony failure is inevitable as the hive bee and forager bee numbers are driven to zero.

Student Researcher: Lori W. Brown
Major: Classics
Research Mentor(s): Dr. Liane Houghtalin
Project Title: Bacchus and Ariadne: A Journey from Greek Myth to Italian Painting

The power of pagan myth permeated much of artistic and literary life during the Renaissance in Europe. Classical images of mythological figures and settings inspired the works of artists from Michelangelo to Botticelli, defining the spirit of the age and influencing the direction of religion, commerce, and politics. Yet, there is clear evidence that the influence of purely Greek myth is nearly absent from the works of Renaissance artists. This presentation will follow the evolution of Greek myth as it moved into Roman culture and from Roman culture into 16th Century European life. It will also explore why purely Greek myth virtually disappeared during the Renaissance. Finally, through an in-depth examination of Titian's *Bacchus and Ariadne,* it will explain the specific reasons why one Renaissance artist chose Roman influences over those from the Greek mythological tradition.

Student Researcher: Morgan M Brown
Major: Mathematics
Research Mentor(s): Dr. Jangwoon (Leo) Lee
Project Title: Numerical Approximations to the One- and Two-Dimensional Wave Equations

In this thesis we use numerical approximation methods to model the wave equation both in one and two dimensions. We first derive approximations to the equation by use of Taylor series expansion. Then, we develop MATLAB code to solve these approximations in a discretized space-time mesh with increasingly small changes in distance over an increasingly large amount of time. We compare the output of these programs to simple examples completed by hand to be sure of their accuracy, and then use them in real world applications to solve problems more efficiently and quickly than is possible for a human to do alone. The desired outcome of this project has been achieved: to create an algorithm which results in a system of equations and corresponding computer program to approximate the wave equation under given conditions.

Student Researcher: Daniel E. Browne
Sponsoring Department: Chemistry
Research Mentor(s): Dr. Janet Asper
Project Title: Polystyrene in Four Chords or Less

From the grim confines of the Jepson organic chemistry labs comes Daniel Browne, troubadour and aspiring chemist, singing the riveting story of polystyrene with his ukulele. Beginning with its accidental discovery in the nineteenth century from the distilled resin of a sweetgum tree, he takes us through the discovery of polystyrene's formation mechanism, to this spring semester at UMW, where students in Dr. Asper's first Honors Organic Chemistry class explored polystyrene synthesis for themselves.

Student Researcher: Daniel E. Browne
Major: Biology
Research Mentor(s): Dr. Theresa Grana
Project Title: Nematology as Vehicle for Undergraduate Education

By the findings of a joint NSF and AAS committee in 2010, life sciences education is in dire need of revision to include more active and engaging experiences for undergraduates, reflect current trends in biology and accurately reflect what real research is like. In accordance with this report, a single semester freshman undergraduate laboratory course has been designed that incorporates nematology research into introductory biology curricula. Students will isolate a novel nematode strain from local soil and characterize it, introducing students to many basic molecular laboratory techniques. Planned modules include behavioral assays, visualization, DNA sequencing and phylogeny building, and professional research presentation skills. Presented here is the course plan and protocols for the course which will be piloted in Fall 2013.

Student Researcher: Christopher J. Burgess
Major: International Affairs
Research Mentor(s): Dr. Paul Fallon
Project Title: An Examination of the Loss of Pharyngealization in Maltese

The modern Maltese language evolved from an older dialect of Siculo-Arabic that was brought to the island by the Fatimid Caliphate. As Malta has been occupied by Europeans over the centuries and become increasingly isolated from Arabic speaking countries, its language has lost some of its Semitic traits. The Pharyngealized, or Emphatic, consonants represent a trait common to Semitic languages, but uncommon to many other language families. Despite Maltese still being considered a Semitic language, it has lost these Pharyngealized consonants entirely.

The goal of this paper is to examine the loss of the features through several linguistic framework and what effects this has had on the language as a whole. In modern dialects of Maltese, the Pharyngealized consonants were merged with the non-Pharyngealized and adjacent vowel quality changed. For example, in Modern Standard Arabic /sˤajf/ and /sajf/ for 'summer' and 'sword' have change to /sejf/ and /sajf/ in Maltese. William Cowan and Mary Ann Walter have both published prior work about this phenomenon and I will further examine this merger and its phonological implications through the Clements and Hume's Unified Feature Theory and Halle's Articulator Theory. This comparison will illustrate the benefits and deficits of viewing this particular phenomenon in these different ways.

Student Researchers: Molly Burns and Virginia Tittermary
Sponsor: HONR100B
Research Mentor(s): Dr. Leanna Giancarlo
Project Title: UMW Students' Perception of Scientists

In this poster, we examine the results of a survey conducted among University of Mary Washington students to determine the prevalence of the "mad" scientist stereotype. Questions in our survey included: what are the characteristics you associate with scientists? What about mad, bad, evil scientists? What characteristics of a scientist do you associate with your science professors, if any at all? Among our findings, we will be specifically looking for the common characteristics most often associated with scientists: a white lab coat, glasses, intelligence, white frizzy hair, facial hair, and lab equipment. We hope to find that University of Mary Washington students will see scientists in this way, for both real life scientists, as well as mad, bad and evil scientists.

Student Researcher: William S. Camp
Major: Physics

Research Mentor(s): Dr. George King, III
Project Title: Nonlinear Dynamics – Applications of Duffing's Equation

Nonlinear systems are predominate systems that govern the way the universe operates. Most nonlinear systems do not have an analytic solution and numerical methods are required. A nonlinear system can also lead to chaos. This is known as chaotic dynamics. Duffing's Equation is an example of a nonlinear mechanical system which exhibits a period doubling route to chaos. Mathematica was used to find a numerical solution for the nonlinear differential equation which allows us to see the period-doubling bifurcations and its strange attractor. Experimentally, a resistor-inductor-diode circuit was constructed to see the chaotic behavior inherent in a diode. In both the theoretical and experimental approach we will see that in a nonlinear system there is a sensitive dependence on initial conditions.

Student Researcher: Catherine Anna Carbone
Major: Classics
Research Mentor(s): Dr. Liane Houghtalin
Project Title: Hellenistic Influence on Buddhist Thought and Artistic Tradition

Long before Alexander the Great, western civilizations from the Near East to Rome knew about the existence of India. Herodotus, Ctesias, Megasthenes, Strabo and Arrian all speak about India's geography or Alexander's conquest of it. Trade routes and Persia's rule of India made India well aware of the Greeks as well. Past scholarship has presented the effects on India of Alexander's invasion and the subsequent Hellenistic colonization of India. Many studies have examined how the East and West interacted or have looked at parallels in their philosophies. Other studies have determined how Buddhist art in India changed after Alexander's conquest. None, however, have fully examined the Hellenistic influence and how its syncretism with ancient India affected Buddhist thought and image. How did Buddhism change as a result of Hellenistic influence? Even if the shift in political power was not developed, cultural convergence took place as Hellenistic colonies arose and Indian Kings combined Hellenistic characteristics with Buddhist doctrine as a measure of unification.

Student Researchers: Michael A. Carlo and Abigail A. Kimmitt
Major: Biology
Research Mentor(s): Dr. Andrew Dolby
Project Title: Evaluating the effects of capture and handling time on three physiological stress indicators in the Tufted Titmouse (*Baeolophus bicolor*)

All organisms face both internal and external sources of stress, which affect normal physiological function and may reduce fitness. To cope with stressors, birds have a protective physiological response known as the stress response, which consists of three components: the hormonal response, the immune response and the intracellular response. This study evaluates the relationship between acute distress due to capture and handling and biomarkers of three components of the stress response in the Tufted Titmouse (*Baeolophus bicolor*): plasma corticosterone (CORT) levels, heterophil/lymphocyte ratios (H/L), and heat shock proteins (HSPs). These biomarkers are currently being used as stress indicators in both basic and applied avian research, but their relationships with each other, as well as their responses to specific stressors such as capture and handling, have been little studied. Very few studies have compared HSP, CORT and H/L values in samples taken from the same subjects at the same time, and no one has compared them in such samples taken from free ranging birds. No study has examined the effects of capture and handling procedures on HSP, CORT, and H/L by measuring each in relation to the time elapsed between the initial moment of capture and blood collection. Such experiments are necessary to determine if HSP and CORT levels and H/L values are being utilized and interpreted correctly in observational studies as indicators of stress levels in birds. The reliability of these stress assessment tools is paramount to the success of avian research concerning

bird management and conservation. In evaluating the effects of handling stress on these three physiological stress indicators, this study aims to refine the current stress assessment tools available to researchers and to help researchers choose the best stress bioindicators for their specific research purposes and effectively interpret stress data.

Student Researchers: Ann Carroll, Rebecca Smith, Kathryn Callaghan, Molly Sullivan and Mara Rowcliffe
Major: Psychology
Research Mentor(s): Dr. Debra Steckler
Project Title: Emerging Adulthood: A College Student, Middle-Class Perk?

Arnett proposed that all young adults experience the stage of emerging adulthood; however, other researchers question the stage's universality. We hypothesize that lower education level and lower socioeconomic status decrease the exhibition of emerging adulthood traits. Results partially support our hypothesis and suggest that the characteristics of Emerging Adulthood may be associated with the extent of one's college education and their family and individual income. Participants who achieved only a high school diploma or equivalent showed significantly fewer emerging adulthood characteristics than those who obtained some college and those who have a Bachelor's degree. However results suggest that individuals with lower individual incomes exhibit more emerging adult characteristics, and this finding was obtained for individuals whose family's incomes were $75,000 and $100,000. Curtailing college education may indicate that the individual has to make earlier commitments, foregoing the experimentation associated with Emerging Adulthood. A lower individual income may indicate that the person has not set upon a career but is still exploring their possibilities, while a middle-class family income may be the financial support an Emerging Adult needs to support this exploration. This study supports the idea that, while exceptions may exist, the stage of Emerging Adulthood may vary depending on level of college education and income.

Student Researcher: Katherine L. Casey
Major: Women's and Gender Studies
Research Mentor(s): Dr. Tracy Citeroni
Project Title: Eight Children and Two Book Deals: Biblical Womanhood Blog Networks and Entrepreneurship

Biblical Womanhood blogs form a tightly connected network designed to promote a vision of womanhood based on traditional gender roles. These bloggers are primarily wives and mothers, almost exclusively homeschooling their children, and theologically conservative. However, many of them are also highly business-oriented; their blogs are monetized, through advertisements, selling products, and consulting businesses, and a fourth of bloggers have authored and published books. Examining how these business connections fit within the broader network of Biblical Womanhood blog gives interesting insight into how Biblical Womanhood bloggers create and maintain their gendered identities online. The presentation will present a visual overview of the Biblical Womanhood blog network, followed by three case studies examining prominent bloggers, their business activities, and the gendered content of their blogs.

Student Researchers: Rossanna M. Catahan, Keelin E. Haw and Brennan W. Miller
Major: Computer Science
Research Mentor(s): Dr. Stephen Davies and Dr. Karen Anewalt
Project Title: UMW EagleICE (Internet Computing Experience)

EagleICE ("Internet Computing Experience") is a massively open online course (MOOC) offered by Computer Science professors Drs. Anewalt and Davies along with a mentor team of UMW computer science majors. The course is comparable to UMW's CPSC 110 course and teaches basic computer programming skills. The course is Web-development based and includes the use of JavaScript, JQuery, CSS, HTML, and

Ajax. The EagleICE MOOC experience was initially designed to address the lack of software engineers in the industry while attempting to recruit more young women into computer science courses. The EagleICE team believed that the majority of people who are unfamiliar with the discipline usually make incorrect assumptions about what exactly computer science is, and it is these assumptions that cause the lack of interest. It was our aim to especially recruit young women to EagleICE primarily in hopes that we could reach them early enough to wipe away any misconceptions of what computer science actually is.

The EagleICE team reached out to local private schools (Fredericksburg Academy, Fredericksburg Christian Schools) and homeschoolers for this initial pilot course. EagleICE differs from some of the major MOOCs recently offered by MIT and Harvard in that our enrollment was exponentially smaller. This allowed us a sample size that made class size easier to manage, which made providing feedback to students much easier allowing for a more UMW-esque experience with individual mentors. The continued enrollment in the course relative to traditional MOOCs was a little better, but considering our smaller sample size it was expected and may not be indicative of the format used. Overall, the information gathered from the course will help us in further course offerings, and may potentially give us enough feedback to offer it on a national level.

Student Researchers: Erica Christian, Andrea Fritch, Eric Knapp and Mercedes McWaters
Major: Psychology
Research Mentor(s): Dr. Jennifer Mailloux and Dr. W. David Stahlman
Project Title: Facilitation versus Overshadowing: Does Multimodal Input Help or Hinder Object Recognition?

We seek to determine whether learning unfamiliar objects multimodally (both visually and haptically) will produce greater or lesser recognition compared to learning unfamiliar objects unimodally (visually or haptically). In this study, participants will explore objects using haptic and/or visual modalities, and then select learned objects from a set of objects containing those presented at learning and some other randomly-selected objects. If multimodal information facilitates learning, we predict learning objects multimodally will increase recognition compared to learning objects unimodally; however, if one type of stimulation overshadows the other type of stimulation, we predict learning objects unimodally will increase recognition compared to learning objects multimodally.

Student Researcher: Elyse V. Clark
Major: Environmental Science / Geology
Research Mentor(s): Dr. Ben Odhiambo Kisila
Project Title: Comparative analysis of watershed erosion, reservoir sedimentation and sediment trace metals in two Virginia lakes

Two contrasting reservoirs in Virginia were studied to compare their environmental evolution based on watershed soil erosion, reservoir sedimentation and sediments trace metals variations. Lake Moomaw, located in the Blue Ridge Mountains, is a relatively pristine reservoir with extreme slopes surrounded by undeveloped, protected land. Lake Pelham is located in Culpeper County, which is a more human developed area consisting of agriculture and a variety of industrial developments. The Revised Universal Soil Loss Equation (RUSLE) was used in soil erosion estimates in the two watersheds. Three sediment cores from each reservoir were used for 210Pb sediment accumulation rates estimates, as well as trace metal analysis. Bathymetric and sedimentation surveys of the two lakes were also conducted using a multi-frequency echo sounder system.

The RUSLE/SDR erosion model estimates 2.149 Mg/ha/yr for Lake Pelham, which is a 410% increase from assumed pristine conditions. For Lake Moomaw, 2.717 Mg/ha/yr of erosion was estimated, a 13% increase from pristine conditions. The average 210Pb-based sediment accumulation rates were 0.348 $\pm$0.053 g/cm2/yr for Lake Pelham and 0.246$\pm$0.043 g/ cm2/yr for Lake Moomaw. The geophysical survey results

estimates sediment average accumulation rates of 0.599 cm/yr and 1.514 cm/yr for Lakes Moomaw and Pelham respectively. The sediment trace metal results show that both reservoirs have moderate to high enrichment of Cu and little enrichment of Zn and Pb. Overall, Lake Moomaw has relatively low sediment accumulation and watershed erosion rates due to the pristine nature of the watershed, but is also more vulnerable due to the steep slopes that characterize the basin. Comparatively, Lake Pelham has higher erosion rates, sediment accumulation rates and high metal enrichment of Cu and Zn, which directly reflects the impact of human development on its environmental evolution.

Student Researcher: Robert P. Clark
Major: Environmental Geology
Research Mentor(s): Dr. Ben Odhiambo Kisila
Project Title: Comparative Spatial Erosional Analysis Using RUSLE and USPED Models

The Rappahannock River is the leading source of sediments in tons/mi2 to the Chesapeake Bay which leads to increases in eutrophication and decreases in water clarity. This study evaluates erosion rates and sediment source areas in three sub-watersheds of the Rappahannock River; Claiborne Run, Little Falls Run and Horsepen Run. Claiborne Run watershed is predominantly human developed, Little Falls is of mixed land-use whereas Horsepen Run is primarily forested. The GIS based Revised Universal Soils Loss Equation (RUSLE) model was used together with Sediment Delivery Ratios (SDR) to estimate watershed soil losses. In addition, the Unit Stream Power Erosional Depositional (USPED) model was adapted to the current ArcGIS edition (10.1) and ran to identify exact erosional and depositional areas topographically. The RUSLE/SDR model estimates that 332, 130, and 212 tons/yr are currently being delivered to Claiborne Run, Little Falls Run and Horsepen Run respectively. These results directly correspond to the level of anthropogenic impact observed, where Claiborne Run, which has the most human development, has the highest soil loss and Horsepen which is mostly forested has the least. The USPED model outputs a map identifying areas of gully and sheet erosion which can then be used in conjunction with the RUSLE/SDR results to further understand where erosional and depositional processes are occurring. These results show that human development greatly increases erosional processes and influences suspended sediment loads currently being observed in the Rappahannock River and its tributaries. The results also were able to locate major topographical contributing areas for erosion and deposition.

Student Researcher: Nicole Cochrane
Major: Economics
Research Mentor(s): Dr. Shawn Humphrey
Project Title: Repayment Incentives in Individual-liability Microfinance

As a tool of alleviation of poverty, microfinance has been lauded for its ability to overcome barriers to lending to the poor. Since its inception, there has been a marked shift in microfinance methodologies, from the traditional group-liability lending scheme that made credit access for the poor possible to individual-liability loan contracts. Without the joint-liability condition, individual-liability micro-lenders would appear to face the same barriers to lending that existed prior to the establishment of microfinance. Thus, understanding repayment incentives is critical to the practice of individual-liability microfinance contracts. Some microfinance institutions require a demonstration of ability to pay. Because the poor often function entirely in the informal sector, such demonstration is inherently difficult, raising concerns that individual-liability micro-lenders are less likely to reach poorer borrowers. This paper will analyze the factors that influence the repayment of the clients of an individual-liability microfinance institution, absent certain demonstrations of ability to repay. Targeting socio-economic factors that impact repayment ability have implications for the poor and their ability to access the microcredit market.

Student Researcher: Michael S. Crawford
Major: Computer science
Research Mentor(s): Dr. Stephen Davies
Project Title: An individual-based, GIS driven model of *Aeschynomene virginica* and its tidal marsh environment

Since the birth of high performance computing, ecology has entered a new, computational paradigm. "Ecoinformatics" allows researchers to confront many assumptions they previously made to simplify models of natural phenomena. The mean-field assumption is one of the most prominent; can we assume that all individuals interact uniformly and thus individuals' locations in space can be disregarded? In our individual-based, GIS driven simulation of the rare plant *Aeschynomene virginica*, or Sensitive joint-vetch, we test this assumption for a tidal wetlands environment. Using empirical data to model sensitive joint-vetch and geospatial data to frame the individuals in their environment, we examine the effects hydrochory, or seed dispersal via water, localized competition with other plants, and intraspecies carrying capacity on the metapopulation dynamics of Sensitive joint-vetch. Additionally, we investigate whether joint-vetch can be saved. Can we cut away the competition and give it a leg up to establish new populations and reinforce existing? Is its current population level sustainable, or is its fate largely sealed?

Student Researcher: Matt L. Cronin
Major: Economics
Research Mentor(s): Dr. Margaret Ray
Project Title: Performance Enhancing Drug Use in College Sports: What Factors Matter?

The use of performance enhancing drugs in sports has always been a significant issue that needs to be addressed. This analysis is a follow up on a previous study that utilized ordinary least squares regression analysis on NCAA drug testing data from 2005-2010 in order to determine if potential sports salaries effect the amount of positive drug tests within a certain college sport. Like the previous study the results of this analysis show that potential salaries or future monetary incentives play little role in performance enhancing drug use of college athletes. However the amount of strength required for each sport and other factors play a larger role in effecting the amount of observed drug use in a particular college sport.

Student Researchers: Paul Crowley, Ashley Rowles and Katherine Mayo
Major: Sociology
Research Mentor(s): Dr. Nora Kim
Project Title: Campus Racial Climate at University of Mary Washington: Interaction with Students

We surveyed Mary Washington students to explore how they perceive the campus racial climate of Mary Washington. Students are asked to identify racial composition of their friends and to assess whether students of any particular racial/ethnic background tend to segregate themselves.

Student Researcher: Jeff Davidson
Major: Chemistry
Research Mentor(s): Dr. Leanna Giancarlo
Project Title: An Adsorption Phenomena: Analyzing Carboxylic Acid Molecules Via STM

Scanning tunneling microscopy (STM) has uses in analyzing the surface of conductors or semi-conductors, examining substances adsorbed to these surfaces, and constructing nanotechnologies. STM has been used to observe semimetals such as graphite and molecules that are physisorbed to graphite. The manner in which molecules orient themselves on graphite can be observed due to the stability of the self-assembled physisorbed adlayer. Bare graphite has been imaged via STM, and two different acid molecules dissolved in phenyloctane, octadecanoic acid and tetracosanoic acid, have been adsorbed on the graphite surface and visualized via STM. Both octadecanoic acid and tetracosanoic acid form 2-D self-assemblies on the graphite

yielding columns or lamellae of molecules. The lamellae show the "dark" carboxylic acid functional groups hydrogen bonding with each other; the lamellae have been used to calculate the length of an octadecanoic acid molecule to be 2.3nm, and the length of a tetracosanoic molecule to be 3.7nm. Mixtures of octadecanoic acid and tetracosanoic acid will be made and applied to graphite to find the mole percent the acid molecules adsorb to graphite equally. The mixtures will be in a range between 10-15 mol percent of tetracosanoic acid based upon research done previously.

Student Researchers: Danielle C. DeVille and Mariah A. Young
Sponsoring Department: UMW Speaking Center
Research Mentor(s): Dr. Esther Yook
Project Title: Achieving the unachievable: The effeciveness of a communication center in the absence of a communication department

In this study the authors explore the extent to which a communication center in a liberal arts college can or cannot thrive without the supportive foundation of an official communication department. After reviewing the current literature on the subject, the authors theoretiaclly explore the drawbacks, benefits and successes unique to Mary Washington's Speaking Center, which exists without a communication department. The researchers also examine data on UMW Speaking Center effectiveness collected from communication, first year seminar and speaking-across-the-curriculum professors. Ultimately, the paper concludes that while there are clear disadvantages unique to the communication center that lacks the supportive framework of a communication department, it is possible for a speaking center to succeed and thrive in the absence of the corresponding department.

Student Researcher: Laura Dick
Major: Economics
Research Mentor(s): Dr. Shawn Humphrey
Project Title: Responses to Formal Institutional Reform: A Theoretical Framework and Case Study

In 2009, political protests in Madagascar escalated, resulting in the removal of the president, Marc Ravalomanana, from office. This was classified by the US and other countries as a military coup, and diplomatic recognition was revoked, which also ended foreign aid, crippling the government. But one major cause of the protests was changes in formal land tenure laws, allowing multinational companies to lease huge swaths of the country. This caused outrage, as deep-seated informal institutions about land were anathema to its sale to outsiders. However, in plenty of other situations of formal land tenure reforms, the results were less violent. In my thesis, I will explore the conditions that led Malagasy citizens to react in this way, examining choices made along the way. Formal institutions were created that conflicted with pre-existing informal institutions, and in this case, the state had the power to enforce the new rules (and did). The people, then, chose to resist, and to resist actively. To fully understand this path of choices, however, I will look at the other options at each stage, and try to identify the factors that affect the costs and benefits to different actors, and thus their choices. I use a multi-player decision tree to model this process, examining the costs and benefits to both state and local actors. Although the importance of institutions and strong property rights for economic growth are clearly understood, we are far from an understanding of the complexities and unintended consequences of the institutional change needed to arrive there. This thesis begins to model a framework for more nuanced analysis of property rights reform.

Student Researcher: Kathryn E. Dillinger
Major: Mathematics
Research Mentor(s): Dr. Jangwoon (Leo) Lee
Project Title: Analysis of the Heat Equation with a Heat Source Term

In this Mathematics study, we utilize the heat equation, a partial differential equation, with a heat source term to obtain the temperature of tungsten filaments from Sylvania incandescent light bulbs. We derive the one-dimensional mathematical model of the heat equation and then determine the analytical model using the method of eigenfunction expansion. By applying difference quotients to our partial differential equation, we attain three numerical models, forward difference model, backward difference model, and averaged difference model, to calculate the temperature of our light bulb filaments. We compute the actual temperatures using equations from Physics and determine how the wattage of the light bulb affects the amount of time it takes for our analytical and numerical solutions to converge to the actual temperature. Finally, we develop MATLAB codes for each of our models, so we can experiment with the three numerical models to see which produces the most accurate numerical results compared to the analytical solutions of the heat equation.

Student Researchers: Jessica A. Dochney and Thy N. Mai
Major: Biology
Research Mentor(s): Dr. Theresa Grana
Project Title: Describing Nematode Diversity

Nematodes play important roles in nutrient cycling and decomposition. The nematode phylum is one of the most diverse and abundant groups of animals, with a projected 1 million species. However, fewer than 29,000 nematode species have been described and only a few species have been studied in laboratories. The nematode, *Caenorhabditis elegans* has been well studied as a genetic and developmental model organism. Such studies have contributed to our understanding of basic cell biology, genetics, and neurobiology. Our goal is to find and describe new species of nematodes, particularly those that could build upon our understanding of Caenorhabditids. Since 2005, the number Caenorhabditds known to researchers has doubled from 22 to nearly 50. A representative of one of these new species was found on the UMW campus on the northwest side of Seacobeck Hall. Our work is part of the formal description of this new species, which will help other researchers in understanding the life history of Caenorhabditids. To describe the new species, we are taking high-resolution images, measuring identifying body features, and comparing these data to described species.

Student Researcher: Morgan E. Downing
Major: Women's and Gender Studies
Research Mentor(s): Dr. Miriam Liss
Project Title: Who Would Help? Factors Influencing Bystander Efficacy in Three Categories of Rape

Previous research has investigated the rape culture that pardons perpetrators and blame victims of rapes. This study explored predictors of Rape Myth Acceptance and willingness to intervene in a possible rape situation in three categories of rape - stranger rape, acquaintance rape, and marital rape. Previous research has shown that beliefs in traditional gender roles are high predictors of victim blaming and Rape Myth Acceptance. Explicit Power-Sex Associations have also been shown to be high predictors of Rape Myth Acceptance but was only studied in men. 145 women took this survey to evaluate how Explicit Power-Sex Associations and Conforming to Feminine Norms influenced their bystander efficacy and rape myth acceptance, as well as how likely they were to encourage a victim to call the police in each of the three rape categories. Women with higher Rape Myth Acceptance and higher Explicit Power-Sex Associations had lower confidence in intervening. They also were significantly more likely to encourage the victim to call the police in a stranger rape than an acquaintance or marital rape. Finally, women with high scores of Bystander Efficacy were significantly more likely to encourage the victim to call the police in a marital rape.

Student Researchers: Thomas J. Eldridge and Arsela Hameed
Major: Chemistry

Research Mentor(s): Dr. Leanna Giancarlo
Project Title: Validating Adsorption theory in light of Langmuir and Freundlich models: A comparative study between a theoretical and experimental model of adsorption

The purpose of this research is to investigate adsorption theory. Adsorption is a phenomenon that occurs when a compound, known as the adsorbate, binds to a surface, known as the adsorbent. Adsorption is an important phenomenon to understand and predict since it has several chemical, biological, and industrial applications such as catalysis and chromatography. For this research, Procion Red MX-5B, a triaziline dye, was adsorbed to cellulose filter paper. The absorbance of a series of Procion Red solutions have been measured before and after adsorption equilibrium has been achieved. Using Beer's Law, the equilibration concentrations of these solutions can be determined. The Langmuir model can then determine the amount of adsorbate bound to the cellulose relative to the maximum number of binding sites and the rate at which adsorption and desportion occurs. The empirical Freundlich model can then be used to evaluate the interactions between the adsorbate and adsorbent. The results of this experiment will be compared to previous research1 in order to evaluate the accuracy of the data. Data obtained after three days of equilibration indicate a trend similar to previous work,1 as the absorbance of the Procion Red solutions have dropped noticeably and each piece of cellulose filter paper have significantly darkened in color.

References (1) Guiardo, G.; Ayllon, J.A. J. Chem. Educ., 2011, 88 (5), pp 624–628

Student Researchers: Ashley T. Elliott, Holly Richters and Erin E. Stewart
Major: Environmental Science
Research Mentor(s): Dr. Michael Bass
Project Title: A Comparative Analysis of the Health of the Ni River and Massaponax Creek in Spotsylvania County

The main focus of this research project was to determine the health of both the Ni River and Massaponax Creek in Spotsylvania County, VA. As good representations of a rural and urban tributaries respectively, the two streams provide a good demonstration of the effects of urban development. The Ni River was also examined in anticipation of the Ni Village development and will be monitored during the building process to determine the impacts of construction on stream ecology. There are four sample sites located on Massaponax Creek and three sites on the Ni River. Each stream includes sites of either high or low human influence. At each site, macrobenthic samples were taken as a bio-indicator of pollution. These samples were corroborated by water chemistry analyses, including conductivity, dissolved oxygen levels, fecal coliform, alkalinity, calcium hardness, phosphate and nitrate concentrations and total dissolved solids, in an attempt to determine potential sources of pollution. All samples were taken within each season in order to understand seasonal variations and to monitor any changes within the stream systems. An examination of the macrobenthic results indicate the Ni River is healthier than Massaponax Creek. This is represented by the higher EPT percentages and diversity of macrobenthic individuals within the Ni River. However, Massaponax Creek has maintained good health despite increased development within its watershed.

Student Researchers: Patrick Emsley, Kristina Southern and Mae A. Carpenter
Major: Chemistry
Research Mentor(s): Dr. Leanna Giancarlo
Project Title: Spectroscopic Analysis of Solvent Composition Using a Solvatochromic Probe Dye

Solvatochromism, the dependence of absorbance maxima of a solute upon changes in polarity of a solvent, will be explored using Reichardt's Dye in solutions with varying ethanol concentration. Reichardt's Dye is a betaine dye and exhibits changes in electronic transition energies with changes in solvent polarity that can be qualitatively explained via consideration of differing intra- and intermolecular interactions in the ground and excited electronic states. These changes are, to some extent, predictable, and, thus Reichardt's Dye is the

basis of the empirical scale of solvent polarity known as the ET(30) scale. Theory and mathematical derivations can be utilized in order to gain a better understanding of the scale and the physical rationale for the observed color changes; however, the ET(30) scale is highly simplified, and numerous limitations exist. This study will demonstrate that a solvatochromic dye, like Reichardt's Dye, can be utilized to determine the fraction of a polar solvent, ethanol, in an unknown solution and explore the limitations that the scale possesses in terms of acidic solutions, strictly nonpolar solutions, and solutions in which preferential solvation occurs.

Student Researchers: Erica L. Falvey, Alison Litvin and Kelly Sanborn
Sponsoring Program: HONR100
Research Mentor(s): Dr. Mary Kayler
Project Title: 'Real Life' and Gaming

We are looking at how gaming in the virtual world affects real world players, whether this be through personality, mentality, or productivity. These three catagories are addressed as well as any differences between being dedicated and being "addicted." We have each surveyed individuals with differing demographics and have compiled and analyzed our results as it pertains to our individual research focus.

Student Researchers: Matthew Gaughan, Brittany Harris and Joe Fried
Sponsoring Program: HONR100B
Research Mentor(s): Dr. Leanna Giancarlo
Project Title: Ozone vs. Aerosol: The Ultimate Showdown

In this documentary style video consider the development of chlorofluorocarbons, also known as CFCs, by Thomas Midgley and the later discovery of their negative impact by Frank Sherwood Rowland and Mario J. Molina. CFCs were used in several devices, from refrigerators to bug spray, because they do not react. However, these compounds were later found by Rowland and Molina to be destroying the plant's ozone layer, leading to Midgley's vilification and a Nobel Prize nomination for Rowland and Molina. This video, a reenactment, discusses events around 1990 after the Montreal Protocol, which restricted usage of CFCs. The purpose of this project is to discuss the role of the scientist in discovery and their responsibility if that discovery eventually is found to have an unforeseen negative impact. Even if a scientist (in this case Midgley) discovers something that is later found to adversely affect humanity, (s)he should not be vilified. The scientific community should work together to reverse/stop of the collateral damage of the discovery.

Student Researcher: Darren M. Getts
Major: Physics / Mathematics
Research Mentor(s): Dr. Hai Nguyen
Project Title: An Acousto-Optical Modulated Mach Zehnder Interferometer

We report on a versatile interferometer setup which allows for both heterodyne and path length difference interferometry. Most interferometers are designed for only one type of test or result and can be expensive or complicated to use. A different type of interferometer is needed that will allow for multiple types of investigation, is inexpensive, and easy use. We solve these problems by creating an interferometer which uses AOM's (Acousto-Optical Modulators) implemented into a modified Mach-Zehnder Interferometer. This project describes this inexpensive and multipurpose interferometer setup. With our design we demonstrate the results for the heterodyne system with the optical beat notes and interference patterns recorded by the simple path length setup will also be presented.

Student Researchers: Rachel A. Goldsmith and Charlea A. Kimbleton
Major: Chemistry
Research Mentor(s): Dr. Janet Asper

Project Title: Styrofoam Packing Peanuts versus Cornstarch Packing Peanuts

In today's packaging industry there are two major kinds of packing peanuts available for use. The more environmentally friendly version of the packing peanut is made from cornstarch, a naturally occurring polymer, while the other is made from a synthetic polymer; polystyrene (or Styrofoam). While both of these are polymers, they exhibit different properties. To demonstrate this, the polystyrene packing peanuts will be dissolved in acetone and the cornstarch packing peanuts will be dissolved in water. Should water be used to try and dissolve the polystyrene peanuts, it will not dissolve. The same is true for the cornstarch peanuts in acetone. The process of synthesizing polystyrene will be reviewed. The manufacturing process for both peanuts will be explained, clarifying why it is that cornstarch peanuts are the more environmentally friendly option. For the demonstration, styrofoam cups will be used instead of styrofoam packing peanuts.

Student Researcher: Zachary C. Goodwyn
Major: Computer Science
Research Mentor(s): Dr. David Toth
Project Title: CPU Monitoring Software for the LittleFe Compute Cluster

The LittleFe compute cluster consists of 6 dual-core CPU computers networked together in one box that is the size of a desktop computer. LittleFe clusters are used by a number of computer science faculty at various institutions, including UMW, for outreach and for teaching parallel computing. One of the ways the LittleFe could be improved to make it even better for demonstrations is by adding software that monitors and graphically displays the CPU utilization of all 12 cores so that people can see which CPU cores are busy at a given time during different demonstrations. We have developed the software to perform that task. The software should be bundled with future distributions of the operating system that the LittleFe clusters run.

Student Researcher: Anne R. Grasselli
Major: Art History
Research Mentor(s): Dr. Marjorie Och
Project Title: Looking Out, Looking In: The Window Motif in Impressionist Depictions of Paris

The Impressionist painters at the end of the nineteenth century were known for their interest and depiction of light and air with colors that captured the sense of fluidity and weightlessness of their surroundings. They painted out of doors, en plein air, and used the special quality of light to make their pictures have unique and colorful dimensions. When they chose to paint indoors they were able to use windows that presented the world around them with a clear, framed picture.

Before Baron Georges Haussmann redesigned Paris in the 1850s, there is little evidence of an artistic attraction to the city. This suggests that Haussmann's new uniform apartment buildings, wide boulevards, and integrated green spaces inspired a wave of responses that came to be known as Impressionism. Artists like Claude Monet, Camille Pissarro, Auguste Renoir, Edouard Manet, Berthe Morisot, and Gustave Caillebotte interpreted these changes, and used windows to enhance their pictures.

Impressionists used windows as a viewpoint from which they could look out on the world and paint it, sometimes giving an unusual view from above that had not previously been possible in urban settings. They also used them to define interior spaces, to allow light into them, and to serve as a link between the inside and outside worlds. Lastly, they used the rhythmic repetition of windows along streets and on building facades as prominent compositional elements in their paintings. Combining these three different perspectives of Impressionist "window" paintings reveals why the artists were so attracted to Paris and how Haussmann made important changes to the cityscape in the middle of the nineteenth century. The lives and interactions of the various artists and the fascination with the new Paris helps us understand their reactions to modern subjects and the world around them.

Student Researcher: Osatohanmwen Guobadia
Major: Computer Science
Research Mentor(s): Dr. David Toth
Project Title: Advancing Research & Education for Drug Discovery

As pharmaceuticals continue to play a large role in our lives to cure diseases, drug discovery has become very important. Unfortunately, it takes many years and millions of dollars to take a drug from a concept to clinical trials and hopefully, approval. Because of the nearly infinite possible molecules that can be created, just trying different molecules in a wet lab is too expensive and is unlikely to produce the desired results. Virtual screening is a process where a computer can simulate the molecules and protein and predict how well the molecule should bind to the protein. This process can help identify potential drugs and can greatly speed up the process of drug discovery, as well as lowering the cost. Virtual screens produce a vast quantity of data that has to be analyzed to find the best possible leads for potential drugs. Processing this data manually is extremely time-consuming and error-prone. We have developed software to automate the data processing, speeding it up significantly and eliminating human errors. Because virtual screening is so useful, a number of pharmaceutical companies use the process. Therefore, it is very helpful for students to be exposed to it. However, the programs to conduct virtual screening are typically run from a command line and many biology and chemistry students are not comfortable using the command line. We have developed a graphical user interface to allow students to conduct small-scale virtual screens on a desktop computer to get comfortable with the concepts and the process before learning to conduct virtual screens through the command line on a supercomputer.

Student Researchers: Amanda M. Halprin, Carisa Chaplin and Cameron Kostyack
Sponsoring Program: HONR100
Research Mentor(s): Dr. Mary Kayler
Project Title: Stereotypes, Gamers, and Violence

An analysis of stereotypes in video games, looking at Grand Theft Auto and Call of Duty for specific examples.

Student Researchers: Brittany S. Harris, Dana C. Bargh and Rachel M. Cote
Major: Chemistry
Research Mentor(s): Dr. Ray Scott
Project Title: The Effect of Acid on the Synthesis of Chlorapentaaminecobalt(III) Chloride

An unknown cobalt coordination compound was synthesized from chloro-ligands, using a cobalt compound with a charge of 2+. This was changed to a compound of 3+, producing [Co(NH3)5Cl]2+.Through the known properties of cobalt solutions, such as color and wavelength, the identity of the newly formed compound ([Co(NH3)5Cl]2+) was determined through spectroscopy. After this, the compound was placed in a water bath and varying amounts of HCl were added in order to determine whether the reaction was catalyzed by acid or not. At regular fifteen-minute intervals, the absorbance of five different solutions with varying concentrations of solution was measured at 550nm. From this, the absorbance was calculated and a graph generated. Differing rate constants, represented by the varying slopes on this graph were used to determine the effect of the acid on the cobalt reaction.

Student Researchers: Lonnie A. Harris, William D. Davis and Jerome M. Mueller
Major: Chemistry
Research Mentor(s): Dr. Ray Scott
Project Title: Synthesis and Analysis of Aspirin and its Copper Complex

Organic chemistry is the study of carbon containing compounds bonded together with hydrogen, halides, and other elements to form complex molecules. Organic compounds are the basis of all biological life on the

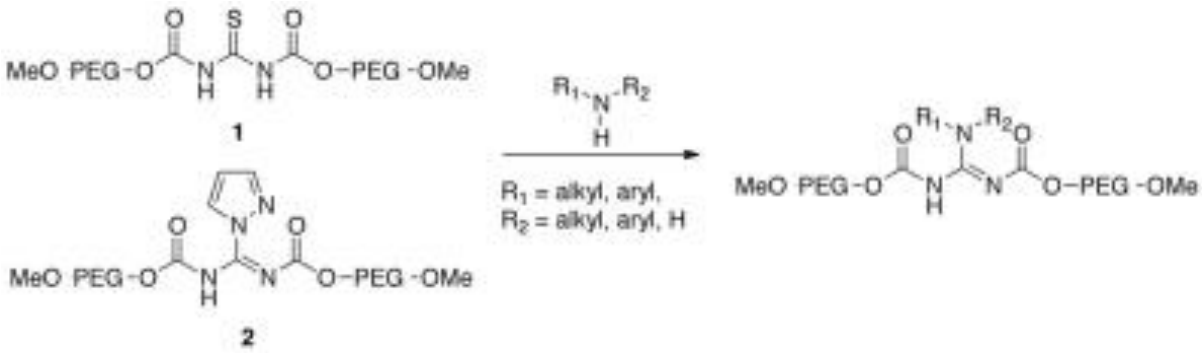
planet, and also large component of manmade synthetics. The ultimate goal of this experiment was to study just one of group of organic compounds, aspirin and its derivatives. In the first part of the experiment aspirin or acetylsalicylic acid was produced for analysis. Using melting temperature, Infrared Spectrum, and a back titration the yield and purity of the aspirin produced was determined to be 96% with a small amount of impurities in the product. In the second phase of the experiment the aspirin was reacted with a copper compound to produce copper aspirinate, from which the percent copper was determined by complexometric titration. The results of this part showed that the copper content of the aspirinate was not near the theoretical value, but was probably due to undissolved aspirin in the solution. In a separate experiment, the synthesized aspirin was combusted in a Parr 6200 calorimeter, and the internal energy as well as the enthalpy was determined to be around 3600 kJ/mol.

Student Researchers: Lonnie Harris and Jake Rieder
Sponsoring Program: HONR100B
Research Mentor(s): Dr. Leanna Giancarlo
Project Title: Oppenheimer: Savior or Destroyer?

Robert Oppenheimer's work on the Manhattan project is one of the most controversial of the twentieth century. Under his skillful leadership, the United States created the most powerful weapon ever known to mankind: the atomic bomb. Since his work in the forties, there have been two prevailing opinions of Oppenheimer. On one hand, he is seen as an arbiter of destruction, leading directly to the deaths of hundreds of thousands of Japanese civilians. On the other, he is seen as the savior of thousands of American GI's and millions of Japanese civilians and soldiers who would have been lost during the planned invasion of Japan. Through a case study of his life and work, we can gain a better understanding of the nature of science in general and its interaction with society as a whole.

Student Researchers: Robert F. Higgins and Mae A. Carpenter
Major: Chemistry
Research Mentor(s): Dr. Janet Asper
Project Title: Poly(ethylene glycol) tagged guanidinylation reagents based on thiourea and guanylpyrazole

Two new guanidinylation reagents are being developed which will be evaluated for in reactions with primary and secondary amines. The poly(ethylene glycol) carbamate functionality serves as both a protetive group for the guanidine and a phase tag for Liquid Phase Organic Synthesis (LPOS). Compounds 1 and 2 have been prepared in modest yields, and have been characterized by 1H NMR, 13C NMR and MALDI-TOF-MS. Their effectiveness in guanidinylating primary and secondary amines will be discussed.



Student Researchers: Robert F. Higgins, Jennifer Larson and Rafia Virk
Major: Chemistry
Research Mentor(s): Dr. Leanna Giancarlo
Project Title: Viscosity of sugar solutions: dependence on concentration, temperature, and chain length

Viscosity is an important chemical characteristic of a liquid or solution that can be directly and quantitatively measured. The viscosity of sugar solutions has been investigated as a function of concentration, chain length, and temperature. According to the particle theory of matter, as the number of particles (here, sugar molecules) increases in solution, the internal resistance between particles is raised, which in turn increases their resistance to flow resulting in a more viscous solution; therefore, the density and viscosity of a solution are directly proportional and can be directly compared. The viscosity of glucose (monosaccharide), maltose (disaccharide) and raffinose (trisaccharide) solutions has been determined at concentrations ranging from 0 to 0.25 M and temperatures of 25 °C, 50 °C, and 75 °C using an Ubbelohde viscometer. A direct correlation between the concentration of solution and viscosity has been experimentally observed. Viscosity is expected to be highest for the longer-chained polysaccharide solution versus the shorter mono- and disaccharides due to the particle theory of matter.

Student Researcher: Alexandra M. Hoenscheid
Sponsoring Program: HONR100
Research Mentor(s): Dr. Nina Mikhalevsky
Project Title: Equally Human: On Whether Canonical Text Supports the Ordination of Women in the Roman Catholic Church

For my expanded Honors research project for my Introduction to Feminism class, I have conducted field research to address the issue of whether the Roman Catholic Church's stance on women's ordination reflects Biblical intent. My research, overseen by Professor Nina Mikhalevsky, incorporates books, scholarly articles, primary documents, and notably interviews with Dr. Dorothy Irvin, an archeologist specializing in artifacts pertaining to women's ordination, Sister Maureen Fiedler, host of the radio show Interfaith Voices, and Dr. Rosemary Radford Ruether, a famous feminist scholar and activist.

To discern the reasons behind the Church's refusal to ordain women, I have, in addition to my field research, studied Pope John Paul II's Ordinatio Sacerdotalis and the 1976 Declaration on the Question of the Admission of Women to the Ministerial Priesthood by the Sacred Congregation for the Doctrine of the Faith. I have also reviewed the inconclusive report of the Pontifical Biblical Commission on women's ordination, relevant Biblical passages, archeological evidence of female priests, and arguments from religious and feminist theorists, including Simone M. St. Pierre and Mary Daly. Through my findings, I have reached the final conclusion that the exclusion of women from the priesthood does not reflect scripture, but rather arbitrary hierarchy, sexist attitudes, and the twisting of Biblical text.

I believe that the public is largely unaware of the archeological evidence of validly ordained women in the early Catholic Church, the Church's Byzantine-era shift in women's ordination policy, official reports declaring no scriptural basis for excluding women, and the Bible's teachings of equality. It is my aim to craft a readable, comprehensive overview of the struggle for women's ordination and highlight the weaknesses inherent in the Church's traditionalist argument so that this issue may be brought to the forefront of public debate.

Student Researcher: Andrew N. Hogan
Major: Biology
Research Mentor(s): Dr. Rosemary Barra

Project Title: The Effects of Brain Derived Neurotrophic Factor on Y79 Retinoblastoma Cells

Retinoblastoma is a rare form of cancer that affects the retina of the eye, occurring in approximately 1 in 15,000 live births, and it is also the most common type of inherited malignancy. Although current treatments including chemotherapy and surgical procedures have been successful, there is still a high rate of reoccurrence in patients. Recent research on neural cancers has focused on the neurotrophin receptors and their corresponding ligands. This study was designed to evaluate the role of the p75 neurotrophin receptor (p75NTR) in retinoblastoma cells. The receptor and its ligand are known to play a role in the regulation of programmed cell death in neural tissues. Brain derived neurotrophin factor (BDNF) is a neural ligand typically associated with neurotrophin receptors. Retinoblastomas have been found to express low levels of p75NTR, leading to an increase in cell growth. The primary cell line used in this study was the Y79 human retinoblastoma cell line. The cells were cultured in RPMI media with 10% fetal bovine serum, and 1% penicillin-streptomyocin. Initial immunocytochemical studies using an anti-p75 NGF receptor antibody (ab8874) demonstrated the presence of the p75NTR on the retinoblastoma cells. The Y79 cells were then incubated for 24 hours at 37oC with various concentrations of BDNF (0.02ng/mL, 0.2ng/mL, and 2.0ng/mL) and a MTT viability assay was performed. Contrary to current literature, the MTT assay showed a decrease in overall cell viability. A human 3 – caspase ELISA assay was conducted to determine whether the decrease in viability was caused by caspase 3 mediated apoptosis. Preliminary results indicate that BDNF treatment does effect caspase 3 activity. Studies are continuing to determine the exposure time required for the maximum effect.

Student Researcher: Ngoc Quyen Huynh
Major: Physics
Research Mentor(s): Dr. Hai Nguyen
Project Title: Saturated Spectroscopy of Rubidium

Rubidium is widely used in atomic clocks and GPS's, as well as in many other applications. My research involves optimizing an external-cavity, grating-feedback diode laser and a simple optical set-up of the saturated absorption spectrometer for rubidium atom excitation. Laser excitation, cooling, and trapping enable us to study the physical chemistry and properties of atoms, allowing us to manipulate their properties to better their current applications and to use it for future experimentations. Because of its hyperfine energy structure, rubidium is easily excited by the frequency from our diode laser, therefore it is easier to cool and trap. I will present in detail the set-up and results of my experiment.

Student Researchers: Karmel James and Brooke A. Andrews
Major: Chemistry
Research Mentor(s): Dr. Nicole Crowder
Project Title: Modification of bipyridine ligands for the development of a tethered carbon dioxide reduction catalyst

Polypyridyl ligands in combination with certain ruthenium complexes can serve as catalysts to lower the potential needed to chemically reduce carbon dioxide. Modified bipyridine compounds were synthesized as a means to bind the electrocatalyst to an electrode surface via a phosphonate monolayer. Lithium diisopropylamide was used in both a 1 and 2.5 molar equivalence to remove a proton from the methyl groups on 4,4'-dimethyl-2,2'-bipyridine. Following the proton removal, 1,9-dibromononane was added to the solution to form the products 4-(10-bromodecyl),4'-methyl-2,2'-bipyridine and 4,4'-(10-bromodecyl)- 2,2'-bipyridine respectively. Thin-layer chromatography and nuclear magnetic resonance spectroscopy confirmed production of the modified bipyridine compounds. Purification of the compounds was achieved via flash chromatography. Following purification, a Michaelis-Arbuzov rearrangement was conducted with triethyl phosphite yielding 4-(diethyl[decyl]10-phosphonate),4'-methyl-2,2'-bipyridine and 4,4'-(diethyl[decyl]10-

phosphonate)-2,2'-bipyridine respectively. Deprotection of the phosphonate yielded the corresponding phosphonic acids which were used to modify electrode surfaces; subsequent reaction with [Ru(CO)3Cl2]2 resulted in the tethered catalyst.

Student Researchers: Karmel James and Monica Chiu
Major: Chemistry
Research Mentor(s): Dr. Leanna Giancarlo
Project Title: Equilibrium determination of Bromocresol-Green using Beer's Law and Ionic strength

A real solution differs from an ideal one, since the former experiences attractive and repulsive forces due to charged ions in solution. Mathematically, the attractive/repulsive forces are accounted for through the activity coefficient in order to describe the equilibrium of the system. Debye-Hückel theory evaluates the activity coefficient in terms of the ionic strength of the solution which is dependent on the concentration of ions and their respective charges. Due to these charges, the equilibrium of a solution relies on the interaction of ions rather than the overall concentration of the solution. Using UV-Vis spectroscopy, the concentration of monoanionic and dianionic bromocresol-green (BCG) in salt solutions can be evaluated by measuring absorbance via Beer's Law; this yields information on the effect of ionic strength as the ratio of dianionic to monoanionic BCG stays constant. The activity coefficient can be determined to establish a relationship between the changes in the ionic strength of the solution and their effect on the equilibrium concentration quotient, Kc. In general, an increase in the ionic strength leads to a decreasing linear trend with respect to Kc.

Student Researchers: Yireda Jilili, Rohina Shafiq and Kristin Frye
Sponsoring Program: HONR100B
Research Mentor(s): Dr. Leanna Giancarlo
Project Title: The Birth of the Mad, Bad and Evil

Here, we will present a comparison between mad and bad fictional and actual scientists. Both the personal and professional lives of al the scientists will be examined in depth. The mad fictional characters, Dr. Jekyll and Dr. Moreau, will be compared to actual scientists, Stubbins Ffirth and Vladimir Demikhov, whose experiments have qualified them as mad scientists as well. Successful scientists, Maria Mitchell and Kevin Warwick, will also be discussed in contrast to the mad scientists. Through comparison of these different scientists, we hope to uncover the origins of the mad scientist stereotype and draw attention to how scientists are exaggerated in literature. Each scientist's characteristics and extent of research will be reported to strengthen our argument.

Student Researcher: Charlotte A. Johnson
Major: International Affairs / German
Research Mentor(s): Dr. Jason Davidson and Dr. Marcel Rotter
Project Title: US and EU Food Security Policy

Why do U.S. and EU food security policies differ with respect to developing countries? This paper provides an explanation as to why the U.S. and EU choose to pursue diverging food security policies. This study looks at both short- and long-term food security policy objectives that each actor has implemented. It seeks to explain why the policies differ with the goal of providing answers on how each actor could improve its policies and how the U.S. and EU can coordinate and thus work more efficiently toward achieving stated global food security goals.

Student Researcher: Eric M. Johnson
Major: Chemistry - ACS

Research Mentor(s): Dr. Nicole Crowder
Project Title: Modifying copper surfaces with azide-terminated phosphonic acids: A platform for surface functionalization via click chemistry

A platform on metal oxide surfaces suitable for copper-catalyzed azide-alkyne cycloaddition (CuAAC), or click chemistry, provides a route to many future reactions. To this end, diethyl 2-bromoethyl phosphonate is used in a series of reactions to yield a phosphonic acid and an azide on opposing ends of the molecule: the azide allows for the click reaction, while the phosphonic acid allows for the molecule to bond to a metal oxide surface. Deprotection of the phosphonate yields the phosphonic acid, which is then attached to a copper oxide surface by a Tethering By Aggregation and Growth (TBAG) deposition method. The azide is attached to the surface-bound phosphonate by performing a backside attack on the terminal bromine using sodium azide. A CuAAC click reaction is used to react the azide with a model terminal alkyne to form the 1,4-substituted 1,2,3-triazole. Surface modification is confirmed via specular reflectance infrared spectroscopy.

Student Researcher: Anna K. Kania
Major: Biology
Research Mentor(s): Dr. Theresa Grana
Project Title: Improving efficiency of genomic sequencing from Nematode species

Even though nematodes are one of the most abundant organisms on the plant, their phylogenic history is lacking a lot of information due to the fact that only few thousand out of the estimated million species have been identified and characterized. Thus to truly understand the evolutionary patterns that have taken place in the very large and diverse phylum of Nematoda, more species need to be described and sequenced.

The primary goal of this project is to improve the efficiency and quality of genomic sequencing of new nematode species. The DNA sequences obtained through the process are used to place those new species in context of their evolutionary history on the phylogenic tree.

The genomic sequencing process is challenging, however. It consists of multiple steps, each with alternative ways of accomplish the same task. The principal objective is to determine the optimal way of accomplishing each and every step and therefore maximize the overall efficiency. While progress has been made and now we are able to obtain sequences from 60% of strains, further improvements are necessary. Our goal is to obtain a good DNA sequence from 90% of the new nematode species collected.

Student Researcher: Virginia L. King
Sponsoring Department: Biology
Research Mentor(s): Dr. Deborah O'Dell
Project Title: Effects of Bisphenol A on Wnt Gene Expression in Developing Rats

The two cell signaling pathways which regulate the development of both the nervous systems and the reproductive systems in vertebrates are the Wnt pathway and the estrogen pathway. Aberrant expression of certain Wnt proteins has been linked to cancers of the reproductive systems in males and females. The Wnt pathway has been demonstrated to interact with the estrogen pathway, indicating that stimulation of the estrogen pathways can change the transcription of Wnt proteins. Bisphenol A (BPA) is a xenoestrogen which interacts with the estrogen receptors, and has been linked to abnormal development and cancers of the reproductive systems. We examined whether the Wnt pathways could be affected by exposure to BPA during development. The experimental group consisted of neonates (n=23, male=10, female = 13) from mothers fed BPA (100 mcg/L) in the drinking water throughout their gestation. The control group consisted of neonates from females which were not exposed to BPA (n=26, male = 11and female=13). Brains, gonads

and reproductive tracts were dissected, pooled by sex, and divided into two samples. One sample was analyzed for levels of Wnt7a and Wnt 5a, and the other sample was analyzed for levels of BPA. The tissues for Wnt analysis were homogenized and levels of Wnt7a and Wnt5a were measured using a Sandwich ELISA. The tissues for BPA analysis were frozen, and manually ground in methanol before extraction with dichloromethane/methanol. The samples were evaporated and resuspended in methanol/hexane before separation on a SEP-Pak NH2 column. The BPA was desorbed with methanol, and evaporated to dryness before re-suspension in methanol. Levels of BPA were then measured using HPLC. The results were analyzed and are presented.

Student Researchers: Susanna N. Kirschner, Jenna C. Stockton and Teresa E. Fenn
Major: Environmental Sciences
Research Mentor(s): Dr. Melanie Szulczewski
Project Title: Fractionation of Metal Contaminants in Acid Mine Drainage-Impacted Soil and the Effects on the Surrounding Ecosystem

Anthropogenic activity can adversely affect an environment even long after the harmful activity has ceased. Contrary Creek is an 8-km stream located in Louisa County, Virginia, and the site of a few abandoned pyrite mines that closed almost a century ago. The surrounding ecosystem is still exhibiting strong signs of acid mine drainage (AMD) impacts as a result of the mining operations and leftover waste piles. After three years of studying several parts of this ecosystem, it is clear that AMD continues to affect the soil, water, and the area as a whole with very little improvement despite past attempts of remediation. Streamwater, sediment, soil, and vegetation samples were collected from sites that extend upstream and downstream along Contrary Creek as well as at an abandoned mine shaft about 50 m away from the creek. The samples were analyzed for trace metals, pH, and other factors. The soil, sediment, and vegetation samples were acid digested to determine total metal content. A sequential extraction was also performed on the soil and sediment samples to differentiate the distribution of metals. Although the pyrite mines closed in the 1920s, pH values in the soil, water, and sediments are still very low and total and soluble trace metal concentrations are often above acceptable limits for a healthy ecosystem. High bioavailable concentrations do not always correspond with high total metal concentrations, but they do show correlations with certain ecosystem effects.

Student Researcher: Taylor L. Knight
Major: Economics
Research Mentor(s): Dr. Steven Greenlaw and Dr. Margaret Ray
Project Title: Money, the Way to a High School Diploma

This paper examines the affect of income and unemployment on educational attainment in the United States. The author compares how disadvantaged families' education achievement compares with those of more affluent members of society. She does this though looking at how their income and the county unemployment rates affect their educational attainment. The results showed that her hypothesis was wrong, but the author concluded that the results were inconclusive because she was not convinced that her data was adequate for what she was attempting to test. The author believed that it was necessary to do more research to see if her original conclusion was correct or if there was more persuasive data proved her hypothesis correct.

Student Researcher: Sebastian Langenberg
Major: Classics
Research Mentor(s): Dr. Liane Houghtalin
Project Title: Plutarch's Perceived Leadership of Pericles, as Read in the *Pericles*

Plutarch wrote to teach virtues to his readers and to teach how to lead a good and happy life. But what does he say about leadership in the *Pericles*? By writing his biography of the great Athenian, Plutarch presents an

argument about how he believed Pericles performed as a leader as well as a moral agent. Furthermore, he indicates that the reader should emulate this portrait of Periclean leadership and moral agency. Key methods of leadership that Plutarch describes Pericles as using are how he set up his career, his use of ostracism, his control of the mob, and specifically how he used the fear of war to dispel personal attacks.

Student Researchers: William K. Langston, David Maguire and Raihana Sherdil
Major: Chemistry
Research Mentor(s): Dr. Leanna Giancarlo
Project Title: Kinetic and Thermodynamic Investigation of Binding between Lysozyme and Eosin-Y

Protein-ligand binding is a ubiquitous chemical reaction in biological systems. Diverse processes such as enzyme catalysis and oxygen transportation in blood are governed by protein-ligand binding. The protein and ligand, hen's egg white lysozyme (HEWL) and Eosin-Y, will be studied kinetically and thermodynamically using fluorescence spectroscopy. In the absence of Eosin-Y, HEWL exhibits strong fluorescence emission. Eosin-Y complexes with HEWL and through Resonant Energy Transfer reduces the intensity of HEWL fluorescence emission. Fluorescence data are obtained at different temperatures (5-35 oC) for solutions with constant HEWL (3 μM) and varied Eosin-Y (0-100 μM). These data are used to evaluate the reaction kinetically by determining the dissociation constant, KD. This kinetics determination provides information on the extent to which Eosin-Y binds to lysozyme in aqueous solution. Using the Arrhenius equation, thermodynamic parameters such as the free energy (ΔG), enthalpy (ΔH) and entropy (ΔS) of the reaction are determined. These thermodynamic data provide insight into the energetic barriers of Eosin-Y and HEWL binding. Previous work has determined KD, ΔG, ΔH and ΔS to be 28.25 μmol L-1, -26.04 kJ mol-1, -4.07 kJ mol-1 and 73.94 J mol-1 K-1.1 The empirically determined kinetic and thermodynamic parameters are discussed relative to these literature values.

References

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Student Researcher: Isabelle J. Malouf
Major: Biology
Research Mentor(s): Dr. Janet Asper
Project Title: Plasticizers, helpful or harmful?

Plastic can be found everywhere and now so are plasticizers. Plasticizers, which consist of a class of chemicals called phthalates, have become almost as ubiquitous as plastic due to their ability to soften harder plastics such as polyvinylchloride and make them more flexible. However, recently research has connected several plasticizers as having endocrine disrupting effects, which interfere with certain hormonal pathways. Legislation has even been put in place in hopes to regulate certain plasticizer's potentially harmful effects. Plasticizers can behave as endocrine disrupters in a variety of ways, some act on hormone receptors blocking the active site of hormones produced in the body. Others can disrupt hormone signaling pathways, which can lead to a variety of medical ailments. However, the legitimacy of these claims is often criticized by citing the high concentration of phthalates used in studies as being unrealistic in comparison to real-life exposure as well as not differentiating between high molecular weight and low molecular weight phthalates. For my presentation I will attempt to provide some clarity in the debate over plasticizers as endocrine disruptors by exploring the scientific evidence behind claims on either side of the debate.

Student Researcher: Patrick Marek
Major: Economics

Research Mentor(s): Dr. Steven Greenlaw
Project Title: Behavior of Modern Unemployment: A Disaggregated Analysis of the Growing Disparity between Output Growth and Employment Growth

My study's aim is to compare the behavior of unemployment since 1990 to its long run, post-World War II, trend in relation to output growth. Building off previous research, I link Okun's Law to the output identity to explain why unemployment is taking increasingly longer periods of time to recover from recession. Testing Okun's Law through regression analysis is done to determine if a significant change has occurred in recent business cycles. Going further I disaggregate the labor force, the employment rate, and by extension the unemployment rate, into five separate skill levels. The skill levels are operationally defined by educational attainment and age. Disaggregating the labor force allows for further analysis of Okun's Law as it pertains to the skill levels of the workforce population. The results produce some unpredicted outcomes, with the unemployment rate of college graduates being less responsive to changes in the output gap than the overall unemployment rate, while the unemployment rate of high school dropouts are more responsive to changes in the output gap. The data shows that the slow reduction in the unemployment rate, and as a consequence an elevated unemployment rate for a protracted period of time, is not due to a lack of aggregate demand in the labor markets but due to a lack of appropriately skilled labor being supplied.

Student Researcher: Shirley N. Martey
Major: Political Science
Research Mentor(s): Dr. Elizabeth Larus
Project Title: Thirty Year Plan for Efficient Use of Coal Energy in China

China's reliance on coal for its energy has created a whole host of problems economically. This presentation offers a workable solution of coal cleaning to aid in alleviating China's inefficient use of coal which is compromising economic growth and development as a result of china's extravagant coal consumption and production. coal is a very important resource to china's economy and is readily available to china whereas other natural resources such as oil is not. with the change of new leadership in china, there have been reports that the new vice chairMAN of the National development reform commission (NDRC), vice chairman liu he, may be the catalyst for the policy change needed in order for the NDRC to get away from interest-based policy to planned policy for the good of china. the NDRC is the sector of china that is in charge of energy policy as well as the chinese economy. in this presentation, i will propose a 30 year plan in which china's leadership will begin to improve policy to apply clean coal technologies. phase 1 is "reForming and Planning, " Phase 2 is "Construction of New Technology Facilities," and Phase 3 is "Funding". the key to improve energy efficiency is government support. china has a strong opportunity to take meaningful steps toward improving energy policy to continue to maximize economic industrial growth in future years.

Student Researcher: Sarah R. Marzec
Major: Biology
Research Mentor(s): Dr. Theresa Grana
Project Title: Free-living Soil Nematode Population Dynamics at an *Asimina tiloba* site in Virginia

Nematodes are microscopic roundworms that are highly successful in many environments. The model organism *Caenorhabditis elegans* is specifically a free-living nematode which can be found in soil but has been mostly isolated from anthropogenic habitats. Thus little is known about the environmental factors that affect *C. elegans* and where it is proliferate in nature. Information on ecological factors affecting *C. elegans* and other *Caenorhabditis* species will be useful in identifying selective pressures that can influence genomic changes. The goals of this study are to find *C. elegans* and other *Caenorhabditis* species and shed light on relationships between the ecological factors and proliferating populations of nematodes. An *Asimina tiloba* (paw paw tree) site provides a natural Virginian habitat with a food source for *Caenorhabditis* species. This site is sampled

every two weeks and any relevant ecological factors are recorded for the duration of a year. Nematodes are isolated from each soil sample and are separated based on morphology. The life stages of the nematodes from each sample are recorded and then the nematodes are sequenced for species identification. At present, four samples have been collected and several strains of nematodes have been isolated among and within the samples. All nematodes have shown to be in the dauer life-stage, a non-feeding migratory stage, showing that there are no established colonies. This is most likely due to the cold weather and we expect future results taken between the months of May through October to show proliferating populations.

Student Researchers: Kelsey B. Matthews, Kendall Simonpietri and Josephine Appiah
Major: History
Research Mentor(s): Dr. Jess Rigelhaupt
Project Title: Oral History Interviews of the World War II Homefront: Archived and Analyzed

When thinking about World War II, there are many iconic images associated with the War. One of these symbols is Rosie the Riveter, which served as inspiration for this project. Our idea was to explore the popular conceptions of the home front during World War II and to examine how people who experienced the War conceptualized their experiences. The resulting product is a website at <rosietheriveter.umw.edu> consisting of 25 oral history interviews, 5 short documentaries, and other resources relating to World War II.

The papers presented will focus on the analysis involved after an oral history interview, as well as the process, archiving, and creating short documentaries from multiple interviews. Each paper presentation will last roughly 10 minutes, for a total of 30 minutes, in addition to a 5 minute documentary showing. These papers explore the role of gender, home life, and differing narrative style of the interviewees and seek to explain the results of the oral history taken.

Student Researcher: Luke M. Mendelsohn
Major: Economics
Research Mentor(s): Dr. Steve Greenlaw and Dr. Margaret Ray
Project Title: How Economies Recover: A Closer Look at the Role of Federal Funds Rate in Influencing Economic Recoveries

What effect does the federal funds rate have on economic recovery times? The answer that I propose is that the federal funds rate does not have a significant impact on economic recovery times. Previous research that specifically looked at the federal funds rate, state that lowering the federal funds rate has a short term relatively quick effect of boosting a firms output and therefore decreasing economic recovery time. My argument is that time lags in federal funds rate effectiveness prevent the quick and effective result others have predicted. Previous monetary research has focused on the monetary base or money supply. This is not as indicative of how monetary policy is enacted as looking primarily at interest rate policies. Therefore I look at how the federal funds rate impacts the output gap, or in other words how the federal funds rate influences economic recovery time. In order to test my hypothesis I ran an ordinary least squares regression based on the IS-MP model. A major assumption that I prove is that the federal funds rate does not have an immediate impact on an economic recovery.

Student Researcher: Matthew Meyer
Major: Classics
Research Mentor(s): Dr. Liane Houghtalin
Project Title: The Emperor Who Never Was: Flavius Aetius

The Western Roman Empire faced dissolution in the first quarter of the 5th century AD. The control of the center was slipping away, and Gaul, Britain, and Spain all seemed poised to slide out of Rome's reach forever. While the Empire would in fact crumble before the start of the 6th century, the efforts of one man briefly

stabilized it. Flavius Aetius, born around 396 AD, the son of a mid-ranking legionary and aristocratic Italian mother, would eventually scheme, intrigue, and conquer his way into commanding all of Rome's forces and would temporarily restore the Western Empire. Furthermore, he saved the West from Hunnic conquest by turning Attila back at the Battle of the Catalaunian Fields in 451 AD. Rome had a well-established pattern of a great general staging a coup to save the Empire in a time of crisis. Yet, despite being eminently qualified for the purple due to his military genius and unique ability to understand the various barbarian tribes roaming across the West, Aetius never made a move to take the throne and was assassinated by the emperor who feared such a ploy. By exploring Aetius' life, this presentation will examine how some of the causes of Aetius' success also explain why he died an underling rather than an emperor.

Student Researcher: Kate L. Miceli
Major: Political Science
Research Mentor(s): Dr. Rosalyn Cooperman
Project Title: The Role of Republican Women Senators in the 112th Senate

Despite the growing interest in research about American women's role in politics, there has been little attention paid to the influence of Republican women. Voters tend to generalize Republican women as liberal on social issues, especially issues relating to women, because there is little research on Republican women and their voting patterns. This study analyzes the legislative behavior on women's issues of five Republican women in the 112th Senate. For this study, the senator's legislative behavior was defined as their bill and resolution sponsorship and co-sponsorship, floor speeches and committee assignments. The main findings of the study concluded that three of the five senators were more likely to have a progressive stance on women's issues while two were more likely to have a conservative stance. Adding to the big picture, a slight shift to the right on women's issues is apparent among the junior Republican women in the Senate while the senior members are more progressive or centrist. This research adds to a growing body of work being completed as more women from both sides of the aisles are being elected to higher public office.

Student Researcher: Russell D. Michelson
Major: Communication
Research Mentor(s): Dr. Esther Yook
Project Title: Communication Center Consultation Methods

I will be discussing methods for effective communication center consultations, including practicing with the feedback given, making the consultation more discussion-heavy, and making sure they leave knowing what to work on.

Student Researchers: Haley Miles-McLean, Caitlin Robertson, Charlotte Hagerman, Michelle Gnoleba and Leanna Papp
Major: Psychology
Research Mentor(s): Dr. Dr. Miriam Liss and Dr. Mindy Erchull
Project Title: Conceptualizing Objectification as a Source of Insidious Trauma

Interpersonal experiences of sexism and sexual objectification are known to lead to negative outcomes such as depression and anxiety (Fischer & Bolton Holz, 2007; Kozee et al., 2008; Moradi & Funderburk, 2006). Previous research has suggested that objectification can be viewed within the framework of insidious trauma (Erchull et al., 2012), a concept that proposes the development of trauma symptoms as a result of lifetime discrimination (Owen, Tao, & Rodolfa, 2010; Root, 1992). Whether or not experiences of sexism, interpersonal sexual objectification, and self-objectification specifically produce trauma symptoms has not been investigated. Our research sought to explore the relationships among these variables.

In the current investigation, women completed an online survey measuring trauma history, objectification experiences, sexism, and mental health. Of these women 40% reported a history of sexual trauma, while 60% did not. The sample was diverse with approximately 50% being Caucasian.

In order to explore the interrelationships among the measured variables we developed and tested a path model. The model had good fit for both the traumatized and non-traumatized samples. We found that experiences of sexist events and unwanted sexual advances, an aspect of sexual objectification, led directly to trauma symptoms. Interpersonal experiences of sexual objectification also led indirectly to trauma symptoms through the mediators body surveillance and body shame. Both sexual objectification and sexist events led to anxiety and depression indirectly through trauma symptoms.

Our data support the conceptualization of interpersonal experiences of sexual objectification as forms of insidious trauma or microaggression. Objectification is known to be negative and our data suggest it may be more traumatic than previously believed. Researchers may benefit from conceptualizing the consequences of objectification through an understanding of trauma. Furthermore, clinicians may utilize this understanding to offer relevant treatments and interventions.

Student Researchers: Hannah J. Mills and Erin N. Keener
Major: Psychology
Research Mentor(s): Dr. Chris McBride
Project Title: The Effect of Stress on Children's Eating Behavior

Research has shown that different types of stressors may have different effects on the manifestation of stress eating in children. For this study, children were put under both a cognitive and social stressor, as well as in a control condition, and were given food after each task. Heart rates were recorded before, during, and after the task, and during eating. The amount of food eaten was recorded for each session. Children were asked to fill out an eating behavior questionnaire, with three subscales of external, emotional, and restrained eating. Both tasks were hypothesized to increase heart rate and induce stress. It was expected that emotional and restrained eaters would eat more, with no difference in the external eaters. Results showed that the social stressor produced greater increases in heart rate than both the cognitive stressor and the control. Because the cognitive stressor did not cause as much stress, further results focus on only the social stressor, which was perceived to be the most threatening, anxiety provoking, and stressful. Overall, children ate more during the control than during the social stressor, and did not eat more depending on whether or not they were external, emotional, or restrained eaters. It is possible that there were no significant differences between types of eaters because children cannot acknowledge the influence of external stimuli, they had more feelings of boredom than negative emotions, and/or the presence of the experimenters in the room caused them to eat less.

Student Researchers: James Moore, Nick Eghtessad and Christina Gaul
Major: Sociology
Research Mentor(s): Dr. Nora Kim
Project Title: Campus Racial Climate at University of Mary Washington: Interacting with Professors

We surveyed Mary Washington students to explore how they perceive the campus racial climate of Mary Washington. Students are asked to evaluate their interactions with faculty members to explore whether race plays a role in determining the nature of the interactions.

Student Researcher: Chelsea L. Neal
Major: Art History
Research Mentor(s): Dr. Marjorie Och

Project Title: Renaissance Self-Fashioning and the Antiquities Collection of Isabella d'Este

For the Renaissance elite, arguably the most effective form of propaganda was the studiolo, or the study. Originally intended as a space for private contemplation and retreat from the outside world, the studiolo had, by the early modern period, taken on a much more significant political role. The decoration and the objects chosen for display in these spaces were thought of as a reflection of the owner's cultural tastes and moral values, and studioli therefore became spaces dedicated to self-promotion through the blending of splendor and statecraft. One of most unique examples of this type of propaganda occurs in the studiolo of Isabella d'Este, the Marchesa of Mantua. Although she was not the first woman to set aside a private study for her own use, she was first to employ the studiolo as an integral part of her own program of self-fashioning and to include in that program types of art that had previously been the prerogative of male patrons: namely mythological paintings and Greco-Roman antiquities. Isabella's collection served as a reflection of the dual role she played within the Mantuan court, innovatively designed to promote her capabilities as a ruler while at the same time working to ensure that she remained within the prescribed social boundaries of the Renaissance court lady. While the mythological paintings in the Marchesa's collection have long been a subject of careful analysis, this project will highlight her collection of Greco-Roman antiquities and examine the part these precious objects played in defining Isabella's role within the court.

Student Researcher: Laura Nelson
Major: Physics
Research Mentor(s): Dr. Hai Nguyen
Project Title: Lunar Spectroscopic Experiments

Experimental activities in the undergraduate physics curriculum often suffer from a lack of connection with the courses they are designed to support. This project applies the underlying physical principles to a set of experiments in atomic spectroscopy based on a commercially available discharge tubes and spectrometers to astronomical spectroscopy. The experiments take students through several important topics including atomic spectroscopy of commonly used elements in first year undergraduate physics courses (H, He, Ne, Hg, and Kr). In a subsequent experiments, the optical fiber from the spectrometer connects to a reflector telescope. The spectrum of sunlight reflected off the moon can be recorded with this set-up and compared to a direct sunlight spectrum sample from another day. Teaching methodologies and experimental expectations from the moon absorption will be presented. This project provides a recipe for easy integration of atomic spectroscopy into existing courses throughout undergraduate curriculum from University Physics and Astronomy to Quantum Mechanics.

Student Researcher: Michael P. Nolan
Major: Art History
Research Mentor(s): Dr. Joseph Dreiss
Project Title: Napoleon Bonaparte and the Art of an Empire

On the subject of Napoléon Bonaparte and his effect on art in France, the famous nineteenth-century French Romantic painter Eugène Delacroix wrote in his journal in the year 1824, "The life of Napoléon is our century's epic for all the arts." Perhaps no single artist, painter, sculptor, architect, or craftsman had a bigger effect on art and architecture in late eighteenth-century and early nineteenth-century France than the Corsican born soldier who rose to become the leader of the First French Empire, Napoléon Bonaparte. My paper investigates Napoléon Bonaparte's influence on art and architecture in Paris during his over 14 year reign as leader of the First French Empire.

Student Researcher: Jacqueline H. Nova
Major: Geography

Research Mentor(s): Dr. Brian Rizzo
Project Title: The Geospatial Analysis of the Marcellus Shale and Utica Shale Subsurface Geological Formations

The U.S. Geological Survey (USGS) has been researching the potential of geological storage of carbon dioxide (CO2) within depleted oil and gas reservoirs in the United States. This paper illustrates the subsurface temperatures of the geological formations of Marcellus Shale and Utica Shale. The subsurface temperatures of these geological formations were investigated in order to provide and improve upon the geospatial data used to evaluate the sequestration potential within western New York State. Data on Marcellus Shale and Utica Shale formation depths, bottom hole temperatures and locations were integrated into a Geographic Information System (GIS) to produce sufficient geospatial data that will be used to determine the potential of geological storage of carbon dioxide within these geological formations.

Student Researcher: Thomas Papeco
Sponsoring Program: UMW Speaking Center
Research Mentor(s): Dr. Esther Yook
Project Title: Overcoming the Theory-Practice Problem of Empowerment in Speaking Centers

The purpose of this article is to review and extend the issue of student empowerment originally addressed in the article entitled "The Communication Center: A Critical Site of Intervention for Student Empowerment" by Sandra Pensoneau-Conway and Nick Romerhausen (2012). Consultations can have educational benefits for students coming to communication centers, but the article overlooks the critical role that the consultant plays in a consultation. This paper will first extend the main arguments made in the Pensoneau-Conway and Romerhausen piece. The importance lies in the conclusion where the authors admit conditions may exist for empowerment for students, but communication centers do not necessarily result in empowerment for students. Theoretically, students can utilize the communication center for the sake of empowerment, but admittedly in practice this does not always result. In reading Pensoneau-Conway and Romerhausen against themselves, this paper will demonstrate how their article glaringly overlooks the role of the consultant in the communication center. In order for a consultation to have an empowering effect, it is necessary for consultants to reorient how they understand their role in the consultation. Bridging the theory-practice problem of empowerment in communication centers will require critical reflection and understanding consultations as mutual exchanges from the perspective of the consultant. Finally, this paper will also reveal how the experience of a consultation empowers not only the students coming to communication centers, but the consultants as well. This paper in no way claims to have a one-fix solution to the problem of student empowerment and communication centers' roles in that process, but any discussion on this topic without the perspective of the consultant has limited utility toward empowering students.

Student Researchers: Leanna Papp, Michelle Gnoleba, Charlotte Hagerman, Caitlin Robertson and Haley Miles-McLean
Major: Psychology
Research Mentor(s): Dr. Miriam Liss and Dr. Mindy Erchull
Project Title: Exploring the Sexual Double Standard through Slut-Shaming on Facebook

Research regarding the sexual double standard and slut-shaming has focused primarily on the expression and inhibition of female sexuality as it attempts to work within a society with a double standard. Research has found support for the sexual double standard (Clayton, 2007; Hamilton, 2009; Lai & Hynie, 2011; Marks, 2008; Milhausen & Herold, 2001; Ratter & Riccioli, 2009; Sakaluk & Milhausen, 2012). Propelling our use of a male "slut" target, some research suggests the existence of a reverse sexual double standard held by women (Milhausen & Herold, 1999; Milhausen & Herold, 2001; Sakaluk & Milhausen, 2012; Sprecher, McKinney, & Orbuch, 1991). The reverse sexual double standard was typically found while measuring social distancing,

suggesting that women do not want themselves or their friends dating a man who has had many partners. However, other studies have illustrated a lack of the double standard (Kelly & Bazzini, 2001; Marks & Fraley, 2005; Marks & Fraley, 2006; O'Sullivan, 1995).

For our study, male and female college students saw Facebook conversations involving a "slut" and "slut-shamer;" sex was varied for each role. Perceptions of "sluts" and "shamers" were assessed through measures evaluating person perception, social distancing, and assumed tone. Results show a reverse double standard with regard to the sex of the "slut." Male "sluts" were rated as less appealing and were evaluated more negatively than were female "sluts;" participants also desired greater social distance from male "sluts." In assessing the attitudes toward the "shamer," we found that the "shamer" was viewed more negatively if he or she was shaming a female "slut;" this finding was particularly prevalent if the condition was a female "slut" and a male "shamer." We also hope to share some finding from a qualitative analysis of open-ended responses about what participants believe that "shame" actually saw the "slut" do.

Student Researcher: Amanda Parker
Major: Geology
Research Mentor(s): Dr. Neal Tibert
Project Title: Paleoecological Succession of Reef and Lagoonal Deposits in the Dominican Republic Approaching the Middle Holocene Thermal Maximum

The southwestern region of the Dominican Republic contains well-preserved reef and lagoon deposits that have been the focus of numerous paleoclimatic studies. During the Early-to Middle Holocene, the Enriquillo Valley was an extension of the Caribbean Sea where a fringing coral reef thrived until alluvium deposits separated the lagoon from the sea creating the modern saline lake. Our objective herein is to use ostracodes and stable isotopes (δ18O, δ13C) to document the paleoecological succession of a stenohaline reef to oligohaline lagoon that was potentially forced by the northern migration of the Intertropical Convergence Zone (ITCZ) with increased northern hemispheric warmth during the Early-Middle Holocene time interval.

The stratigraphic section at Las Clavellinas comprises an upward fining sequence of alternating calcarenite and micrite that grades up-section into a thick grey mudstone. We observe three microfossil associations. Biofacies A is characterized by the stenohaline marine ostracode Bairdia victrix associated with a relatively rich foraminiferal assemblage. This facies is associated with Acropora cervicornis and Montastraea annularis corals accordingly. Biofacies B is characterized by the mesohaline ostracoda Loxoconcha fisheri in association with Loxoconcha levis(?) and the coral Acropora cervicornis. Biofacies C contains mesohaline Loxoconcha sp. and brackish Cyprideis salebrosa. The Acropora cervicornis coral bed pinches out laterally up-section into a clastic shell bed.

The paleoecological succession indicates a transition from dry/cool conditions in a marine lagoon that gave way to warm/wet conditions and increased freshening in the lagoon. These past climate reconstructions in the Dominican Republic provide another perspective into tropical climate evolution during development of the Middle Holocene Thermal Maximum and the impact on the ecology of marine reefs during this important time interval.

Student Researchers: Susanna Parmelee, Rebecca McGillicuddy, Krysha Snyder, Rob Tsyzka, Melissa Arrowsmith, Emily DelRoss and Betsy Caulfield
Major: Historic Preservation
Research Mentor(s): Dr. Andrea Livi Smith
Project Title: Bike|Ped|Fred, a Bicycle and Pedestrian Plan for the City of Fredericksburg

This spring, eleven Historic Preservation majors in the Laboratory in Preservation Planning class worked together to develop Bike|Ped|Fred, a bicycle and pedestrian plan for the city of Fredericksburg, Virginia. This plan assesses the current conditions of bicycle and pedestrian facilities in the city and suggests policy and design improvements to address insufficient areas. Students gathered objective data through the Pedestrian Environmental Data Scan (PEDS) and pedestrian counts, and charts and Geographic Information Systems (GIS) maps were produced to illustrate the results. This information was used to craft policy and design solutions that aim to improve safety, network completion, awareness, and placemaking (SNAP), the four priorities of the plan. These priorities respond to the plan's goals to complete the vision of Bike|Ped|Fred, which is to increase transportational and recreational bicycle and pedestrian activity for residents and students living in Fredericksburg, Virginia.

Student Researcher: Jessica L. Patterson
Major: Spanish
Research Mentor(s): Dr. Jose Sainz
Project Title: The Integration of Moroccans in Spain

My independent study focuses on the process of integration of Moroccans in Spain. In order to know whether they are well integrated or not I focus on three aspects. First I focus on any government policies and any organization that helps with the integration of immigrants. Second, through various case studies on Moroccans in Spain, I look to see whether Moroccans wants to integrate in to the Spanish culture and if so what are their difficulties. Lastly, I look at how Spaniards have reacted to Moroccans immigrants, by analyzing various newspaper articles.

Student Researcher: Chris F. Petroff
Major: Geology
Research Mentor(s): Dr. Neil Tibert
Project Title: Lower Cretaceous Nonmarine Ostracodes from the Cedar Mountain Formation, Utah

Lower Cretaceous nonmarine ostracodes serve as a basis for biostratigraphy and paleoenvironmental analysis in Western Europe yet they remain largely underutilized in North America. Utah's Cedar Mountain formation contains an exceptional fossil record of both vertebrates and invertebrates. The early Cretaceous dinosaur fossils are significant given the diversification of species at the Jurassic-Cretaceous boundary, though the age of the deposits in which they are located remain in question. Early ostracode studies in North America by Peck et al. (1941) and Sohn (1979) highlighted the potential for Lower Cretaceous biostratigraphic application of ostracodes in the Lakota Formation and Rocky Mountain Region. The purpose of this study is to illustrate the Lower Cretaceous ostracodes and charophytes from Cedar Mountain Formation deposits that are referred to as Lake Madison and Lake Carpenter. Our primary objective is to illustrate and identify well known Cyprideidae ostracodes that can be used to constrain the age and environment of dinosaur-bearing deposits. Our preliminary results indicate several species of ostracodes occur in stratigraphic succession that includes Cypridea setina (Anderson), Candona spp., Pontocypris (?) and previously unreported charophytes. Sames (2011) argued that the age of the Cedar Mountain Formation is Berriasian-Valanginian which is significantly older than the supporting biostratigraphic and radiometric dates reported in Kirkland and Madsen (2007). Our data reported herein indicate that Cypridea setina occurs in both the Poison Strip and Ruby Ranch Members that indicates that this long ranging taxon is likely not individually adequate to constrain the age of the Cedar Mountain Formation to the early Lower Cretaceous. The newly reported ostracode taxa herein may better able the ostracodes to serve as biostratigraphic markers.

Student Researchers: Emily C. Pineiro and Justin E. Sahs
Major: Biology
Research Mentor(s): Dr. Janet Asper

Project Title: How Polymer Chemistry Has Revolutionized Medicine Since WWII

Polymer science has been used vastly in the biomedical field since World War II. During that era polymers were being studied to a great extent. Due to this, it was discovered that polymethylmethacrylate (PMMA) was well suited to the human eye, which led to the idea of creating an artificial cornea using polymers. Eventually, these ideas led to a widespread movement to use polymer science in the medical field. Today, polymers are used in not only our everyday life but also in medicine. Common procedures such as heart valve insertions, vascular graphs, kidney dialysis, and hip replacements all use polymers as a necessity.

There are also many more medical uses for polymers such as drug delivery devices, catheters, and pacemakers. Polymers have opened up a lot of doors for the medical fields and it's patients. In the past, many medical procedures were expensive and unattainable for many people due to the price of materials. Now, due to the low cost and easy of manufacturing these polymers there are many cheaper options available for patients. To this day polymer research is still affecting the medical field. Recently a student at New York University developed Veti-gel, a polymer gel capable of stopping the blood flow of an open wound. If approved, this could revolutionize the military and save a lot of lives. Polymer science is a very important part of everyone's life and should continue to be studied.

Student Researcher: Jessica A. Queitzsch
Sponsoring Department: Biology
Research Mentor(s): Dr. Stephen Fuller
Project Title: Inducing germination/propagation in Mountain Laurel, Kalmia latifolia L.

Mountain Laurel, Kalmia latifolia, is a flowering shrub native to the Eastern United States. It thrives in acidic soil and shade, although during germination and propagation Kalmia latifolia enjoys constant sunlight. Mountain laurel is a popular landscaping plant but is difficult to cultivate in greenhouse and laboratory environments. This experiment attempts to propagate seeds and induce rooting in cuttings of Kalmia latifolia. Stem cuttings of Mountain Laurel plants, Kalmia latifolia L, failed to propagate in soil containing [1] 4 parts peat moss and 1 part perlite/ vermiculite , but appear to be successfully propagating in soils containing[2] 1 part potting soil, 1 part sand, 1 part peat moss, and 1 part perlite/vermiculite had 6 seedlings per tray, and [4] 1 part sand and 1 part peat moss. Seeds of Kalmia latifolia L appear to be successfully propagating in soil mixtures containing [1] 4 parts peat moss and 1 part perlite/ vermiculite, [2] 1 part potting soil, 1 part sand, 1 part peat moss, and 1 part perlite/vermiculite had 6 seedlings per tray, and [4] 1 part sand and 1 part peat moss , but not in soil [3] containing 1 part potting soil and 1 part peat moss. This would indicate that the best possible soil mixture for propagating Kalmia latifolia L changes depending on whether the plant is being propagated from seeds or stem cuttings.

Student Researcher: Chris Rieve
Major: Economics
Research Mentor(s): Drs. Robert Rycroft and Bill Lofquist, Professor of Sociology, SUNY-Geneseo
Project Title: Effects of State Welfare Spending on Violent Crime in the United States

This project looks at the problem of violent crime and what are the most effective ways states can combat this problem. Welfare spending is analyzed to see what effects that it has on the murder rate in different states. Welfare spending is compared to protection spending and education spending; these are analyzed and it is decided which is the most effective use of state spending. The institutional anomie theory of Messner and Rosenfeld is used to predict how changes in spending will affect the violent crime rate. A panel study is done for the years 2000-2004 for fifty United States, and a difference in differences model is used.

Student Researchers: Danny Ryer, Bryanne Salazar, Faye Haymond, Anna Jopich and Margaret Murphy

Major: English
Research Mentor(s): Dr. Warren Rochelle
Project Title: Stories and Storytellers: English 470B Fiction Seminar Students Read their Creative Work

The capstone course for English majors who are concentrating in creative writing is a senior seminar in either fiction, poetry, or creative nonfiction. For the students in the fiction seminar, their final project is to complete 30-50 pages of polished prose that can be a novella, 1 or 2 chapters from a novel, or 2 short stories. This is a semester-long project that requires intensive workshops, many revisions, conferences, and a final oral presentation. For many students this is the longest sustained piece of fiction they have written. They write in multiple genres, including mainstream literary fiction and science fiction or fantasy. Students in this panel will be reading excerpts from their class projects.

Student Researcher: Shelby Sanders
Major: Geology
Research Mentor(s): Dr. Neal Tibert
Project Title: Age and Paleo-environmental Significance of Upper Paleozoic Ostracodes from the Appalachian and Eastern Illinois Basins

The Greene Formation of the Dunkard Group is the youngest Paleozoic stratigraphic unit in the Appalachian Basin. Given the absence of marine fossils, the age assignment of these strata has been contentious, although plant fossils indicate a position at or near the Pennsylvanian-Permian boundary. The recent discovery of ostracodes from the GIL 30 core in western Kentucky (Illinois Basin), bearing non-marine Permian fossil associations, is of significance for regional comparisons. The objective of this study, therefore, is to compare the non-marine ostracodes assemblages from the Dunkard to those in the Kentucky core, the goal being accurate age determinations for these rocks.

The GIL 30 core was recovered from a down-faulted block located near Sturgis, KY and contains strata deposited during the latest Pennsylvanian and earliest Permian. The Pennsylvanian Mattoon formation comprises mostly siltstone and shale layers with a few layers of coal, marine fossils such as Lingula and other brachiopods are found, along with plant remains. The overlying Permian Mauzy Formation lacks coal and contains a much higher proportion of non-marine limestone than the Mattoon. A single marine zone yielded fusulinids, which indicate Early Permian age according to R.C. Douglass of the U.S. Geological Survey.

We observed three ostracodes assemblages in the GIL 30 core: (A) a marine assemblage dominated by Hollinella sp.; (B) a brackish assemblage dominated by Geisina sp., Cavellina nebrascensis, and Velatomorpha sp.; and (C) a freshwater assemblage dominated by Whipplella cuneiformis. The freshwater assemblage in the GIL 30 can be correlated with confidene to the uppermost units of the Greene Formation (e.g., Windy Gap Limestone) of the Dunkard Group in the stratotype area of northeastern West Virginia and southwestern Pennsylvania. These findings confirm an Early Permian age for at least the uppermost Dunkard Group strata.

Student Researcher: Emily Scheuer
Major: Spanish
Research Mentor(s): Dr. Ana Chichester
Project Title: Don Junípero and El Moro Muza: Anti-Independence As Shown In Pro-Spanish Media in the 1860s

Today, society has a general expectation that the press will be independent and unbiased, but during the turbulent decade of the1860s in Cuba, two well-known weekly newspapers, Don Junipero (1864-1869) and El Moro Muza (1861-1871) clearly took anti-independence stances against Cuba's fight to end Spain's colonial control over the island. Both Don Junipero and El Moro Muza showed pro-Spanish sentiments that, in the

case of Don Junipero, reflected the views of its publisher, Victor Patricio Landaluze. Landaluze was a Spanish-born painter from Bilbao and the cartoons that he drew for his paper and El Moro Muza, as well as those by other cartoonists published in the papers, clearly showed an anti-independence sentiment. In my presentation, I will give a brief history of Cuba's first war for independence, with a focus on the presence of Spaniards in Cuba and their perspective on Cuban independence. I will argue that Landaluze maintained the commonly held views of Spaniards living on the island and that each of the newspapers served as a mouthpiece to promote the continued colonial presence in Cuba.

Student Researchers: Rebekah Selbrede and Sally Brown
Sponsoring Program: HONR100B
Research Mentor(s): Dr. Leanna Giancarlo
Project Title: Mad, Bad and Eccentric Scientists at Mary Washington

There are all kinds of scientists in the world, some are good and some aren't. Some help cure horrific diseases for the sake of humanity while others cause chaos and destruction wherever they go. This presentation will be a display of the spectrum of scientists ranging from hero to pure evil with examples of everything in between. Each scientist has a defining action that they are known for and that determines where on the spectrum they fall, as well as which side of the "line" they land. There will be scientists who stay far away from the fabled line, as well as some who tip toe along the border, and even those who knowingly pole-vault over it into infamy.

Student Researchers: Grace Sey, David R. Elliott and Chad Hatch
Major: Chemistry
Research Mentor(s): Dr. Leanna Giancarlo
Project Title: The Solvolysis of 2-chloro-2-methylpropane: A Kinetic Study

Chemical kinetics is the study of reaction rates. The rate constants and activation energy, Ea, are determined from rate data. Using the activation energy, the Eyring parameters, $\Delta S\dagger$ and $\Delta H\dagger$ are then calculated. In this experiment, the rate of the solvolysis of 2-chloro-2-methylpropane is studied as a function of temperature and solvent composition. The reaction is performed at three different temperatures with a change in the solvent composition each time. Since there is the production of strong electrolytes from a mixture of non-electrolytes, there is an increase in conductivity as the reaction progresses. By measuring conductivity at many times, the rate constant and activation parameters can be determined. The rate constant for 15%, 20%, and 25% (v/v) ethanol and water mixture at 298K were determined to be 0.01112 s-1, 0.00424 s-1, 0.00022 s-1, respectively. Previous studies have shown the activation energy and the pre-exponential factor were 76 ± 3 kJ/mol and $(2.4 \pm 1.2) * 1011$ s-1 respectively.1 Eyring parameters are the thermodynamic quantities, $\Delta H\ddagger$ and $\Delta S\ddagger$, at the activation energy, which correspond to the enthalpy and entropy of activation respectively. The Eyring parameters were determined to be, 73 ± 3 kJ/mol and -35 ± 11J/mol K for $\Delta H\ddagger$ and $\Delta S\ddagger$, respectively (1).

1. Marzluff, Elaine M.; Crawford, Mary A. and Reynolds, Helen. "Study of the Kinetics of an SN1 Reaction by Conductivity Measurement". J.Chem.Educ. 2011, 88, 1586 – 1588.

Student Researchers: Jennifer Sherba, Andrew Moeller and Aisha Martin
Major: Sociology
Research Mentor(s): Dr. Nora Kim
Project Title: Campus Racial Climate at University of Mary Washington: Interacting with Administrators and Staff Members

We surveyed Mary Washington students to explore how they perceive the campus racial climate of Mary Washington. Students are asked to evaluate their interactions with administrators and staff members to explore whether race plays a role in determining the nature of the interactions.

Student Researchers: Matt Spaulding, Sam Clark and July Laszakovits
Sponsoring Program: HONR100B
Research Mentor(s): Dr. Leanna Giancarlo
Project Title: Why's Really Behind the Lab Coat?

In this documentary we focus on disproving the stereotypes of scientists. The documentary opens with videos of students creating the images that come to mind when they complete the sentence: "When I think of a scientist, I think of…" in light of Margaret Mead's 1957 study. Interviews of real life scientists, specifically the University of Mary Washington's science professors, will include questions about their discipline, research, classes, media portrayals, and hobbies. This will also include footage of the professor doing research in lab and teaching their classes. Common images of the scientist will be evaluated by discussions of the scientists interviewed think of when they imagine a scientist and their literal images.

Student Researchers: Orlando C. Stewart, Jr. and Anisa Kaur
Major: Chemistry
Research Mentor(s): Dr. Janet Asper
Project Title: The Wonders of Superabsorbent Polymers

Superabsorbent polymers (SAP) are employed in a variety of products that we use in our everyday lives. From diapers to potting soil, SAPs have taken the commercial world by storm. They are inexpensive both on the market and in production. The most common SAPs are produced by a radical polymerization of neutralized acrylic acid which has been introduced to a cross-linker. Once the SAPs have been polymerized, polar water molecules can then be attracted to the ionic centers of the polymer and thus readily absorbed into it. Due to the cross-linkage of the polymer, limits can be placed on the amount of water molecules that can be absorbed. However, water is not the only type of substance that SAPs can absorb. In addition to the hydrophilic polymers that absorb water, a class of hydrophobic polymers exist that bond to hydrocarbon chains, such as those found in oil.

For our presentation two demonstrations will be performed. The first will be a demonstration of the "diaper polymer," sodium polyacrylate. Using a Pampers baby diaper, a large amount of water will be added to demonstrate the swelling power of the hydrophilic SAP. In addition, we will show the effect of adding salt to the polymer after it has absorbed the water. The second demonstration will be one that demonstrates the absorbing power of hydrophobic SAPs. Using Enviro-Bond 403 and Mystery Marvel Oil, and water, the audience will witness the polymer's ability to separate oil from water. We hope to express how SAPs have become a great resource in everyday life and how they may change life in the future.

Student Researcher: Kathryn Stiltz
Major: Classics
Research Mentor(s): Dr. Liane Houghtalin
Project Title: The Mystery of the Cult Statue of Artemis at Ephesus

The cult statue of Artemis at Ephesus (modern Turkey) has puzzled scholars for years. The original Greek statue, studied primarily through its Roman copies, has a "multi-breasted" appearance that is quite different from typical Greco-Roman statues. Several hypotheses have emerged to explain the statue's unusual appearance. The most popular of these explanations is the thought that the nodules adorning her chest are actually breasts. Another popular explanation is that the nodules are bull testes. Both of these explanations arose from the close connection between Artemis Ephesia and the fertility goddess Cybele, whose origins lay

in Anatolia. Yet a third popular explanation is that the protrusions from her chest are merely an Anatolian clothing motif. This presentation will affirm Artemis' appearance as developing from a clothing motif that evolved and was misinterpreted over the years as multiple breasts.

Student Researcher: Andrew Thomas
Major: Economics
Research Mentor(s): Dr. Robert Rycroft
Project Title: North Dakota and the Effects of the Oil Boom

North Dakota is currently experiencing a boom in its oil industry. This boom is having a large effect on North Dakota. For social problems to economic expansion, the oil boom is reshaping the North Dakota landscape, both figuratively and physically. The presentation will go over how the oil boom is changing North Dakota. The benefits and problems of the oil boom will be gone over. The presentation will also go over the public reaction of North Dakotans towards the oil industry. Newspaper articles will be presented to show exactly how North Dakotans are reacting.

Student Researcher: Aissata Traore
Major: Women's and Gender Studies
Research Mentor(s): Dr. Kristin Marsh
Project Title: Women's Experiences in the American Legal Field

This study centers on the experiences of female attorneys in the American legal field. Through ten semi-structured interviews conducted in the Fredericksburg and D.C. area, this project seeks to discern the way issues of professional attainment and work-life balance manifest themselves in female attorney's careers. The presentation will center on a brief review of the literature surrounding women in the workplace, work-life balance, and female attorneys, followed by a presentation of the study findings.

Student Researcher: Katherine E. Vanderpool
Major: Chemistry
Research Mentor(s): Dr. Janet Asper
Project Title: Imbiber beads- A clean environmentally friendly absorbent polymer

Imbiber beads are a commercially available oil absorbing polymer. The polymer has been designed to have an affinity for hydrocarbon compounds and is used as an absorbent to remove hydrocarbons. INTECH RESEARCH & DEVELOPMENT1 claims that pre-soaking the imbiber beads in hexane greatly increases their ability to soak up oil. Therefore, the aim of the project is to quantify their claim. Pre-soaked beads and dry beads were tested for their absorbance and the dry beads had negligible absorbance when oil was added. Two methods for oil absorbance were tested: the beads were presoaked and oil was added to the beads or beads were added to oil. Initial data shows that pre-soaked beads added to motor oil works the best, with the pre-soaked beads absorbing eight times their weight in oil. Future work includes varying the solvent and using a microscope to determine the bead diameter before and after oil absorbance.

Student Researchers: Jesse B. Vanous, Claire Growney and Melissa Peters
Major: Psychology
Research Mentor(s): Dr. Hilary Stebbins
Project Title: The Effect of Arousing Emotional Facial Expressions on the Positivity Bias in Older Adults

Findings from previous behavioral studies suggest an increased preference for positive over negative stimuli among elderly adults that is not present among young adults. This positivity bias is known to be a controlled, resource-demanding process that can be mediated by levels of arousal of emotional stimuli used. The purpose of this study is to investigate the role of arousal in the positivity bias using low and high arousal emotional faces. Young and old participants will complete a spatial cuing task to measure the attentional

processing of happy, sad, fearful, and neutral faces that are classified as either high or low arousal. We hypothesize that the positivity bias will occur only for elderly participants in low-arousal conditions. These findings could further clarify the extent of the positivity bias in aging participants.

Student Researchers: Hannah Walker, Virginia L. King and Alexa Faraone
Major: Sociology
Research Mentor(s): Dr. Nora Kim
Project Title: Campus Racial Climate at University of Mary Washington: Choosing Mary Washington

We surveyed Mary Washington students to explore how they perceive the campus racial climate of Mary Washington. Students are asked to evaluate to what extent race is a factor in terms of their decision to come to and stay at Mary Washington.

Student Researcher: Margaret F. Walker
Major: Biology
Research Mentor(s): Dr. Alan Griffith
Project Title: Effects of dam removal on riparian vegetation abundance, distribution, and biodiversity

Dams only have a finite lifetime, and many must eventually be removed. Removal can change riparian areas in many ways, for example, pond levels can recede and soil can be uncovered. Two dams were removed in New Kent County, Virginia on a tributary of the Pamunkey River. After dam removal, species were planted in the area to help counteract the increase of growth of invasive species. Invasive species can thrive in this area because of the amount of nutrient rich soil, which has been uncovered. Percent cover data of species present was collected before and after dam removal. The data were collected along 6 transects throughout the pond area. On the transects ever 5 meters, 1 m2 quadrats were used to sample the vegetation. Several known invasive species were found in the area prior to dam removal. Microstegium vimineum and Murdannia keisak are the two known invasive species in the area. After dam removal M. keisak was found in wetter quadrats and was more abundant than M. vimineum, which was found in drier quadrats. Planted species dominated above the upper dam while invasive species dominated below the upper dam. In fall data collections, percent cover of invasive species decreased overall after dam removal. Biodiversity was higher downstream before dam removal, but was higher after dam removal upstream.

Student Researcher: Jessica N. White
Major: Computer Science
Research Mentor(s): Dr. Stephen Davies
Project Title: A Computational Simulation to Study the Factors Impacting a College Student Body's Racial Diversity

Despite many efforts to attract a more racially diverse population, UMW still maintains a vastly white student body. The perception of social estrangement (feeling isolated or disconnected from the larger population) is a key contributing factor to the attrition rate for minority college students. We have created a computational simulation of student interactions at UMW which enables us to observe any emergent macroscopic patterns that may arise from a large group of individuals behaving in psychologically predisposed ways. By altering certain policies (for example, how students are assigned to orientation groups), we can observe if these policy changes have an effect on how connected a student feels. If a policy change results in students feeling less alienated in the simulation, then the same policy could potentially be implemented in real life to reduce attrition rates.

Student Researcher: Kristine S. Woeckener

Major: Art History and Spanish
Research Mentor(s): Dr. Marjorie Och
Project Title: The Influence of Titian and Rubens on the Equestrian Portraits of Velázquez

This project is exploring the influence that Titian and Rubens may have had upon the style and career Diego Velazquez, court painter to Philip IV of Spain. My research is focused on the equestrian portraits of Velázquez and his symbolic representation of power and authority through his depiction of the horse. Of particular interest are the paintings of the royal family of Philip IV, consisting of Equestrian Portrait of King Philip IV of Spain (1635-1636), Equestrian Portrait of Queen Isabella of France (1635-1636), and Equestrian Portrait of Prince Baltasar Carlos (1635-1636). I am exploring the realistic portrayal of the horses as opposed to the often stylized equines shown by other artists of the era. The portraits were intended to promote the idea of the king's power, and I am looking at the relationship between Philip IV and Velázquez and how this influenced the artist's style. The painting of Philip was intended as an invocation of the past glory of Spain. I am comparing and contrasting his works with those of the painters Titian and Rubens and attempting to discern what force these artists' styles exerted over Velázquez's own portrayals. Specifically, Titian's The Emperor Charles V at Mulhberg (1548) and Rubens's Philip IV of Spain on Horseback (1628) would have been known to Velázquez before he executed his own equestrian portraits of the 1630s and may have played a role in the choices Velázquez made in his own works. Since the latter painting has been lost, I have included The Cardinal-Infante Fernando of Austria in the Battle of Nordlingen (ca. 1634-1640) by Rubens in my analysis and supplemented it with a copy of the lost 1628 painting by Rubens, made circa 1645, in his style.

Student Researcher: Frank Womble
Major: Biology
Research Mentor(s): Dr. Janet Asper
Project Title: How Polymer Chemistry Makes Us Safer

Polymers let police and firefithers do their jobs safely and help protect athletes from injury. But polymer chemistry isn't just important for athletic equiptment, firemens' suits and bullet proof vests - polymers make cars lighter and safer, help medical devices work better and protect the enviornment from hazardous chemicals. This presentation will demonstrate the life saving properties of polymers, showcasing basic polymer chemistry in several common applications, as well as more novel, cutting edge technologies.

Student Researcher: Thikiri L. Yee
Major: Chemistry
Research Mentor(s): Dr. Janet Asper
Project Title: A Greener Earth: The Latest Advancements in Green Polymer Chemistry

Recently, an international conference held in Germany by a plastic production company focused on the recent developments in green polymer chemistry. Because synthetic polymers have become extensively incorporated in to everyday usage, from grocery bags to plasma TV screens, scientists have been trying to find ways to reduce the harmful environmental effects that polymer build-up could cause. For instance, BASF has now manufactured biodegradable plastic bags (Ecovio and Ecoflex) that will have numerous benefits for the environment in terms of health, space and cost. There is also research in finding ways to convert biosynthetic properties to those of synthetic polymers. Increasing awareness and educating people on the simple things that can be done to make the environment greener will slow down the rate and degree of environmental pollution.

Acknowledgement

Funding for this program has been generously provided by the Class of 1959 Endowment. The endowment was established in 2009 to express appreciation for the education, personal growth and enjoyment of Mary Washington's unique environment that was provided to members of the Class of 1959. The endowment supports activities such as the Research and Creativity Day Symposium, conferences or seminars that focus on research or improving instructional methods at the University of Mary Washington.

The Council on Undergraduate Research hosts a Registry of Undergraduate Researchers. The purpose of this registry is to facilitate matchmaking between undergraduates who have research experience and a desire to pursue an advanced degree, with graduate schools seeking high quality students who are well prepared for research. The Registry is open to students and graduate schools in the fields of Anthropology/Archaeology, Arts/Humanities, Biology/Biochemistry, Business, Chemistry/Biochemistry, Economics, Education, Engineering, English and Linguistics, Environmental Studies, Geosciences, Health Professions, History, Journalism and Communications, Mathematics/Computer Science, Physics/ Astronomy, Political Science, Psychology, Social Work and Sociology.

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