PROGRAM SCHEDULE WITH ABSTRACTS

APRIL 24, 2015
University of Mary Washington
Fredericksburg, Virginia

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

Schedule of Events

April 24, 2015

Researcher Registration and Poster Set-up

8:30 am - 9:30 am in the Information & Technology Convergence Center
(Check-in at Digital Auditorium; Poster Pick-up begins at 4:00 pm)

Oral Sessions	**10:00 am - 4:20 pm**
ITCC Classrooms 327, 328 & 329	
Original Dance Recital	**11:00 am**
Studio 4, Goolrick Hall Dance Suite	
Poster Sessions	**12:00– 1:00 pm**
ITCC Building Locations	*refreshments served for all*
Original Music Performances	**1:15 - 2:00 pm**
Digital Auditorium	
Additional Exhibits and Sessions	
Lee Hall (Psychology)	**10:00 am – 4:00 pm**
Phyllis Ridderhof Martin Gallery (Art History)	**1:00 – 3:00 pm**
Combs Hall (Modern Languages & Literatures)	**1:00 – 3:30 pm**
Trinkle Hall (Religion)	**3:00 – 5:00 pm**
Melchers Hall Studio open house	**10:00 am – 4:00 pm**
DuPont Gallery Annual Student Art Exhibit	**10:00 am – 4:00 pm**
Theatrical Performance	**7:00 pm**
Studio115 duPont Hall	

Session in Lee Hall

Psi Chi Research Symposium

10:00 – 4:00
Room 411

This year marks the 30th annual Psi Chi Research Symposium hosted by the Department of Psychology. Presentations will take place on Thursday, April 23rd and Friday, April 24th. Students present talks about the projects they completed as part of the independent study research teams or in their research seminars. They also present posters about the research completed as part of research methods. The keynote address will be delivered by Dr. Amy Van Arsdale, Assistant Professor of Psychology at Marymount University. She will present a talk entitled *Questioning, Creating, and Caring: Impacting Your Community at Every Level* at 4:00 pm Friday. The Psychology Department awards ceremony and reception immediately follows the conclusion of Dr. Van Arsdale's talk.

Thursday, April 23, 2015

8:40 *The Effect of Parenting Styles on an Emerging Adult's Ability to Detect Emotional Abuse* Tyler Holmes, Sophie Perkins, Kiersten Pyrtle, & Samantha Gross (Research Seminar Project, Dr. Mackintosh).

9:00 *To Tat or Not to Tat: Perceptions of Tattooed and Non- Tattooed Faces* Veronica Boyd, Charlotte Owens, Jocelyn Edwards, & Turner Sheehan**.** (492 Research, Dr. Steckler)

9:40-10:40 Poster Presentations

Self- Compassion, Perception of Body Attractiveness and Perceptions of Physical Conditioning Influencing Exercise Motivation Hanna Johnson, Madeline Brown, Michelle Lee, & Hannah Walker (Methods Project, Dr. Stebbins).

Effect of Self-affirmation and Reaffirmation on Problem Solving Carlee Budd, Shelba Durham, Alexis Robinson, & Samantha Varljen (Methods Project, Dr. Stebbins).

Red Cheeks are Sexy Cheeks Megan Blosser, Megan Luning, Sarah Etherton, & Michael Middleton (Methods Project, Dr. Stebbins).

How Social Anxiety and Communication through Technology Affect Level of Anxiety during Face to Face Communication Haley Breksin, Anastasia Sorenson, & Stephanie Ingram. (Methods Project, Dr. Stebbins).

The Effect of Color on Time Perception and Test Anxiety Kaitlin Habeeb, Jessica Rolaf, Victoria Hall, & Monica Farzyee (Methods Project, Dr. Stebbins).

The Effect of the Presence of a Cell Phone During Social Situations Brianna Costache, Michaela De Asis, Marley Wilson, Jordan Williams, & Kate Schaefer (Methods Project, Dr. Stebbins).

You Received a Facebook Friend Request. Will You Accept? The Effect of Facebook Comments and Social Cues on Social Perceptions of Adults Holly Aleksonis, Haley Kane, Tyler Barnikel, & Rachel Carson (Methods Project, Dr. Stebbins).

Understanding How Involvement and Time Management Affects Students' Academic Success and Academic Satisfaction Samantha Amos, Elizabeth Carter, Leila Gustavson, & Samantha Kasner (Methods Project, Dr. Stebbins).

11:00 *Influence of Parental Closeness and Peer Influence and the Use of Alcohol and Drugs* Greg Smith, Bryce Fulton, & Courtney White (Research Seminar Project, Dr. Mackintosh).

11:20 *Body Image Awareness When Looking at Self-Perceived Attractiveness and Attractiveness of Others* Jennifer Carroll, Rosemary Bruno, Chris Brier, & Andrew Mansfield (Research Seminar Project, Dr. Kolar).

12:00 *Effects of Gender on Outsider Perceptions of Sexual Assault* Brittany Simmons, Alesha Ballman, Emma Leheney, & Katherine Miller (492 Research, Dr. Wilson).

12:20 *Curbing the Stress Eater's Appetite: Can Mindfulness Prevent Eating Under Stress?* Kathryn Tsagronis, Margaret Baxter, Sara Hickey, & Janine Crossman (492 Research, Dr. McBride).

12:40 *Influence of Education and Victim Gender on Blame Attribution in Cases of Sexual Assault* Rebecca Moses, Dominique Fair, & Emily Bedwell (Research Seminar Project, Dr. Kolar).

2:00 *Effects of Acknowledgement Status on Post-Trauma Functioning in Rape Survivors* Emma Leheney, Katherine Miller, Brittany Simmons, & Alesha Ballman (492 Research, Dr. Wilson).

2:20 *Feast or Fret? The Effects of Food Choice and Preparation on Stress* Lindsey Green, Gabriella Taweel, Erica Parker, & Samantha Worman (Research Seminar Project, Dr. Mailloux).

2:40 *Facebook: The Connection Between Self-Esteem and Self-Reported vs. Actual Facebook Use* Caitlyn Denkler, Melissa Dorna, & Harrison Miles (Research Seminar Project, Dr. Kolar).

3:00 *The Influence of Communication on Alcohol Consumption* Abigail Heller, Dani Galbraith, Cara Wimberley, & Jessica Fisher (Research Seminar Project, Dr. Mackintosh).

3:20 *A Rodent Aquathlon: A Comparison of Positively-Reinforced Running and Negatively Reinforced Swimming in the Production of Behavioral Variability* Rachael Dearborn, M. Sarah Phillips, Cierra Everette, & Siara Rouzer (492 Research, Dr. Stahlman).

Friday, April 24, 2015

10:00 *Team Building: Effects of Temperature and Priming* Gabriela Burgos, Jared Krikorian, & Heather Chlebo (Research Seminar Project, Dr. Kolar).

10:20 *How Social Media Has Influenced the Religious and Political Viewpoints of the Emerging Adult* Randi Crabbe, Sierra Ashton, Olivia Rivero, & Angelica Estero (Research Seminar Project, Dr. Mackintosh).

11:00-12:00 Poster Presentations

Interoception and Eating Behavior Rebekah Selbrede & Brittany Simmons (URES Project, Dr. Erchull & Dr. Mailloux).

The Effect of Emotional State and Cognitive Load on Memory Recall Sameet Ashfaq, John Bozek, & Kelsy Minnick (Methods Project, Dr. Stebbins).

Perception of Taste Test Sarah Chehaitelli, Lady Montano, Shaquanda Stewart, & Janagan Bharathan (Methods Project, Dr. Stahlman).

Distracting Effects of a Ringing Cell Phone Mikaela Barton, Jamie Dillon, Hannah Pierson, & Maryfay Jackson (Methods Project, Dr. Stahlman).

Effect of Media on Rating of Life Satisfaction Reagan Henderson, Brittney Turner, & Elaine Dorr (Methods Project, Dr. Stahlman).

Effect of Time Constraints on Performance Kayleigh Rasnick, Ashley Beasley, & Ariella Richmond (Methods Project, Dr. Stahlman).

"Green Just Isn't Your Color": Perceptions of Jealousy and Abuse in Relationships Casey Bachmann, Berri Flood, Jenna Gray, & Jennifer Zeballos (Methods Project, Dr. Stebbins).

The Effects of Music Genre on Stress Relief Aloria Vanover, Asma Noman, Evan Puckett, & Barbara Adwoa-Mfum (Methods Project, Dr. Stahlman)

12:20 *Intensive Parenting Attitudes: The Good, the Bad, and the Ugly* Katie Lebling, Elizabeth Carroll, Claire Merenda, Sara Edwards, & Kimberly Flores (492 Research, Dr. Mackintosh).

12:40 *Erotic Capital? The Relationship Between Sexualization and Leadership* Kathleen Adragna, Katlyn Baines, Celeste Kelly, & Julia Smith (492 Research, Dr. Erchull & Dr. Liss).

1:40 *What Would You Do? A Study of Forgiveness in Romantic Relationships* Samar Alkhelaifi, Katie Turner, Kelsey Herrick, & Sarah Treacey (Research Seminar Project, Dr. Kolar).

2:00 *Recovery from Stress: There's an App for That!* Erin Doherty, Sara Hickey, Conor Gillis, & Madeline Moravitz (Research Seminar Project, Dr. Mailloux).

2:20 *The Effect of Type of Home Community and Social Support on Ego-Resiliency in Emerging Adults* Matthew Babineau, Jordan Baughan, Callie Price, & Lula Sargent (Research Seminar Project, Dr. Mackintosh).

2:40 *The Effect of Attractiveness on Race Classification of Very Briefly Presented Faces* Neomelani L. Gangi, Katelyn Hedrick, Britta Grim, & Gabriela Lopez (492 Research, Dr. Hampton).

3:00 *Music to Our Fears: The Effect of Music on Physiological Responses to Films* Allison Boespflug, Sean Lee, Julianne Kuhn, & Sarah Pollard (Research Seminar Project, Dr. Mailloux).

3:20 *What Are You Lookin' At? The Relationship Between Sexualized Appearance and Perceptions of Electability and Competence* Julia Smith, Celeste Kelly, Katlyn Baines, & Kathleen Adragna (492 Research, Dr. Liss & Dr. Erchull).

4:00 **Keynote Speaker: Dr. Amy Van Arsdale**
Questioning, Creating, and Caring: Impacting Your Community at Every Level

Recital in Goolrick Hall Dance Suite

11:00

Studio 4 Goolrick Dance Suite

Juxtaposed, choreographed by Covenant Babatunde '15 with dancers Mason Storm Prince '15 and Lauren Armstrong '15.

This eleven-minute contemporary dance explores the juxtaposition of people and things that share space and a relationship.

Sessions in Phyllis Ridderhof Martin Gallery

1:00 – 3:00

Individual Studies in Art History

Alyssa Hughes, "Herrad of Hohenbourg and Her Garden of Delights", (JeanAnn Dabb)

Alexandra Parrish, "A Critical Reassessment of Duchamp's Readymades and his Antiaesthetic of the Ordinary" (Joseph Dreiss)
Following a brief intermission with refreshments, Art History and Museum Studies students Virginia (Maggie) Ayres, Eynav Ovadia, and Berkeley Vollino will present "Perspectives on Lily Cox-Richard", a discussion of "The Stand (Possessing Powers)" by Lily Cox-Richard, the current exhibition in the Phyllis Ridderhof Martin Gallery. The students will offer ways of understanding the

work of Lily Cox- Richard through considerations of Renaissance, Modern, and contemporary art practices. Their work originates in research they have conducted for ARTH 460: Women and Western Art, and the panel is in partial fulfillment of Museum Studies credit .

Session in Combs Hall

Modern Languages and Literatures

1:00 – 1:15
Room 215

Ellynn Loftus (Spanish): "Sor Juana Inés de la Cruz: la "Santa Catarina" para la educación de las mujeres en el siglo XVII"

2:30 – 3:20
Room 213

Alyssa Hughes (German): "Hildegard of Bingen: the Influence of a Patriarchal Society on the Creation of the Scivias"

Maria Sitzler-Sawicki (German): "The Germans' longing for Italy"

Session in Trinkle Hall

3:00 – 5:00
Room 242 Classics, Philosophy & Religion Suite

Religion Senior Thesis Oral Presentations

Joseph Hart "Early Islam: The Driving Force Behind the Byzantine Iconoclasm"

Lauren Hearne, "Spiritual Disability: Does Having a Mental or Certain Physical Disability Make a Disabled Faith?"

Emily Hummel "'Made in His Image': A Discussion of God's Gender Identity in the Abrahamic Religions"

Sara McDermott, "American Misunderstanding of Islam Since 9/11"

Morning Oral Sessions in Information & Technology Convergence Center

10:00 – 11:00

Room 328

Session Chair: Dr. Hai Nguyen (Physics)

Ryan Quint, "Winning the War, Losing Reconstruction: The U.S. Army's Role in Reconstruction" (Claudine Ferrell)

John Robie, "Railguns and Electromagnetic Propulsion" (George King)

Ciara Peacock, "The Unheard Voices of U.S. K-12 Education Policy: No Child Left Behind (NCLB) and Student Perspectives on Public Education" (Rosalyn Cooperman)

11:00 – 12:00

Room 327

Session Chair: Dr. Janet Asper (Chemistry)

Steven Roper, "Red Communists and Silver Screens: The Cold War Through American Film" (Claudine Ferrell)

Andrew Quarles, Alex Ankerson, Suzanne Obetz, Prudence Sheffield, "Placemaking Through a Comprehensive Redesign of Downtown Fredericksburg's Wayfinding Signage and Street Furniture" (Andrea Smith)

Poster Sessions – Information Technology Convergence Center
12:00 – 1:00

- Hugh Anderson, Michael Hudgins, "A Study of the Kinetics and Thermodynamics of the Catalytic Decomposition of Hydrogen Peroxide" (Leanna Giancarlo)
- Brooke Andrews, "Dots in a Box: Modeling Quantum Phenomena with CdSe Quantum Dots" (Leanna Giancarlo)
- Brooke Andrews, Ly Sandrine, "Surface modification for electrocatalytic reduction of carbon dioxide, (Nicole Crowder)

- Dana Bargh, "Mathematical Modeling of Tuberculosis" (Christopher Gray)
- Alexander Bond, Kristina Krumpos, Rachel Thomas, "Engineering a Double-GFP Plasmid Expression Vector for Nuclear Localization Studies" (Stephen Gallik and Deborah Zies)
- Katie Branum, "Dutch, English, and German: A Crosslinguistic Analysis of Morpheme Acquisition" (Paul Fallon)
- Ruth Catlett, " "One-and-done": A Look at Collegiate Basketball Career Length on NBA Performance" (Stephen Davies)
- Megan Clevenger, Robert Courtland Lyle, "Marsh Accretion In The Tidal Tributaries Of The Potomac River Through Sediment Cores" (Neil Tibert)
- Taylor Coxon, "The Spatial and Temporal Distribution of Trace Metals within the Fluvial and Lacustrine Sediments of the Southern Chesapeake Bay Watershed" (Ben Kisila and Leanna Giancarlo)
- Sofia Di Benigno, "Polymers on the Painter's Palette: Analysis of Lightfastness in Artist's Paints" (Janet Asper)
- Tiffany Diaz-Calderon, "Applications of Hydrogels in Medicine" (Janet Asper)
- Elizabeth Doswell, "Establishing Protocols for Measuring CIN8 expression during the Saccharomyces cerevisiae cell cycle" (Deborah Zies)
- Sabrina Elliott, "Beauty Is (Not Always) Pain: Polydimethylsiloxane Explained" (Janet Asper)
- Mitchell Greenwood, "Plastic Recycling: Is it Actually Environmentally Friendly?" (Janet Asper)
- Claire Harrington, "The Effect of Tian Xian Liquid (TXL) on Transformed Epithelial Cells" (Rosemary Barra)
- Steven Hartzell, Victoria Nguyen, "Predicting Long-Term Citation Results with the WSB Triple" (Melody Denhere)
- Stephanie Hein, "Effects of CLOCK on Gene Transcription in HEK 293" (Deborah Zies)
- Sarah Heisey, "The Future of Flubber: Medical Applications of Polymer Hydrogels" (Janet Asper)
- Lucas Hidalgo, William Davis, Lonnie Harris, Connor McLear, "Quantifcation of Polycyclic Aromatic Hydrocarbons in Soil Samples" (Randall Reif)
- Suzanne Holland, "Indian Economic Policy: Politics and Reformation" (Dr. Surupa Gupta)
- Quyen Huynh, "Applications of a Fabry-Perot Interferometer" (Hai Nguyen)
- Tolulope Idowu, Brittany Harris, Hung-I Ho, Tierra Clay, "Determining the Arsenic Concentration in Tattoo Ink" (Randall Reif)
- Lauren Johnson, "Cloning the Promoter Region of the Human RAI1 Gene" (Deborah Zies)
- Anna Kania, "Silencing of Essential Genes in Free-living Nematodes Resembling Parasites" (Theresa Grana)
- Hannah Kass, "Polymers - The Cure for Cancer?" (Janet Asper)
- Anisa Kaur, Sandrine Ly and Orlando Stewart, "Shining a Light on Inter- and Intramolecular Forces: A Spectral Investigation into Hydrogen Bonding" (Leanna Giancarlo)
- Amy Larsen, "Free Trade in India: A Debate" (Dr. Surupa Gupta)
- Juliana Laszakovits, "A polychromatic method to determine the wavelength dependence of singlet oxygen quantum yields for natural and effluent organic matter" (Charles Sharpless)

- Juliana Laszakovits, Kelly McDaniel, Zaire Sprowal, Matt Walters, "Determination of Heavy Metal Pollution in UMW's Soil using ICP-AES" (Randall Reif)
- Isabelle Malouf, "Long Term and Acute Effect of Atrazine on Sexual Development of Zebrafish" (Dianne Baker)
- Matthew McLear, "New methods for the synthesis of spider silk-like polymer fibers" (Janet Asper)
- Alaina Morello, "Clifford embeddings: a problem in quantum coding theory" (Keith Mellinger)
- Laura Morris, Megan Blosser, "Eye Trackers and Objectification: Through the Eyes of an Undergraduate Research Student" (Mindy Erchull and Miriam Liss)
- Rebecca Na, "Pyrolysis of Waste Plastic into Synthetic Fuel" (Janet Asper)
- Miles Neilson, Chris Moulton, "A Millennial Record of Oyster Colonies In The Central Potomac Estuary Along The Northern Neck Of Virginia" (Neil Tibert)
- Teresa Nguyen, Sydney Welch, "Molecular Identification of Trematodes In the Rappahannock River Using Mitochondrial Cytochrome C Oxidase Subunit 1" (Abbie Tomba)
- David Nunez, Lonnie Harris, William Davis, "Analysis of Biological Samples by Inductively Coupled Plasma Atomic Emission Spectroscopy" (Kelli Slunt)
- Jillian Powers, Tammy Prescott, "Microfossils as Proxies for Sea Level Rise in the Chesapeake Bay" (Neil Tibert)
- Sabia Prescott, "Perceptual Dialectology and the Attribution of Responsibility: On Narrating Sexual Assault" (Judith Parker)
- Alex Priest, "Identification of Inhibitors of Fatty Acid Synthesis Enzymes in *Mycobacterium smegmatis* (Lynn Lewis)
- Jesse Radolinski, "Comparative Analysis of Non-Tidal, Mitigated, Forested Wetlands in Virginia Piedmont and Inner Coastal Plain" (Michael Bass)
- Claire Reilly, "Stress and Drying Behavior of Synthetic Latex" (Janet Asper)
- Claire Reilly, Rebecca Na, William Thomas, "Experimental Determination of Iron Content in Common Vegetables" (Randall Reif)
- Alexandra Ritter, Lauren Jennison, "Fluorescence Microscopy Study of Protein Diffusion into Liver Cell Nuclei" (Stephen Gallik)
- William Rodriguez, "Study of Bacillus Bacteriophage Lysogeny and Propagation Following Sporulation" (Lynn Lewis)
- Andrea Sanchez, Sydney Welch, "Identification of Alarm Cue in the Crayfish *Cambarus acuminatus*" (Abbie Tomba)
- Andrea Sanchez, Tolulope Idowu, "Investigating Genetically Modified foods using Polymerase Chain Reaction" (Kelli Slunt)
- Riley Scalzo, Virginia King, "Cell Phone Radiation Induced Gene Expression in Human Glioblastoma Cells" (Deborah O'Dell)
- Rebekah Selbrede, Brittany Simmons, "Interoception and Eating Behavior" (Jennifer Mailloux and Mindy Erchull)
- Junaid Shahid, "Establishment of a Cell Culture System for Measuring the Expression of the Long Non-coding RNA Gas5" (Deborah Zies)
- Amanda Shea, "Chemical Structures of Fire Safe Polymers and their Applications" (Janet Asper)

- Amanda Shea, "Isolation and Identification of Nematode Pathogens with PCR techniques" (Theresa Grana)
- Hannah Somers, "Phosphorous and sediment flux analysis in Aquia Creek, Stafford County, Virginia, USA" (Ben O. Kisila)
- Rachel Thomas, "Mathematical Modeling of Meningitis" (Christopher Gray)
- Emmanuel Valdez, Isabelle Malouf, Leah Roth, Hannah Kass, Laura Mangano, Erica Falvey, "Operation: Protocol, One Groups Journey in Digitizing and Organizing Their Lab" (Dianne Baker)
- Megan Wagner, Teresa Fenn, Taylor McConnell, Maura Slocum, "Analysis of Soil and Water Samples at an Acid Mine Drainage Site" (Melanie Szulczewski)
- Sharon Wildberger, "Hydraulic Fracturing, Arsenic and Selenium: Threats of Pollution in the George Washington National Forest" (Melanie Szulczewski)
- Eileen Yoon, Joanna Kim, "Quantitative and Qualitative Analysis of Commerical Chocolates using High-Performance Liquid Chromatography" (Kelli Slunt)
- Eileen Yoon, Rachel Goldsmith, "Assay Development for Phthalates Ligand Binding to Peroxisome Proliferators Receptor" (Kelli Slunt)
- Sherry Young, "Using GIS to Explore Susceptibility of Slope Failures in Stafford County, Virginia" (Jackie Gallagher)
- Pengcheng Zhang, "Excitation and Detection of Nanoparticles" (Hai Nguyen)

Policy Papers in Poverty, Affluence & Equality Poster Session

Thursday, April 23 from 12:30 - 1:45 ITCC 328

Students in ECON 351 - Poverty, Affluence & Equality will present their policy papers in poster format during the class time

- Fatemeh Ahmadi, "Should Marriage be Encouraged?"
- Jack Anderson, "Should Early Childhood Education be Subsidized?"
- Patrick Burnett, "Universal Basic Income"
- Margaret Chenault, "Should Drug Testing be Required to Receive Welfare Benefits?"
- Virgil Davis, "Should There be Restrictions on Divorce?"
- Stephanie George, "Should the U.S. Implement the Robin Hood Tax?"
- Cooper Graham, "What Have Been the Effects of NAFTA on the Labor Market?"
- Aashna Jain, "Should College be Free?"
- James King, "The Economics of the War on Drugs"
- Mary-Kate McCleary, "Why Marriage Should be Encouraged"
- Catrina Meyer, "Should the US. Require and Provide Preschool Education?"
- Michael O'Neal, "Economics of Birth Control Regulation and Legality"
- Thomas Rinaldi, "Should Election Day be Changed to the Weekend?"
- John Rowley, "Should the U.S. Increase Funding for Schools in Low-Income Areas?"
- Christine Rumpf, "Deregulation of the Adoption System in the U.S."
- Alexandre Shivnen, "Should the U.S. Adopt a National Health Insurance System?"
- Nadya Syed, "Is Welfare What We Think it Is?

- Sophia Therriault, "Should the Government Provide Educational Loans Solely Based on an Individual's Field of Study?"
- John Travis, "Should Access to Pre-School be More Widely Available?"
- Caitlin Turner-Lafving, "Should the U.S. Raise Taxes on the Wealthiest Americans?"
- James van Emmerik, "Should Out-of-Wedlock Births be Discouraged?"
- Sarah Van Giezen, "Should the Earned Income Tax Credit be Expanded?"

Original Music Performances – Digital Auditorium
1:15 – 2:00

Hold Still — Becky Brown

Becky Brown, live art & electronics

Intensity — Gyeore Lee

Gyeore Lee, clarinet and electronics

Blue Veined Child — Justin Carrico

Claire Ashur, soprano voice
Becky Brown, harp

Midnight Rocket Runaway — Terena Chao

Terena Chao, processed guitar and voice

Hazel Colored Nebula — Austin O'Rourke

fixed media

Powers — Mary Paige Rodgers

Stephen Hennessey, electric guitar
Becky Brown, Harp
Mary Paige Rodgers, banjo
Austin O'Rourke, timpani
Michael Prime, Euphonium
Justin Carrico, electric bass

Basic Phone Call — Dominique Giles

Dominique Giles, voice & electronics

Program Notes:

Faculty mentor: Dr. Mark Snyder

Music 170: Introduction to MIDI Composition students: Terena Chao, Dominique Giles & Gyeore Lee

Music 370: Electronic Music students: Austin O'Rourke

Music 483: Music Composition students: Justin Carrico & Mary Paige Rogers

Music 491: Music Independent Study student: Becky Brown

Hold Still, by Becky Brown

To create a sense of nostalgia and exploration, Hold Still uses a variety of mediums in its composition, both real and electronic. An Arduino turns a piece of paper into a custom MIDI controller, using the variable resistance of graphite as a slide sensor. The pattern and paper are different for each performance, as drawing all over the controller is core to the piece. Max/MSP/Jitter, an audio/video programming language, takes MIDI data from the paper controller and uses it to control the poem driving the work and to process video taken via webcam of the live drawings done on the paper itself. While the technologies involved are interesting and unique, I chose them solely to express something tremendously personal.

Becky Brown is a senior Music and Computer Science student at the University of Mary Washington. She has been a performer of electroacoustic music at a variety of festivals, including the SCI National Conference, Ball State New Music Festival, West Fork New Music Festival, and Electronic Music Midwest, as well as at numerous universities. She has been the tech director for the Electroacoustic Barn Dance at UMW for three years.

Intensity, by Gyeore Lee

Intensity is for Processed clarinet and Ableton Live. Gyeore is a sophomore Studio Art Major with a minor in Digital Studies

Blue Veined Child , by Justin Carrico

Blue Veined Child was composed by Justin Carrico a senior and music major at UMW. The piece is inspired by the art songs of Franz Schubert. The lyrics were adapted from the James Joyce poem entitled: *A Flower Given to My Daughter*.

Midnight Rocket Runaway, by Terena Chao

Created in Ableton Live, *Midnight Rocket Runaway* is comprised of audio loops taken from Logic Pro X, MIDI tracks both written and played in, and recorded electric guitar and vocals. Each scene, a grouping of audio and MIDI clips organized to play at the same time, in Live is triggered by a Keith McMillien's SoftStep. McMillen's SoftStep allows the performer to simply use their feet to control events and effects in Live, thus becoming the ultimate hands-free MIDI controller. With its memorable bass line, soothing shakers, hypnotic beat, and piercing guitar, *Midnight Rocket Runaway* is sure to get your foot tapping in no time. Terena Chao is a junior Computer Science major.

Hazel Colored Nebula, by Austin O'Rourke

Hazel Colored Nebula is a piece dedicated to the aesthetic similarities between irises (avg. 12mm in diameter) and the star forming gas clouds called nebulae (avg. 8,000 light years in diameter). *Hazel Colored Nebula* for two pianos and processing won the ASCAP Morton Gould Young Composer Award. Austin is a sophomore majoring in Music with a minor in Physics.

Powers, by Mary Paige Rodgers

This piece was written in memory of Mary Paige's great-grandmother, who passed away earlier this year. Not only was her last name "Powers," but as a child, Mary Paige also believed that her great-grandmother had magical powers. Still alive are the most wonderful memories of walking through her garden that she built herself, and getting peacock feathers in the mail from the majestic birds that wandered around her yard. With such magical memories of great-grandmother Powers, it is only fitting that the piece evokes the same imagery and happiness.

Mary Paige Rodgers is a junior majoring in music at UMW. Her principal instrument is the guitar. Her original guitar pieces have been performed at the 2012 Yale University Guitar Extravaganza, as well as the West Fork New Music Festival at Fairmont State University in 2014. Recently, she has delved into composing electronic music and has had her work performed at the Electroacoustic Barn Dance in 2014 and the N_SEME Student Electronic Music Festival at Bowling Green State University earlier this year. Mary Paige sees a future in composing, and wishes to compose music for movies or video games once she graduates in 2016.

Basic Phone Call, by Dominique Giles

Made with Ableton live. Used the wii controller for triggering sections. Something way different than I've ever attempted. Enjoy. Dominique is a junior Studio Art major.

Theatrical Performance – Studio115 duPont Hall
7:00 pm

Department of Theatre & Dance

The Belle of Amherst by William Luce

Chelsey Shindler '15 performs in this solo performance in which Emily Dickinson welcomes the audience into her home as she recalls the significant people in her life in a provocative play that reveals this extraordinary poet's joys and sorrows. Directed by Julia Wells '16 in Studio 115 in duPont Hall, the performance starts at 7 pm.

Seating is limited; tickets are distributed on a first-come, first-served basis beginning at 6:30 pm.
April 24th

Afternoon Oral Sessions in Information & Technology Convergence Center

1:00 – 2:00

Room 327

Session Chair: Dr. Richard Finkelstein (Dean, College of Arts and Sciences)

Jordan Riser, Audrey Ricks, Kenneth Bellamy, Megan Luning, "Terrorism and Film" (Shumona Dasgupta)

Coleman Hopkins, "President Nixon's Green Legacy" (Steve Farnsworth)

Olivia Smith, "Human Rights in the World Trade Organization" (Surupa Gupta)

Room 329

Session Chair: Dr. Elizabeth Wade (English, Linguistics and Communication)

Panel: Rappahannock Review:

Members of the English 314 class, "Rappahannock Review: Discussion and Readings from UMW's National, Student-Run Literary Journal"

2:00 – 3:00

Room 329

Session Chair: Dr. Grant Woodwell (Earth & Environmental Sciences)

Beatrice Ohene-Okae, "Fossil Fuel Extraction and Violence" (Eric Bonds)

Tawany Almeida, "The Effects of Synthetic Androgen on MCF-7, Androgen Receptor Positive Breast Cancer Cells" (Rosemary Barra)

Magdalene Beglau, "Derechos: An Examination of the History of Straight-line Winds and their Hazards" (Jackie Gallagher)

3:00 – 4:00

Room 327

Session Chairs: Dr. Melody Denhere (Mathematics) and Dr. Stephen Davies (Computer Science)

Panel: Collaborative Undergraduate Research Projects with Dahlgren NSWD

Research projects completed by UMW students working with researchers at the Dahlgren NSWD will be described. These projects represent the third semester of interdisciplinary

collaborations between UMW students and faculty with Dahlgren researchers. These projects were mentored by Stephen Davies, Melody Denhere and Debra Hydorn.

Stephen Hartzell, Victoria Nguyen, "Citation Prediction and Analysis"

Bryan Holster, "Twitter 'bot Detector"

Heather Coleman, Lauren Falkenstein, "Multidimensional Scaling and Principal Components Analysis"

3:00 – 4:20

Room 328

Session Chair: Dr. Angela Pitts (Classics, Philosophy and Religion)

Panel: Classics Symposium

Kara Anthony-Price, "Telling the Story of a Fallen Queen: Dido in Vergil's Aeneid and Dante's Inferno"

Julie Kinsella Gavin, "Success, Failure, and Obedience in Vergil's Georgics IV"

Ellen Paige Receveur, "Catullus and the Spectrum of Roman Masculinity: Analyses of Poems 16,63, and 51"

Harry Rol, "A Most Fateful Encounter: How Scipio Africanus Defeated Hannibal at Zama"

Carolyn Tarne, "Idiosyncracies of Diocletian's Palace in Split, Croatia"

Abstracts

Listed Alphabetically By Student Researcher

Student Researcher: Tawany Almeida
Major: Biology
Research Mentor(s): Dr. Andrew Dolby
Project Title: The Effects of Synthetic Androgen on MCF-7, Androgen Receptor Positive Breast Cance Cells

In the United States, breast cancer is the most prevalent form of cancer in women and is second only to lung and bronchial cancer as the leading cause of cancer death. A number of factors have been identified that increase the risk of developing breast cancer, including specific gene expression, age, estrogen exposure, and obesity. It has also been demonstrated by both *in vivo* and *in vitro* studies, that some breast cancer cells express both androgen and estrogen receptors. These studies suggest that breast cancer may be linked to a hormonal imbalance between estrogens and androgens. The physiological effects of androgens on breast cancer cells have not been clearly described. However, the hyperactivation of the mitogen-activated protein kinase (MAPK) pathway has been shown to result in a growth-inhibitory response. Recent studies have also shown that androgen receptor signaling/activation of the MAPK pathway is dependent on the cyclin dependent inhibitor, p21. For this study, we hypothesized that androgens would have an inhibitory effect on the growth of MCF-7, androgen receptor positive breast cancer cells, and that p21 would mediate this effect. In the first phase of this study, we determined the effects of androgens on cell viability using the MTT assay. At an androgen concentration of 10^{-6} M, the cell viability decreased by 12% in comparison to the control cells. A p21 ELISA assay was used to detect and quantify the level of p21 activity in MCF-7 cells treated with 10^{-6} M androgen. The results of three experiments indicated that p21 activity increased by 34.7% after exposure to androgens for 4 hours. These preliminary studies suggest that p21 plays a role in the observed anti-proliferative effect; however additional studies are needed to confirm this observation and to elucidate the mechanism.

Student Researchers: Hugh Anderson and Michael Hudgins
Major: Chemistry
Research Mentor(s): Dr. Leanna Giancarlo
Project Title: A Study of the Kinetics and Thermodynamics of the Catalytic Decomposition of Hydrogen Peroxide

The decomposition of hydrogen peroxide is a reaction that is commonly used to study thermodynamics and kinetics, specifically activation energy, rate constants, and enthalpy. By measuring the change in temperature over the course of the reaction it is possible to find the rate constant at various temperatures as well as the enthalpy and activation energy of the reaction without having to change the concentrations of the catalyst or hydrogen peroxide. Using a coffee cup calorimeter, the vessel was calibrated to determine the adiabatic conditions of the device. The calibration was done by mixing equal volumes of water at different temperatures and measuring the final temperature. By measuring the initial concentration of hydrogen peroxide for the reaction and measuring the change in temperature as the reaction proceeds, the rate constants at various temperature can be found. From these rate constants an Arrhenius plot can be

constructed where a negative linear trend will be seen. From this a line can be found where the slope is equal to the negative of the activation energy divided by the gas law constant (R). The activation energy is expected to be 56.0 kJ/mole. Also, by using the calibration constant for our calorimeter, the initial mass of hydrogen peroxide, the mass of oxygen released from the reaction, the specific heat of water and the change in temperature over the course of the reaction, the enthalpy of the reaction can be found; this is expected to be -99.0 kJ/mole.

Student Researcher: Brooke Andrews
Major: Chemistry
Research Mentor(s): Dr. Leanna Giancarlo
Project Title: Dots in a Box: Modeling Quantum Phenomena with CdSe Quantum Dots

Nanoscale semiconductors, commonly referred to as quantum dots (QDs), provide a synthetically tunable model system for observing quantum mechanical phenomena both qualitatively and quantitatively. From prepared cadmium and selenium precursor solutions, CdSe crystals of varying diameters were grown by altering the reaction time in the presence of either a saturated or an unsaturated fatty acid surfactant. The deliberate modulation of the particle size resulted in visibly different colored solutions, whose absorbance maxima may be observed via UV-Vis spectroscopy. The observed wavelength of maximum absorbance, λmax, is expected to increase proportionately to the average particle size, which establishes evidence of the quantum mechanical length-dependence for the optical properties. By also altering the structure of the necessary surfactant molecule used to coat the surface of the nanocrystal, it is anticipated that the absorbance maxima will be affected. This experiment entails the facile synthesis of a range of CdSe QDs and subsequent investigation using UV-Vis spectroscopy to determine nanoparticle diameters and establish a correlation between particle diameter and optical properties, as well as an exploration of the effect of different fatty acid surfactants on the particles' absorbance maxima.

Student Researchers: Brooke Andrews and Sandrine Ly
Major: Chemistry
Research Mentor(s): Dr. Nicole Crowder
Project Title: Surface modification for electrocatalytic reduction of carbon dioxide

Carbon dioxide, an abundant waste gas, can be electrochemically reduced with the aid of a catalyst. By modifying a conductive surface, such as copper, with a tailored catalytic complex, the surface simultaneously functions as a working electrode for this electrocatalytic reduction and theoretically facilitates selective reduction to multi-carbon species. The necessary modification requires a bifunctional ligand, capable of both transition metal catalyst coordination and surface tethering; such molecules have been synthesized via multiple routes. Commercially available 4,4'-dimethyl-2,2'-bipyridine can be alkylated using a dibrominated substrate, functionalizing the molecule for the installation of a phosphonate moiety, or the methyl substituents may be radically brominated, allowing for a more direct functionalization. The terminal phosphonate is then converted to a phosphonic acid, which permits covalent binding to a copper oxide surface. Alternatively, the oxidation of the same dimethylbipyridine starting material yields a carboxylic acid that can be used in an esterification reaction with a terminal alcohol previously installed on the surface. These routes allow for the construction of the modified electrodes necessary to reduce carbon dioxide to synthetically useful species.

Student Researcher: Kara Anthony-Price
Major: Latin
Research Mentor(s): Dr. Angela Pitts
Project Title: Telling the Story of a Fallen Queen: Dido in Vergil's Aeneid and Dante's Inferno(Oral)

This paper seeks to answer this question of why Dante treats Dido so harshly for her fault (culpa), when Vergil treats her so leniently. To answer this question, the paper discusses the nature of Dido's roles in the Aeneid and the Inferno, respectively, as well as the role of the gods in the Aeneid in her culpa , the role of Dido's furor, and the implications behind Dante's change in Dido's fate.

One opinion among scholars is that Dante's Inferno was a "Christianized" redaction of the Aeneid, so that Dido's punishment fits her crime exactly. In his article, "Vergil's Inferno," Putnam argues that, Dante, by reviewing the Aeneid through a theological and a teleological lens, was able to conclude his poem in a way that satisfactorily concluded what Vergil started.

The second approach is that Dante was aiming for the maximum aesthetic affect. In Dante's mind, Dido makes a better adulteress than a suicide; through the Dantean lens, one sees Dido as both the beautiful adulteress and the tragic suicide. Poggioli, in his article "Paolo and Francesca," argues that Dante was more concerned with the spirit of the works he alludes to, rather than being literally accurate.

Vergil's Dido is made to suffer needlessly, on account of the machinations of the gods, and the nature of fate, for in Vergil's ontology, the gods use mortals to tweak Fate, and the mortals suffer the consequence. Thus, Dido is more sympathetic as a victim in Vergil's Aeneid, and is treated kindly in the afterlife. Conversely, Dante turns the "Dido story" into a didactic exposé of the nature of lust, providing the reader with a textbook definition of lust. Therefore, Dante's rendition of Dido in the Inferno corrects, enhances and explains Vergil's rendition of her in the Aeneid.

Student Researcher: Julie Arnold
Major: Biology
Research Mentor(s): Dr. Lynn Lewis
Project Title: Glass Bead Method for Archiving Bacillus Bacteriophages

During the first year of working with bacteriophages, it was found that phage-buffer, used by the University of Pittsburgh for Mycobacterium phages, was not a good long-term storage material for our bacteriophages because most of the phages isolated were myoviridae with very skinny necks, which would break easily. This was only discovered after archiving the phages. Consequently, in year 2, we switched to using SM buffer, an old E. coli phage buffer. However, over time the titer would still drop. During 2013, Pitt started having the Mycobacterium phages archived by putting lysate, with DMSO, onto sterile glass beads in bar coded tubes. We decided to try their technique! Two phages that could still be grown were first tested with this technique. The phages were isolated and a lysate was made from scraping dilution plates of each isolated phage. Then DMSO was added to the lysate for a final concentration of 6%. Another tube, a commercially available Microbank tube (Prolab Diagnostics) was inoculated with a stabbed plaque. Both tubes were inverted several times to distribute the phages. Both techniques allowed for bacteriophages to be frozen and grown again at another time. With the process of glass bead being a success, phages frozen during 2011 and 2012 were regrown, using both direct plating and enrichment plating, and frozen onto the glass beads with DMSO.

Student Researcher: Dana Bargh
Major: Mathematics
Research Mentor(s): Dr. Christopher Gray
Project Title: Mathematical Modeling of Tuberculosis

Values found for the infection rate and recovery rate of tuberculosis will be utilized in order to create a model for a mock population. The model will depict an epidemic and will be manipulated to depict different scenarios.

Student Researcher: Magdalene Beglau
Major: Geography
Research Mentor(s): Dr. Jackie Gallagher
Project Title: Derechos: An Examination of the History of Straight-line Winds and their Hazards

Before 2012, the meteorological term, 'derecho' was barely used east of the Mississippi. The derecho of June 29, 2012 provoked the general public's knowledge of these storms. Due to lack of education and knowledge of derechos, most of the public affected by the 2012 derecho was unaware of, or unprepared for, the oncoming storm, putting them at greater risk. This paper focuses on the history, characteristics, hazards, and current warning systems for derechos in the United States. The June 29, 2012 derecho event is used as a case study. Derechos were first defined in 1888, as "non-tornadic, convectively induced winds associated with a

violently progressive mass of cold air" (Hinrichs 1888, in Johns 2007); they are commonly known as 'straight-line' winds. The term was 'lost' until the 1980s when interest in non-tornadic winds was rekindled by aircraft crashes during severe thunderstorms. To be classified as a derecho, the National Weather Service says a storm must have a coverage area of at least 240 miles in length, the surface wind gust speed must be at least 57mph, severe wind reports must progress chronologically, with at least three reports that are separated by 40 miles or more of damage equivalent to an EF1 tornado and/or greater than 74mph, and no more than three hours can elapse between successive reports (Weather Prediction 2015).

In this paper, I argue for a change in the designation of derechos so that their watch/warning status is announced over nationwide cellular networks on the FEMA Wireless Emergency Alerts (WEA), so as to alert the public of impending danger.

Student Researchers: Alexander Bond, Kristina Krumpos and Rachel Thomas
Major: Biology
Research Mentor(s): Drs. Stephen Gallik and Deborah Zies
Project Title: Engineering a Double-GFP Plasmid Expression Vector for Nuclear Localization Studies

A plasmid expression vector is a small circular piece of DNA used to carry genes into another cell, where the genes can be expressed. Expression vectors have a wide variety of applications in the clinical and basic life sciences, including studies into the fate of proteins expressed in this way. The specific objective of the project reported here is to use site-directed mutagenesis and specific cloning techniques to create a plasmid expression vector that contains the DNA code for 2 tandemly-arranged copies of green fluorescent protein (GFP) linked to a series of three tandemly-arranged copies of a nuclear localization signal (NLS). Once expressed, the resulting protein (GFP-GFP-NLS-NLS-NLS) would be used to study the fate of the protein in mammalian cells. It is expected that the 3 copies of the NLS would direct the protein to be transported into the nucleus. The 2 copies of the GFP protein would be used as a super-fluorescent reporter protein showing, through its fluorescence, the location of the protein in the cell. Our double GFP expression vector was created from a pShooter plasmid expression vector, a commercially-available plasmid that already contains one GFP linked to 3 NLSs (GFP-NLS-NLS-NLS). To create our Double GFP expression vector, a second copy of the DNA code for GFP, along with the DNA code for a short benign stretch of 8 amino acids (a linker) was inserted at the front end of the pShooter GFP. Agarose gel electrophoresis analysis and DNA sequencing were used to confirm the successful creation of our double GFP plasmid expression vector.

Student Researcher: Katie Branum
Major: Linguistics
Research Mentor(s): Dr. Paul Fallon
Project Title: Dutch, English, and German: A Crosslinguistic Analysis of Morpheme Acquisition

Morphemes are the basic unit of meaning, and as such, are important to first language acquisition. Children learning their native language acquire different morphemes at different times. For example, English children acquire the plural -s morpheme before the possessive -s (Bowen, 2013). Roger Brown first presented an established order of morpheme acquisition of English after studying three American native English-speaking children from across different backgrounds. Their acquisition of 14 different morphemes was remarkably similar, suggesting a uniformity. This uniformity of the pattern of English leads to the question: do languages of the same family have similar patterns? Brown suggests they might (1973).

In an attempt to seek a universal pattern across three Germanic languages, I researched, compiled, and analyzed existing literature on morpheme acquisition in English, Dutch, and German.

Student Researcher: Ruth Catlett
Major: Computer Science
Research Mentor(s): Dr. Stephen Davies
Project Title: "One-and-done": A Look at Collegiate Basketball Career Length on NBA Performance

According to the Adjusted Graduation Gap (AGG) Report on National Collegiate Athletic Association (NCAA) Basketball, male basketball players from Division One (D-I) schools have a graduation rate 21.8 percentage points lower than other full-time male students (1). Many do not graduate because they choose to

leave after a year of collegiate play and play professionally in the National Basketball Association (NBA) or in another league. This project is a cursory analysis of player data and salary data of those who went on to play professionally. The goal was to collect data from past NCAA D-I players about their statistics on the court and number of years spent at school, as well as data on their professional careers, including starting salary. After the data collection we cleaned up the data and readied it for meaningful analysis. For example, we compared length of time spent at college to professional salary. Moving forward, this project will continue to look at performance at the collegiate level compared to the professional level, and how it is affected by the length of time spent in college. We plan to investigate whether a successful player in the NCAA can overcome the difficulty in transitioning to the NBA. This could help us draw conclusions about how "one-and-done" players can be expected to perform in the professional field even with limited collegiate experience.

Student Researchers: Megan Clevenger and Robert Courtland Lyle
Major: Geology
Research Mentor(s): Dr. Neil Tibert
Project Title: Marsh Accretion In The Tidal Tributaries Of The Potomac River Through Sediment Cores

Tide gauge records in the Chesapeake Bay indicate that relative sea-level rise over the last century is due to a combination of melting land ice (mass changes), ocean thermal expansion (ocean volume changes), and subsidence, mainly from glacio-isostatic adjustment. However, there has been little research to establish a millennial record of marsh accretion to quantify pre-20th century rates of Late Holocene sea level rise in the proximal-central estuary of the Potomac River downstream of Washington DC. Our primary objective is to establish a baseline physical, biological, and geochronological record of marsh deposits spanning the past three millennia.

Three marsh cores were collected from Mattox Creek, Rosiers Creek, and Wilkerson Creek; tidal creeks adjacent to the Potomac River just north or south of Colonial Beach, Virginia. The cores range from 5.0-7.0 meters in length and comprise of two primary lithofacies of basal grey clay and an upper organic-rich peat and clay. The grey clay lithology ranges in Total Organic Matter (TOM) from 4-20% and has highly variable magnetic susceptibility intensity peaks. In contrast, the alternating organic rich peat and clay ranges in TOM from 14-82% and has negligible variability with respect to magnetic susceptibility values. Microfossils extracted from the cores include an association of marsh and estuarine foraminifera. AMS14C dates from woody material and preserved bivalve shells collected from the cores were used to create an age model and indicate a maximum age of 3540±25yrs.

Our prior work indicates that the tidal marshes record deep estuarine conditions transitioning to relatively rapid marsh progradation at the approximate onset of the medieval warm period. Marsh aggradation was initiated at this time due to increasing humidity and favorable conditions for higher marsh productivity. Alternations between peat and clay in the uppermost core record millennial and centennial-scale climate oscillations like the Little Ice Age.

Student Researcher: Taylor Coxon
Major: Geology
Research Mentor(s): Drs. Ben O. Kisila and Leanna Giancarlo
Project Title: The Spatial and Temporal Distribution of Trace Metals within the Fluvial and Lacustrine Sediments of the Southern Chesapeake Bay Watershed

Sedimentation and trace metal accumulation in aquatic systems are natural geological processes magnified by human action on the landscape. This study encompassed the Virginia portion of the Chesapeake Bay watershed. In order to ascertain the spatial distribution of trace metals (Al, Cd, Cr, Cu, Fe, Pb, Mg, Mn, Zn, Ca, As, and Se) within the Virginia portion of the Chesapeake Bay watershed and isolate point and nonpoint sources of effluence, surficial sediment samples were obtained throughout each of its sub-basins. Fluctuations in trace metal input over the area's history of development and industrialization were determined with sediment cores obtained in the lower reaches of each basin and in reservoirs throughout the region. Fluvial cores underwent 137-Cs dating, while lacustrine cores were dated through 210-Pb analysis. Samples obtained

from "pristine" and developed lacustrine systems throughout the study area highlighted the potential effects of atmospheric metal deposition on Virginia's abundant reservoirs.

The sediment record and contemporary distributions revealed the mining and agricultural legacy of the state is responsible for the high enrichment of As, Se, and Cu in western lakes and the headwater reaches of fluvial systems. Improper disposal of mine tailings, application of phosphate fertilizers, and subsequent urban and residential development of these areas has increased metal enrichment of the surrounding landscape. The broad distribution of elevated Pb, As, and Se levels is attributed to the influences of atmospheric aerosols from the west. Recent enrichment spikes of Pb, Cu, Cd and Zn, while not as intense as those of the states' industrial past, are significant and a possible consequence of urban expansion and development along major transportation corridors. Although trace metal concentrations in Virginia's aquatic systems have generally moderated in the past 50 years, the remobilization of legacy sediments, a product of increased runoff, still places many of Chesapeake Bay's aquatic systems at risk.

Student Researcher: Sofia Di Benigno
Major: Chemistry
Research Mentor(s): Dr. Janet Asper
Project Title: Polymers on the Painter's Palette: Analysis of Lightfastness in Artist's Paints

Paints have been used widely for thousands of years, and their function is dependent on various polymerization reactions, which are themselves dependent upon differences in each variety of paint. The many types of paints (oil, acrylic, etc.) differ mostly in what binder and pigments are used. It is the binder which undergoes the polymerization reaction, which can proceed with free-radical mechanisms that occur in air or by a variety of other mechanisms. The pigment is most widely known for its visible properties, but it also protects the binder from ultraviolet damage, which would destabilize the polymers and degrade the paint. This is the challenge for chemists creating and evaluating paints: to determine which pigments stabilize the binder most effectively and best prevent ultraviolet damage. Such pigments would increase the 'lightfastness' of the paints, a desirable quality in paints used in all industries, from fine art paints to airplane exterior paints. Lightfastness is reported on a scale from I to V in the United States; and the degree of lightfastness in paints have been determined by anaysis using such methods as mass spectrometry, attenuated total reflectance spectroscopy, differential scanning calorimetry, and color change analysis. Simple techniques are often preferred for the determination of the ratings indicated on paint tubes; however, application of more complex techniques can provide a much more accurate indication of the probable effects of ultraviolet light exposure on paints, allowing painters to assess more objectively the lightfastness of the paints they consume.

Student Researcher: Tiffany Diaz-Calderon
Major: Chemistry
Research Mentor(s): Dr. Janet Asper
Project Title: Applications of Hydrogels in Medicine

Hydrogels are hydrophilic polymers, which makes them highly biocompatible. Research initially focused on the swelling properties and hydrophilic nature of hydrogels. Researched focused on these properties because swelling is one of the hydrogels principal features that comes from hydrogels hydrophilic nature. Hydrogels expanding property relates to the fact that hydrogels grow in the presence of water and shrink in the absence of water. Hydrogel research has expanded to include the development of different types of hydrogels. The various types of hydrogels allow for an expansion in their uses because of their additional properties. Another property of hydrogels is called 'smart hydrogels' due to their ability to shrink or swell in response to a signal such as pH-level or temperature. Other properties include permeability, ranging flexibilities, and rapid, selective diffusion. The various additional properties of hydrogels opened the door for biological applications such as pharmaceuticals, biomedical, and biotechnical applications. Some current applications of hydrogels include insulin and contacts. Hydrogels are used in insulin to control the amount of insulin delivered to the body by responding to signals. Contacts use hydrogels due to their oxygen permeability and flexibility. Some potential applications of hydrogels include artificial muscles and spinal cord injury repair. The idea behind using hydrogels in artificial muscle is that by having smart hydrogels transform due to electrochemical stimuli it can cause contractions that enable it to act like regular human muscle tissue. Researchers want to use

hydrogels to help treat spinal cord injuries by using the hydrogel to carry substances and/or cells to the affected area and keeping the transported materials in the area needing treatment.

Student Researcher: Elizabeth Doswell
Major: Biology
Research Mentor(s): Dr. Deborah Zies
Project Title: Establishing Protocols for Measuring CIN8 expression during the Saccharomyces cerevisiae cell cycle

In the fall of 2014, I was enrolled in a biology department research intensive course where my partners and I carried out a research project. The goal of the project was to study the expression of the CIN8 protein during the yeast cell cycle. The function of CIN8 is to assemble the spindle fibers and control their function during anaphase. We therefore hypothesized that its expression would be the highest during anaphase and lowest during prophase of the cell cycle. Although we were able to isolate protein from different points in the cell cycle, we were unable to successfully visualize the CIN8 protein using a Western blot technique. This spring, I enrolled in URES 197. My goal was to trouble shoot the protocols for the various steps of this project. These techniques include isolation of total protein from yeast, measuring protein concentration using Pierce BCA Protein assay, gel electrophoresis and protein transfer to a specialized membrane, and protein staining procedures. The poster present for this project shows my progress up to date. The impact of this research is to help set the protocols needed for the BIOL 431 laboratory research course.

Student Researcher: Sabrina Elliott
Major: Chemistry
Research Mentor(s): Dr. Janet Asper
Project Title: Beauty Is (Not Always) Pain: Polydimethylsiloxane Explained

Silicone, is a name given to a, "group of synthetic polymeric organosilicon compounds that can exist as solids, gels, and liquid forms" (Altmeyer, 2009). Specifically, a polymer known as polydimethylsiloxane is most widely used. Polydimethylsiloxane (PDMS) is a silicon-based non-biodegradable thermoset, condensation polymer. It is used in a variety of materials from contact lenses, augmentation procedures, defoaming agent in food, pharmaceutical applications, surgical instruments, and various industrial uses. PDMS is synthesized from sand via various synthesis and distillations, the very pure product is, "practically free of organic impurities and heavy metals," taking a physical form as a liquid with various viscosities to gums and resins (Briquet, Colas, Thomas). The polymer is often used inside of the human body and does not typically cause issues unless incorrectly applied. Because of its wide usage in the world, it is abused more often than not. Though its abuse does have various side-effects, it has a molecular structure which typically prevents damage to the body. This project will further demonstrate the various uses, and misuses, of PDMS in society taking a major focus in the use of cosmetic and medical procedures. Its synthesis will be outlined via illustrations and the specifics of its molecular characteristics, physical and chemical properties, as well as illustrating the versatility of the polymer will be presented. A supplemental explanation of the safety, environmental, and toxicology of the polymer will also be provided.

Student Researchers: English 314 Class Members
Major:
Research Mentor(s): Dr. Elizabeth Wade
Project Title: Rappahannock Review: Discussion and Readings from UMW's National, Student-Run Literary Journal

UMW's literary journal, Rappahannock Review, has established a national presence in the literary community over the two years of its existence. This presentation will discuss Rappahannock Review's unique experiential learning environment and the results this semester: two new issues of previously unpublished literature selected, edited, and designed by the students of ENGL 314, a capstone course in the Creative Writing Concentration. For the presentation, the current editors will introduce the journal, its operation, and its successes and challenges as a student-run publication. Next, members of the staff will read selected works of fiction, nonfiction, and poetry from both the regular issue coming out in April and the special theme issue on

flight coming out in August. The reading will be followed by a short Q&A. The panel will showcase Rappahannock Review's exciting literary contributions this semester, as well as the work of the students on staff, who learned through hands-on experience with the publishing world and without whom the journal wouldn't exist.

Student Researcher: Julie Kinsella Gavin
Major: Latin
Research Mentor(s): Dr. Angela Pitts
Project Title: Success, Failure, and Obedience in Vergil's Georgics IV

This paper explores the concepts of success, failure, and obedience as seen in the Orpheus-Aristaeus story in Vergil's Georgics IV. Through their contrast, along with the juxtaposition of bees, Vergil's Georgics IV demonstrates that obedience in pre-Augustan Rome truly enables success, instead of the widely held notion that hard work does so. It is through the examination of love, toil, obedience, and the separate paths Orpheus, the bees, and Aristaeus take to achieve their goals, that the reader is able to understand Vergil's message in this last book of his masterpiece.

Student Researcher: Mitchell Greenwood
Major: Chemistry
Research Mentor(s): Dr. Janet Asper
Project Title: Plastic Recycling: Is it Actually Environmentally Friendly?

In the synthesis of poly(ethylene terephthalate), or PETE, for water bottles, there must be very clean monomers in order for the polymer to be safe for use in the packaging for human consumption. Chemical recycling of water bottles cannot reach this level of purity without first undergoing complete depolymerization of post-consumer PETE and good chemical separation. The thermodynamics of this depolymerization requires at least an hour and a half of reflux in medium-chain alcohols which have boiling points of 110oC- 150oC. In the original thinking, making virgin PETE seemed to require less energy than that of depolymerization, however after calculations and further research it appears that chemical breakdown of PETE for reuse is the most environmentally friendly use for PETE. Beyond just using the monomers for remaking plastics, there are other applications of the chemicals from PETE depolymerization such as drug development in the pharmaceutical field.

Student Researcher: Claire Harrington
Major: Biology
Research Mentor(s): Dr. Rosemary Barra
Project Title: The Effect of Tian Xian Liquid (TXL) on Transformed Epithelial Cells

The herbal dietary supplement, Tian Xian Liquid (TXL), has been reported to be an effective treatment for some forms of cancer. The mechanism of this effect is unknown, however, studies using a related herbal extract, Tien-Hsien liquid, showed an increase in apoptosis in cancer cells. The activation of p53 is a major regulator of cellular apoptosis. In this study, the anti-proliferative effects of TXL were determined by utilizing an MTT Assay. An ELISA assay was subsequently used to quantify p53 levels in TXL-treated cells.

TXL at concentrations ranging from .002 to .2 mg/ML showed significant anti-proliferative effects in a dose-dependent manner on transformed epithelial cells. As the concentration of TXL increased, the number of viable cells decreased. At .2 mg/mL, the viability expressed as a percent of control values was 54.5%.

There was an increased level of p53 activity in the TXL-treated cells. Interestingly, the cells treated with .002 mg/mL of TXL showed the greatest absorbance, indicating the greatest activity of p53 in those cells, compared to the control and the higher concentrations of TXL. This may be due to the fact that there are a greater number of viable cells at lower concentrations of TXL, allowing the p53 levels to be observed more readily.

This is preliminary data and more research will need to be done to confirm the role of p53 in the anti-proliferative effects of TXL. Also, many other factors may play a role in the anti-proliferative effects of TXL, and so further research is required.

Student Researchers: Steven Hartzell and Victoria Nguyen
Major: Mathematics
Research Mentor(s): Dr. Melody Denhere
Project Title: Predicting Long-Term Citation Results with the WSB Triple

The knowledge of how many citations a scientific paper will receive can be very useful when allocating funds and predicting its impact on a specific field. There are several factors that contribute to the number of citations a paper will receive, and accounting for all of them can be difficult.

In their paper, Quantifying Long-Term Scientific Impact, Wang, Song, and Barabási propose a model to predict citations a paper would garner based on its citation history. This model is based on the incorporation of three parameters: preferential attachment, aging, and fitness. The aim of our research was to develop this predictive model in R, Java or Python as well as determine the error bounds for the predictions.

We were able to derive the three parameters, the WSB triple, that are required to find a fit for the data. The error bounds, unfortunately, proved more difficult. The method suggested by Wang et. al has proven to be inefficient and limited. The bootstrap method applied to a time series may prove more promising, although this requires more testing.

This method proposed by Wang et. al is not without its flaws. The premise, however, is still very promising. Even though concrete values are difficult to come by, there is still some merit in understanding and recreating these results.

Student Researcher: Stephanie Hein
Major: Biochemistry
Research Mentor(s): Dr. Deborah Zies
Project Title: Effects of CLOCK on Gene Transcription in HEK 293

Smith-Magenis syndrome (SMS) is a disorder that results in a number of changes to human biological systems, including developmental delays or deficits in behavioral, neurological, and skeletal systems. One deficit appears in the circadian rhythm of individuals with Smith-Magenis syndrome. This deficit greatly affects other systemic functions including metabolism and cognitive function. I was hypothesized that RAI1, the causative gene for SMS, regulates the transcription of circadian locomotor output cycles kaput (CLOCK) which is the master regulator of the genes that are responsible for a normal circadian rhythm. The hypothesis was tested utilizing a luciferase assay procedure. HEK cells were transfected with RAI1 and the regulatory region of CLOCK or a control. The data did not support the hypothesis. There was no statistical significance between the fold change calculated with pGL3 or pGL4 plasmid with CLOCK (-) or no CLOCK (-). Future experiments will determine if this result represents an artifact of the experiment or the actual condition in cells.

Student Researcher: Sarah Heisey
Major: Biochemistry
Research Mentor(s): Dr. Janet Asper
Project Title: The Future of Flubber: Medical Applications of Polymer Hydrogels

While best known as a popular summer camp arts and crafts activity made from white glue and Borax laundry booster, flubber's unique viscoelastic properties come from its polyvinyl alcohol-tetrahydroxyborate (PVA-THB) composition. The borate ester crosslinks that characterize this material allow for its behavior as a solid that maintains fluid properties. In addition, the spacing of the polyvinyl polymers by the borate ester crosslinks allow it to retain water as well as other hydrophilic molecules. Due to these properties, polymeric hydrogels such as PVA-THB show promise in the medical field as wound dressings that double as drug delivery systems. The initial fluidity of hydrogels allow them to completely cover and conform to wounds of many sizes and severities. Hydrogels then solidify to form a protective barrier, allowing the material to be removed cleanly without causing further damage to the affected tissue. Their retention of water allows them to transdermally release drugs such as anesthetics, antibiotics, and/or wound repair agents directly into acute lacerations. The relative ease of application of hydrogel delivery systems as well as their versatility make them an incredibly innovative technology capable of changing the future of trauma and emergency medicine.

Student Researchers: Lucas Hidalgo, William Davis, Lonnie Harris and William C. McLear
Major: Chemistry
Research Mentor(s): Dr. Randall Reif
Project Title: Quantifcation of Polycyclic Aromatic Hydrocarbons in Soil Samples

Polyaromatic hydrocarbons (PAH's) are a class of conjugated organic compounds formed by the incomplete combustion of organic substances; such as garbage, coal, and oil. Several PAHS's are known carcinogens, and are thus important to quantify in the environment. The samples chosen to be studied were collected from the Norfolk Naval Station, the University of Mary Washington campus, and the Rappahannock River shore. These samples were then extracted using an accelerated solvent extraction system and analyzed via gas chromatography in selective ion monitoring mode. The three compounds that were selected for analysis were benzo(a)anthracene, benzo(a)pyrenem, and chrysene. An internal standard of p-terphenyl-D14 was used to construct response factor curves for the three compounds. The curves were then used to determine the concentration, limit of detection, and limit of quantification of each PAH.

Student Researcher: Suzanne Holland
Major: International Affairs
Research Mentor(s): Dr. Surupa Gupta
Project Title: Indian Economic Policy: Politis and Reformation

Based on the state of the Indian economy there is a consensus on the need for integrated reform. In my research I have been looking at various Indian economic policies and finding evidence for changes in those policies. I have noticed a partisan divide on economic issues that manifests itself in the English speaking media. In my presentation I will demonstrate the partisan divide on economic reform, and backlash on proposed policies from the Modi administration and proponents thereof. I will discuss the political climate in India, and why there were no efforts to reform the economy prior to the current government. We will look at the problems with current proposed policies, where those positions are sourced and analyze the varying opinions on what is best for India's future.

Student Researcher: Bryan Holster
Major: Computer Science
Research Mentor(s): Dr. Stephen Davies
Project Title: Twitter User Classification

I explore the identification of non-human Twitter users. I am interested in classifying users by behavior into the categories of either "bot" or "human".

My goal in this research is to find an accurate and efficient means of identifying and segregating non-human Twitter users from a collection of tweets, leaving only human users for analysis.

Student Researcher: Coleman Hopkins
Major: Political Science and Philosophy
Research Mentor(s): Dr. Stephen Farnsworth
Project Title: President Nixon's Green Legacy

Watergate and the Vietnam War are the two events that come to mind when people think about the Nixon presidency. However, President Nixon's forgotten legacy can be found in his environmental policies. President Theodore Roosevelt's presidency is the starting point -- and the standard for environmental protection -- though the strongest, most lasting environmental policies are actually President Nixon's. The creation of the EPA, NEPA, CAA, CWA and ESA, are all part of President Nixon's environmental regulation legacy. Ultimately I reach the conclusion that whatever his reasons for supporting environmental policies actually may have been, President Nixon's policies were, and remain, good for the environment.

Student Researcher: Alyssa Hughes
Major: German
Research Mentor(s): Dr. Marcel Rotter

Project Title: Hildegard of Bingen: the Influence of a Patriarchal Society on the Creation of the *Scivias*

Hildegard of Bingen was born in the year 1098 and died in the year 1179. She was active as an abbess of the Benedictine order during the height of the 12th century. She was, as many future abbesses were, born into a noble family. However, her family was not as well off as what could have been expected of a noble family at the time. Therefore, being the tenth of ten children and the victim of frequent illness in the form of migraine headaches (later understood as the root of her many profane visions), Hildegard was sent to live in the convent at Disibodenberg at the age of eight. Here she was brought up by Jutta of Sponheim, an anchoress who was essentially buried alive within the convent walls. Jutta was well educated, and taught Hildegard the Latin language. When Jutta passed away in the year 1136 Hildegard became the abbess of Disibodenberg. It was around this time that Hildegard began receiving more frequent visions. The visions would come in the form of these migraine headaches that she had received since childhood, through the pain Hildegard was able to see the light of God. In the year 1142 Hildegard claimed to hear the voice of God telling her to write down what she was seeing and hearing in her visions. The text that acts as a result of this exchange came to be known as the Scivias. In the Scivias, Hildegard notes her visionary experience with the voice of God in three parts. The literary contents of the Scivias are remarkable, no doubt. However, It is essential that this study looks at the influence of the heavy-handed patriarchal society of the time on the creation of this female mystic of the 12th century. Hildegard was initially restricted from writing down her experiences due to the laws that were set forth by her contemporary Benedictine order. In order to combat this hinderance Hildegard enlisted the help of Volmar, a male member of the convent and a friend. He acted as Hildegard's scribe in the creation of the Scivias. The research included within this individual study will investigate the influence of patriarchal society of the creation of Hildegard of Bingen's Scivias. It will focus on the ways through which Hildegard was restricted in creating the Scivias in a solo manner, and the potential influences of Volmar on the physical act of transcending Hildegard's profane experiences with God.

Student Researcher: Alyssa Hughes
Major: Art History
Research Mentor(s): JeanAnn Dabb
Project Title: Herrad of Hohenbourg and her *Garden of Delights*

Herrad of Hohenbourg was a major contributor to the visual culture of 12th century European monastic tradition. She was the abbess of a female convent known as the Hohenbourg Abbey located on the eastern slope of Mount Odilienberg in the Vosges mountain range of modern day Alsace, France. Herrad seceded her mentor Relinde as Abbess of Hohenbourg in the year 1167; her reign would last from this year until her death in 1195. Amidst the suppression of a patriarchal society, Relinde and Herrad were able to instill the necessity of education within the convent. With the passing of Relinde, Herrad perpetuated the practices of Relinde with the creation of her own illuminated manuscript, the Hortus deliciarum (Garden of Delights) in order to supply a spiritual exegesis for the women of Hohenbourg. The text within focused mainly on the Salvation History with sections throughout that focused on making the text more relatable in an earthly since; text was accompanied by brilliant illuminations, which warned, not only against mortal sin, but also the malevolence of men. Herrad was a scholar in a time when the patriarchy of Europe ruled without the understanding of the necessity for the education of women. She was greatly influenced by not only contemporary materials but also by philosophical texts of classicism; this allowed her to create the Hortus: A text that would not only educate the women of the Hohenbourg Abbey, but also break the stereotype of ignorant women in the 12th century monastic tradition. The Hortus was destroyed in a fire that took place in the Strasbourg Library in the year 1871 resulting in the wake of the Franco-Prussian War. Luckily, there were copies made of the text prior to its loss. Therefore, scholars may examine the text and image synthesis and realize the intentions of Herrad of Hohenbourg in her secluded female convent in Alsace. This women has hardly been spoken for amongst the realm of feminist art history; her contributions to the visual culture of the 12th century are simply too great to overlook. This research hopes to map out the historical context of the 12th century, and to explore the Hortus deliciarum in order to further convey the excellence of Herrad's contributions to female monastic tradition.

Student Researcher: Quyen Huynh
Major: Physics

Research Mentor(s): Dr. Hai Nguyen
Project Title: Applications of a Fabry-Perot Interferometer

My research will highlight how to set up a Fabry-Perot Interferometer including the results from our new Fabry-Perot Interferometer and applications of a Fabry-Perot Interferometer in the real world. Fabry-Perot Interferometers use the interference of waves to analyze the finesse or resolution of a light source. The set-up of a FPI involves the alignment of many optical pieces, which all contribute to the accuracy of this instrument. This FPI was included in a larger set-up to study the behavior of light. I will also be dicussing applications of my research in the real world, including optical electronic sensors and detectors; and the importance of studying fundamental physics principles through a simple set-up like this one.

Student Researchers: Tolulope Idowu, Brittany Harris, Hung-I Ho and Tierra Clay
Major: Chemistry
Research Mentor(s): Dr. Randall Reif
Project Title: Determining the Arsenic Concentration in Tattoo Ink

Millions of people in the world obtain new tattoos every year for various reasons. While they may know of the dangers from improperly sterilized needles, they may not be as familiar with the chemical dangers due to the compounds that make up tattoo inks. Poor quality inks can contain chemicals such as arsenic, which at high enough concentrations within the body can cause lesions, changes in pigmentation, and various cancers. These possible side ailments are reasons why the arsenic concentration of tattoo inks needs to be known. The permissible exposure for arsenic is set at 0.3 micrograms per kilogram body weight per day. The arsenic concentration in tattoo ink can be determined by performing an indirect titration. The ink would be digested and a reduction performed to change arsenic (V) to arsenic (III). This would then be reacted with variamine blue, which would bind to iodine, and the product would be measured by a spectrophotometer. The absorbance value can then be compared to those from standards to determine the concentration of arsenic. With this, the quantity of tattoo ink an individual can expose their skin to per day can be more thoroughly monitored and any possible ailments can be avoided.

Student Researcher: Lauren Johnson
Major: Biology
Research Mentor(s): Dr. Deborah Zies
Project Title: Cloning the Promoter Region of the Human RAI1 Gene

Smith Magenis Syndrome (SMS) is a genomic disorder that affects about 1 in 25,000 individuals and results in multiple congenital abnormalities and intellectual disabilities. SMS is caused by the deletion or mutation of the retinoic acid induced 1 (RAI1) gene. The goal of this research is to clone the RAI1 promoter region. Due to the high number of repeated sequences in the RAI1 promoter region, cloning has been problematic; however, we hoped to overcome these problems by modifying polymerase chain reaction (PCR) and utilizing Southern Blotting. PCR is the most commonly used method for amplifying and cloning DNA and the first method we attempted. We first attempted PCR with modifications to magnesium concentrations, adding BSA, altering conditions for gel electrophoresis, and switching to Perfect Taq. Gel electrophoresis of PCR products revealed multiple, almost indistinguishable bands as well as a large portion of DNA and primers that didn't react. Our adjustments to the PCR conditions did not improve band quality. Therefore, we switched our focus to Southern Blot. Currently, we are hopeful that this technique will allow us to clone the RAI1 promoter region so that research into its role in Smith Magenis Syndrome can be continued.

Student Researcher: Anna Kania
Major: Biology
Research Mentor(s): Dr. Theresa Grana
Project Title: Silencing of Essential Genes in Free-living Nematodes Resembling Parasites

The technique of RNA interference (RNAi) allows for a rapid, gene-specific inactivation of expression of an individual gene of interest by utilizing the endogenous defense mechanism against viral infections. RNAi accelerated the study of gene function in many organisms. However, this valuable reverse genetic tool has been either unsuccessful or unreliable in the study of human- and animal-parasitic nematodes. My goal is to

evaluate the efficiency of RNAi in inhibiting gene expression Rhabditis nematode species that have the potential to serve as excellent models for the study of the parasitic nematode. The gene chosen for silencing, dif-1, is an essential gene that encodes a protein required for proper tissue differentiation in a developing embryo. Bacteria engineered to express dsRNA complementary to the gene of interest will be used to induce the silencing mechanism in the nematodes. The final results of my study will identify RNAi susceptible species. Those strains could be used by other researchers to the study of gene functions in many human- and animal-parasitic nematodes and thus contribute to eradicating many diseases by identifying drug target genes. Furthermore, my findings will contribute to the literature by providing more information on the inter- and intraspecific variation in the susceptibility to experimental RNAi . Additionally, results of this study are going to add to the literature by providing more information about the susceptibility of various nematodes species to RNAi.

Student Researcher: Hannah Kass
Major: Chemistry
Research Mentor(s): Dr. Janet Asper
Project Title: Polymers - The Cure for Cancer?

Polymeric nanoparticles (NPs) present a relatively new development in the field of cancer diagnosis and treatment. Polymeric NPs are composed of a biodegradable polymeric core, poly(ethylene glycol) coating, and a biologically active ligand on the periphery. This ligand allows for active cell targeting. Ligand incorporation has been found to increase NP endocytosis in many cancer cell strains. Imaging agents and therapeutic agents, such as small-molecule drugs, are also incorporated. Polymeric NPs exhibit many important characteristics including the ability to degrade and safely release encapsulated agents, to go undetected by the immune system, to be visualized via incorporated imaging molecules and to be cell specific. Treatment with polymeric NPs comes in two forms: release of encapsulated anticancer agents such as paclitaxel and photodynamic therapy. Compared with conventional methods of cancer treatments, polymeric NPs present a more efficient and more manageable form of therapy.

Student Researchers: Anisa Kaur, Sandrine Ly and Orlando Stewart
Major: Chemistry
Research Mentor(s): Dr. Leanna Giancarlo
Project Title: Shining a Light on Inter- and Intramolecular Forces: A Spectral Investigation into Hydrogen Bonding

Flavonols are a class of polyphenolic secondary metabolities that are found in a variety of fruits, vegetables, and beverages.1 With the ability to tautomerize easily in the excited state, flavonols exhibit a dual fluorescence that results from an excited state intramolecular proton transfer (ESIPT) allowing for visual detection of inter- and intramolecular hydrogen bonding. Using fluorescence spectroscopy, the effects of temperature, solvent, and substituents on the ESIPT process of four flavonols, 3-hydroxyflavone, galangin, quercetin, and kaempferol, were determined. Room temperature studies in hexane, ethanol, and THF produced green emissions, verifying the favorable ESIPT process that occurs in 3-hydroxyflavone. Similarly, temperature studies at 313 K showed increased green emission in all solvents indicating the kinetic favorability of ESIPT. At 173 K, however, a blue emission was observed in ethanol, revealing the ability of a polar solvent to hinder the ESIPT process in 3-hydroxyflavone through intermolecular hydrogen bonding. Substituent studies showed no significant effect on the observed emissions of the flavonols. The photophysics behind ESIPT in these systems will be discussed.

Student Researcher: Amy Larsen
Major: International Affairs
Research Mentor(s): Dr. Surupa Gupta
Project Title: Free Trade in India: A Debate

My poster will be organized by sectors of the Indian economy and why or why not they are supportive of free trade in the Southeast Asia. I will highlight what areas in the region pose the

greatest competitive threat to each sector. I will also include what measures the Indian government took to protect these sectors within the frameworks of Indo-ASEAN and RCEP.

Student Researcher: Juliana Laszakovits
Major: ACS Chemistry
Research Mentor(s): Dr. Charles Sharpless
Project Title: A polychromatic method to determine the wavelength dependence of singlet oxygen quantum yields for natural and effluent organic matter

Colored dissolved natural organic matter (CDOM) and effluent organic matter (EfOM) are important aquatic photosensitizers. They can alter the fate of organic pollutants through the production of reactive oxygen species, including singlet oxygen ($^1O_2$). Recent studies demonstrate higher $^1O_2$ quantum yields (Φ_{1O2}) for EfOM than CDOM, suggesting that pollutants in wastewater-impacted waterways may photodegrade more rapidly. Predicting $^1O_2$ production rates requires knowledge of the Φ_{1O2} wavelength dependence. Traditionally, a discrete wavelength approach using band pass filters has been used to determine the spectral distribution of Φ_{1O2}. This approach, however, is time-consuming due to low intensities of light and the limitation that only one sample can be irradiated at once. We have explored the polychromatic approach to determine the wavelength dependence of Φ_{1O2}. A solar simulator and a series of eight long pass filters with increasing cutoff wavelengths are used to simultaneously irradiate up to 16 samples. To generate the spectral distribution of Φ_{1O2}, furfuryl alcohol was used as a chemical probe to determine the steady state concentration of $^1O_2$. CDOM samples showed an increase in Φ_{1O2} (ranging from 0.46 to 3.2%) while EfOM displayed a similar trend ranging from 0.37 to 5.5% with decreasing wavelength, 435 to 295nm.

Student Researchers: Juliana Laszakovits, Kelly McDaniel, Zaire Sprowal and Matt Walters
Major: Chemistry
Research Mentor(s): Dr. Randall Reif
Project Title: Determination of Heavy Metal Pollution in UMW's Soil using ICP-AES

Heavy metal pollution, which has become more common due to increasing anthropogenic activities, can have a wide range of effects on local ecosystems. Some of these metals, known as micronutrients, are needed in trace amounts to sustain life; however, when their concentration exceeds physiological necessity they can pose serious health risks. Common heavy metal contaminants include cadmium, lead, chromium, and aluminum, while common micronutrients include manganese, copper, iron and zinc. The impact of recent construction on heavy metal top soil pollution levels within the Fredericksburg Campus of the University of Mary Washington (UMW) will be assessed. Top soil samples will be collected from Jefferson Square and the amphitheatre to provide a background measurement of the metal content in soil on UMW's Fredericksburg campus. These will be compared to samples collected from current and recent construction sites (Randolph and Mason, the Information and Technology Convergence Center, and the University Center). The soil samples will be digested in an aqua regia solution and subsequently analyzed via inductively coupled plasma atomic emission spectroscopy (ICP-AES). This analysis will be used in conjunction with calibration curves prepared with standards of known concentrations to determine the concentrations of aluminum, iron, manganese, and copper. The comparison of these metal concentrations will reveal the impact these construction sites may have had on the UMW campus.

Student Researcher: Ellynn Loftus
Major: Spanish
Research Mentor(s): Dr. Betsy Lewis
Project Title: Sor Juana Inés de la Cruz: la "Santa Catarina" para la educación de las mujeres en el siglo XVII

Esta investigación se enfoca en dos obras específicas de la monja y poeta mexicana del siglo diecisiete Sor Juana Inés de la Cruz. Se considera Sor Juana como la "primera feminista del Nuevo Mundo" por el tono y los temas de su poesía y prosa. Pero eran las obras que se escribieron casi al final de su carrera literaria y su vida que consolidaban su "fama" como una feminista hoy en día y una defensora de la educación de la mujer. En los años 1690, se criticó Sor Juana por escribir un análisis teológico y crítico de un sermón de Antonio

Vieira. Como respuesta, Sor Juana escribió su obra reconocida *Respuesta a Sor Filotea*, una autodefensa de cuarenta páginas que no solamente era un testimonio personal de su amor por el aprendizaje sino una defensa de mujeres por lo general que desean educarse. Este mismo año que se publicó su *Respuesta*, ella terminó de escribir once villancicos en honor de la Santa Mártir Catarina de Alejandría. Las obras son notablemente similares con respecto a paralelos sutiles pero específicos entre la biografía de Sor Juana y la de Santa Catarina, los temas de la capacitación y el fortalecimiento de las mujeres, el apoyo por la voz de la mujer y la estructura retórica de las obras. Es la meta de esta investigación hacer una comparación y contraste entre las dos obras y establecer que Sor Juana no solamente usó su *Respuesta* como una manera de expresarse sino también usó sus villancicos como otro vehículo para imponer su punto.

Student Researcher: Isabelle Malouf
Major: Biology
Research Mentor(s): Dr. Dianne Baker
Project Title: Long Term and Acute Effect of Atrazine on Sexual Development of Zebrafish

Increasing evidence indicates that atrazine, a commonly used agricultural herbicide, acts as an endocrine disrupter. In several vertebrate studies, acute short-term exposure to atrazine has caused feminization. However, it remains unclear how atrazine mediates these effects. This study focuses on the effects of atrazine on gene expression of enzymes that are key to the synthesis of sex steroids: cytochrome p450 aromatase (cyp19), 17β- hydroxysteroid dehydrogenase (17b-HSD), vitellogenin (vtg), and steroidogenic acute regulatory protein (StAR). Cyp19 plays a key role in feminization as it converts testosterone, a masculinizing hormone, to estradiol, a feminizing hormone. 17β- HSD also produces estradiol, by converting estrone, into estradiol. Vtg, an egg-yolk protein precursor, is commonly used in toxicology studies as an indicator of feminization. StAR transcript levels indicate the amount of cholesterol being shuttled into the steroidogenic pathway. To test for effects of atrazine on expression of these genes, triplicate tanks of juvenile zebrafish (Danio rerio) were exposed from days 20-35 post-fertilization to either 400μg/L of atrazine, 0.05μg/L estradiol, or control water. After the 15-day treatment, six fish were collected from each replicate tank and anesthetized, and viscera were collected. Total RNA was extracted from each sample and converted into cDNA by reverse transcription and quantitative PCR (qPCR) assays were developed to measure transcript levels of each gene. Differences in transcript levels among treatments are now being assessed. Following the analysis of juveniles, remaining zebrafish from each treatment will be dissected at maturity, gonads and liver will be removed, and RNA will be extracted. Transcripts of vtg will be measured in the liver and transcripts of cyp19, 17β-HSD, and StAR will be measured in the gonads. The results of this study will contribute to the discussion of the safety and continued use of atrazine.

Student Researcher: Matthew C. McLear
Major: Chemistry
Research Mentor(s): Dr. Janet Asper
Project Title: New methods for the synthesis of spider silk-like polymer fibers

Spiders can produce highly resilient and elastic proteins, which has long mystified the scientific community regarding not only their means of production, but also their exact composition and why they possess such powerful attributes. Spider silk fibers are known to be 6 times stronger than nylon or steel fibers of equal diameter. This incredible strength is also paired with highly elastic properties. The spider silk fiber can be stretched as much as four times its size and still return to its previous form displaying its resilient properties. The fiber's powerful properties have created a large demand for a method to synthesize these fibers from many different types of manufacturers. Its potential applications range from the fields of medicine and defense, to everyday commercial use such as parachute cords and other highly elastic products.

Unfortunately, it is not possible with current means to utilize spider silk fibers themselves. Taking silk directly from spiders provides insufficient yields for commercial use and applications. An alternate means of production must be attained to form a fiber with comparable qualities. There are two main routes being explored for the fiber's production: a chemical synthesis for spider silk-like polymers as well as a method utilizing recombinant spider DNA technology which creates the fibers in much the same way actual spiders

do. While both of these routes show promise, neither has found widespread success; further exploration is needed.

Student Researcher: Alaina Morello
Major: Mathematics
Research Mentor(s): Dr. Keith Mellinger
Project Title: Clifford embeddings: a problem in quantum coding theory

Error correcting codes allow information to be transmitted over noisy channels in a way that the original message can be recovered if the data was corrupted. Fault tolerant quantum computation would allow the information to be encoded and decoded imperfectly and still retain its original state. Quantum computers in actual existence are limited to a small amount of operations on a few qubits but large scale quantum computers promise to provide computational capabilities believed to be infeasible under our current classical systems, as indicated by Shor's fast factoring algorithm and Grover's search algorithm, for example. Our work focuses on a particular technique for performing quantum coding theory and reduces to a problem in abstract algebra.

Student Researchers: Laura Morris and Megan Blosser
Major: Psychology
Research Mentor(s): Drs. Mindy Erchull and Miriam Liss
Project Title: Eye Trackers and Objectification: Through the Eyes of an Undergraduate Research Student

For our undergraduate research, we worked alongside members of a 491/492 Psychology research team. We used an eye tracker to record what parts of student election campaign materials were viewed most often by participants. An eye tracker is a device for measuring eye position and eye movements. In the past, eye trackers have been used in research on objectification to see which parts of the female body receive the most attention from viewers. It is commonly known in objectification research that women who are objectified are also perceived in a negative way. The team we worked with used the eye tracker to measure objectification and a survey to assess perceived competency in women who are dressed in a more revealing fashion versus women who are dressed more conservatively. Our role in this project was to collect data using the eye tracker. We assisted in calibrating participants, presenting consent and debriefing forms, and administering a survey. This poster is centered on the use of the eye tracker and the view of a 491/492 research team through the eyes of undergraduate research students.

Student Researcher: Rebecca Na
Major: Chemistry
Research Mentor(s): Dr. Janet Asper
Project Title: Pyrolysis of Waste Plastic into Synthetic Fuel

Poly(ethylene) Terephathalte (PETE) is a common plastic that can be found easily anywhere from plastic bags to plastic containers. The need for more techniques in recycling plastics is in demand to reduce the accumulating nonrenewable waste. Pyrolysis is a process where it cracks the PETE polymer into smaller chains under heat and pressure to produce liquids, wax and gas. Temperature and heating rate is a huge factor in producing synthetic fuel which will be discussed. The temperatures effect creates different types of crack along the polymer; random, end chain, chain cracking. The products were separated by distillation and analyzed by Gas Chromatography, Spectroscopy (GCMS).

Student Researchers: Miles Neilson and Chris Moulton
Major: Environmental Geology
Research Mentor(s): Dr. Neil Tibert
Project Title: A Millennial Record of Oyster Colonies In The Central Potomac Estuary Along The Northern Neck Of Virginia

The Potomac River, a tributary of the Chesapeake Bay, was once the home of a successful habitat of the American Oyster, Cassostrea virginica. Historical Records of the region indicate an abundance of oyster beds

throughout the 17th and 18th centuries. However, current surveys indicate a stark absence of major beds within the central estuary. Regional agricultural activity, sea level rise, nutrient runoff, disease, and overharvesting contributed towards intense sedimentation and the decline of the oyster population. The objective of this study is to retrieve short sediment cores for the purposes of radiometric geochronology. The associated data will work in tandem with the geophysical Compressed High Intensity Radar Pulses (CHIRP) in order to assess the spatial-temporal distributions of oyster beds spanning the past several decades.

The portion of the Potomac River in Westmoreland County, Virginia is a tidally affected oligo-mesohaline, partially mixed estuary. Short cores (0.5-1.2m) retrieved off the coast of the county yield brown, silty clay that transitions to grey clay in which stratified Crassostrea virginica shell beds were found below ~72 cm. Radiometric dates of the oyster based skeletal carbonate yield an uncorrected AMS 14 C age of 795± 15 yrs. Assuming a carbonate reservoir effect of 400 years, the approximate age of the beds are early to late 17th century. Calculated sedimentation rates based on Cesium-137 peaks of extracted cores (20-21cm) support the derived age. Various CHIRP transects across a ~1km 2 grid atop the coring locations reveal two strong "mound shaped" reflectors at approximately 1m and 5-8m below the sediment-water surface. These reflectors collectively depict a gently sloping, up streak stacking pattern along the axis of the Potomac. The dominant mound near the positon of the core is 1-3 meters in depth below the sediment surface and has a 150 x 100 meter geophysical extent.

The acquired data suggests that multiple mound shaped oyster beds were actively developing prior to land inhabitation and clearance of the region. The mound structure's stratigraphic stacking patterns are attributed to a late Holocene 1-2mm/yr sea level rise, stemming from Glacial Isostatic Adjustment. Decline of the oyster beds was likely induced by increased sedimentation during the mid-19th century that correlated with changes in salinity and temperature stratification at the end of the Little Ice Age.

Student Researchers: Teresa Nguyen and Sydney Welch
Major: Biology
Research Mentor(s): Dr. Abbie Tomba
Project Title: Molecular Identification of Trematodes In the Rappahannock River Using Mitochondrial Cytochrome C Oxidase Subunit 1

Digenetic trematodes are parasitic flatworms whose primary intermediate hosts are snails and definitive hosts are vertebrates. Larval trematodes castrate snail hosts, potentially affecting host populations within a community, as well as alter host interactions with freshwater ecosystems. Determining individual species would be invaluable in gaining a comprehensive understanding of trematode biodiversity and their ecological effects within the Rappahannock watershed. Due to their morphologically cryptic larval stages, molecular techniques are essential in identifying species within snails and determining specific lifecycles. The mitochondrial cytochrome c oxidase subunit 1 (COI) gene is highly conserved with low conspecific divergence, and serves as a "DNA barcode" to distinguish between closely related species. DNA was extracted from larval trematodes from snails previously collected within the Rappahannock and Little Rivers (Fredericksburg, and Hanover Co., VA). COI genes were then amplified using PCR with trematode specific primers, and sequences were obtained (ACGT, Inc.) and analyzed using Geneious. Interspecific comparisons were made through the construction of pairwise alignments and neighbor-joining phylogenetic trees. Out of the 26 samples digested, 15 were successfully amplified. Eight of these were sent for sequencing, 5 of which were sequenced successfully. COI genes from all 5 parasite samples were between 377-446 bp in length. The phylogenetic trees created suggest that samples N2 and N3 are a single species belonging to the order Echinostomida. N8 and N16 represent a species within the family Collyriclidae, as does N13. More sequencing is currently underway.

Student Researchers: David Nunez, Lonnie Harris and William Davis
Major: Biochemistry
Research Mentor(s): Dr. Kelli Slunt
Project Title: Analysis of Biological Samples by Inductively Coupled Plasma Atomic Emission Spectroscopy

The purpose of this experiment is to determine the applicability of inductively coupled plasma atomic emission spectroscopy (ICP-AES) to analyze biological samples. ICP-AES utilizes argon plasma to excite metal ions in solution. The ions then emit light of a specific wavelength, with the intensity of the emission related to the ion's concentration. Apples stored for long periods of time develop a condition known as a bitter pit, which is characterized by brown lesions on the skin with bitter flesh beneath. This condition is linked to a deficiency in calcium and other metal ions. By determining the concentration of calcium ions and the ion ratios of calcium to magnesium and potassium by ICP-AES, one can predict whether an apple will develop this condition. A calibration series of these three ions will be used to determine their concentration in four varieties of store bought apples. A second application tested is determining the concentration of myoglobin by measuring the concentration of iron in a protein sample. Myoglobin is an oxygen binding protein that contains one iron ion per molecule. By measuring these ions, one can determine the concentration of myoglobin in solution. This method will utilize an iron standard addition, which will determine if the iron bound to the protein is measurable. Results of these studies will be presented.

Student Researchers: Beatrice Ohene-Okae and Zakaria Kronemer
Major: Environmental Science
Research Mentor(s): Dr. Eric Bonds
Project Title: Fossil Fuel Extraction and Violence

The fossil fuel industry is responsible for various instances of violence throughout the world, both direct and indirect. Our research initially focused on the extraction of fossil fuels from the companies with the largest amount of carbon reserves. It eventally evolved into a stronger, more focused endevor to look into not only the extraction but also the types of violence used to marginalize different groups of people around the world to continue this extraction.

Student Researcher: Eynav Ovadia
Major: Art History
Research Mentor(s): Dr. Marjorie Och
Project Title:

As part of the special event hosted by the Department of Art and Art History, I will discuss the artwork of Lily Cox-Richard, in particular, her preparatory technique. Like many artists, Cox-Richard makes preparatory sketches of her ideas before turning them into sculpture. I will examine several of these sketches and look at possible influences, specifically those from the High-Renaissance tradition. Cox-Richard's artistic style can be described as classical, and in my discussion I will compare her highly detailed and realistic drawings to those of Michelangelo, a sculptor who, like Cox-Richard, made many highly detailed preparatory sketches for his work.

Student Researcher: Alexandria Parrish
Major: Art History
Research Mentor(s): Dr. Joseph Dreiss
Project Title: The Readymade and its Legacy: An Historical Overview and Critical Reassessment of Duchamp's Tradition of the Ordinary

This project focuses on the readymades of Marcel Duchamp and the impact made by these influential "anti-art" sculptures on the value of aesthetics in art. Duchamp's readymades and the concepts that informed them have had a profound influence on art since the mid-20th century. In American art, Duchamp's influence is a determinant of the art of the Neo-Dadaists of the 1950s, whose works blur the line of distinction between art and life. Readymades were created by Duchamp as a solution to what he called "retinal art," and were intended to provoke thought from the viewer on the nature of art more so than to illicit a response to the visual object. Duchamp's readymades were initially met with much disparagement. Though some art critics look fondly on Duchamp's experimental art, many take a decidedly negative stance. One such critic, Donald Kuspit, believes strongly that the work of Duchamp signals the end of fine art altogether. Because of its denial of aesthetics, Duchamp's work has had major consequences which both positively and negatively affect the nature and value of the aesthetic experience.

Student Researcher: Ciara Peacock
Major: Political Science
Research Mentor(s): Dr. Rosalyn Cooperman
Project Title: The Unheard Voices of U.S. K-12 Education Policy: No Child Left Behind (NCLB) and Student Perspectives on Public Education

Since the 1960s, education policy has transformed from a state-handled matter, to a national issue, with billions of dollars in federal aid being sent to all 50 states each year. The development of federal funding was an important step in supporting poor states to create better school systems, but over the past 50 years education policy has failed to establish schools that provide excellent educations to American students. No Child Left Behind was established in 2002 to ensure a good education for every child, but the policy's accountability and school choice measures failed to combat issues with achievement gaps and high need students. In this paper I will examine policy reforms and programs following No Child Left Behind, and introduce the various voices of the education reform movement. An important voice has been left out of this movement, and that is the voice of the student. This paper addresses the missing voices of education reform, and considers possibilities of how to enhance the student experience in the U.S. public education system.

Student Researchers: Jillian Powers and Tammy Prescott
Major: Geology
Research Mentor(s): Dr. Neil Tibert
Project Title: Microfossils as Proxies for Sea Level Rise in the Chesapeake Bay

Agglutinated foraminifera are unicellular organisms that thrive in coastal salt marshes with a well-known vertical zonation as related to the regional tidal range in estuaries. Assemblages retrieved from sediment cores at Wilkerson Creek, a tributary of the Potomac River, can be used to evaluate late Holocene marsh development in the Chesapeake and can also be used as proxies for late Holocene sea-level rise in the region.

Cores were collected using a Livingstone Corer. Census counts were made by separating each 1 cm interval of pre-cleaned sediment by size (125 μm, 250 μm, and 500 μm) and placing microfossils on observation slides for identification and cataloguing. Microfossil images were captured using a scanning electron microscope (SEM).

A 6.0 m sediment core comprises two primary lithofacies that include a basal grey clay facies (2.55-6.0 m) and an upper peat- and organic-rich mud (0.0-2.55 m). Corresponding microfossil assemblages including *Ammobaculites dilatatus*, *A. crassus*, and *A. exiguus* are dominant in the grey clay lithofacies where organic matter is sparse. *Miliammina fusca*, *Ammoastuta salsa*, and *Tipotrocha comprimata* characterize the peat and organic material clay facies in the uppermost 2.55 m of the core. Agglutinated testate rhizopods (Thecamoebians) are locally abundant in the rooted zones. AMS14C dates indicate an age of 3050±25 YBP at the grey clay-peat transition.

The grey clay facies dominated by *Ammobaculites spp.* is consistent with an estuarine environment below the mean low water zone and therefore indicate water depths exceeding 1 m. The prevalence of *Miliammina fusca* and thecamoebians is an indication of significantly lower salinities in the coastal marshes and therefore can be used as a past indicator of sea level ranges of 0-1 m. The overall trends in the Wilkerson Creek core demonstrate a pattern of initial sea level rise and estuarine conditions giving rise to a salt marsh that prograded soon after the Medieval Warm period.

Student Researcher: Sabia Prescott
Major: Linguistics
Research Mentor(s): Dr. Judith Parker
Project Title: Perceptual Dialectology and the Attribution of Responsibility: On Narrating Sexual Assault

This study analyzed data from an online survey to determine the effects of language ideologies and dialect perception on narrators of sexual violence. The text focuses specifically on how perceptions of African American Vernacular English can affect the extent to which a speaker is attributed responsibility. Participants in this study (N=32) were asked to answer questions after reading a fictional story told in first person, either

in Standard American English or African American Vernacular English. The results discuss how dialect perceptions are created and maintained, and how they can affect the emotional recovery process of victims of sexual violence.

Student Researcher: Alex Priest
Major: Biology
Research Mentor(s): Dr. Lynn Lewis
Project Title: Identification of Inhibitors of Fatty Acid Synthesis Enzymes in *Mycobacterium smegmatis*

Antibiotic-resistant strains of *Mycobacterium tuberculosis* have rendered some of the current treatments for tuberculosis ineffective, creating a need for new treatments. Today, the most efficient way to find new drugs to treat tuberculosis and other diseases is to use virtual screening to quickly consider millions of potential drug candidates and filter out all but the ones most likely to inhibit the disease. These top hits can then be tested in a traditional wet lab to determine their potential efficacy. Using supercomputers, we screened over 4 million potential drug molecules against each of two enzymes that are critical to the survival of *Mycobacterium tuberculosis*. During this process, we determined the top 56 candidate molecules to test in the wet lab. Our analysis of these chemicals has shown a few patterns in their structure related to the conformation in the binding pocket of the enzyme. We have chosen five compounds from this list representing different functional classes, and we used the antibiotic Isoniazid as a control. We have chosen *Mycobacterium smegmatis* as a model organism to replace *M. tuberculosis* in our research. In order to test the selected compounds, we have used a Spot Culture Inhibition Assay (SPOTi), which uses serial dilutions of the test compound mixed into six well agar plates to determine the Minimum Inhibitory Concentration (MIC) of each compound. Data collection is ongoing at the time of this writing.

Student Researchers: Andrew Quarles, Alex Ankerson, Suzanne Obetz and Prudence Sheffield
Major: Historic Preservation
Research Mentor(s): Dr. Andrea Smith
Project Title: Placemaking through a comprehensive redesign of downtown Fredericksburg's Wayfinding Signage and Street Furniture

The Department of Historic Preservation's Preservation Planning Laboratory (HISP 469) class undertook an organized survey and redesign of the Downtown area of Fredericksburg, VA in the Spring 2015 semester. The Downtown Fredericksburg Design Plan is an effort to coordinate the identity of wayfinding (directional signage in and around downtown) and street furniture (i.e.: benches, planters, bollards, street lamps, etc.) for downtown Fredericksburg in order to create a sense of place. The plan recommends design strategies for Downtown and suggests methods for the city's implementation of these designs. The team surveyed the street furniture, wayfinding and sidewalks in the downtown area. Results from the survey suggested that wayfinding in and around Downtown Fredericksburg is highly diversified and inconsistent in design and content. Locations of street furniture are insufficient in general and lack a unified style. The proposed solution for consolidation of a Downtown identity for Fredericksburg involves a completely redesigned wayfinding system and suggestions for the implementation of unique and more effective street furniture. These changes are meant to improve the experiences of visitors and residents alike. This plan would help Fredericksburg become a more walkable town, thus increasing Downtown vitality. Our presentation will start with analysis of existing street furniture and wayfinding in the downtown Fredericksburg Area. We will then discuss our overall approach to and our plans for Fredericksburg's street furniture and wayfinding.

Student Researcher: Ryan Quint
Major: History
Research Mentor(s): Dr. Claudine Ferrell
Project Title: Winning the War, Losing Reconstruction: The U.S. Army's Role in Reconstruction

After winning the Civil War after four years of bloody conflict, the United States Army was at the peak of its success. However, the tumultous and often-misunderstood period of Reconstruction (1865-1877) soon followed, and the Army was thrust into roles it was unprepared for. Between attempting to follow confusing

or unclear orders from both the president and congress throughout the decade of Reconstruction, the Army's frustrating experiences were rendered nill when it was withdrawn from the South in 1877. At the time of its withdrawal the Army's mission in the former rebellious states was largely unfinished, and home rule, terrorism, and the dark period of Jim Crow followed, targeting freed blacks who no longer had the protection of Federal troops. Thus the Army won the war, but lost Reconstruction.

Student Researcher: Jesse Radolinski
Major: Environmental Science
Research Mentor(s): Dr. Michael Bass
Project Title: Comparative Analysis of Non-Tidal, Mitigated, Forested Wetlands in Virginia Piedmont and Inner Coastal Plain

According to USEPA's "No Net Loss," memorandum, wetlands must be created in compensation for any unavoidable impacts resulting from development. Ideally, each individual constructed wetland should become functionally comparable to its natural predecessor. Three constructed non-tidal palustrine forested wetlands (PFO) and one natural PFO were compared based on vegetative proliferation and soil physiochemical characteristics. Vegetation parameters included woody stem counts, a list of total wetland flora, Basal Area (BA), and Diameter at Breast Height (DBH) measurements. Soils were flooded using synthetic-enriched freshwater (with naturally occurring concentrations of NH_4-N and PO_4-P) for 72 hours and measured for N exchange/release and P sorption/desorption, in order to approximate biogeochemical nutrient cycling as a result of prolonged inundation. All wetland soils released N (2.65-13.6 mg NH_4-N/m^2). P sorption/desorption ranged from -4.35 mg PO_4-P/m^2 (desorption) to 16.6 mg PO_4-P/m^2 (sorption). The natural wetland (PNWL) supported significantly larger trees (DBH=13.1±9.86 cm) (BA=9.93 cm^2 ha^{-1}) ($p<0.0001$) than constructed sites, the lowest density of woody stems (1102 ws ha^{-1}), the lowest species richness (SR=14), while also containing the most phosphorus and percent OM through a depth of 30 cm. Overall, the 19 year old SMWL differed significantly from PNWL with a higher density of predominantly small trees (4095 ws ha^{-1}) ($p=0.046$) (DBH=0.99±0.96 cm) and sandy entisols which show a drastic reduction in soil quality with depth. Underdeveloped, anthropogenically altered soils (udorthents) found in SMWL and intense beaver activity have likely limited success for this constructed PFO. NH4-N release in these wetlands was presumed to be the result of significant microbial N-fixation under anaerobic flood conditions. Findings suggest that special attention be paid to initial soil conditions during construction and underline the complexity of flood-induced nutrient cycling in wetlands especially relevant as sea level rise and increased precipitation may result in more flood-prone wetlands in many transitional fluvial systems.

Student Researcher: Ellen Paige Receveur
Major: Classics: Latin
Research Mentor(s): Dr. Angela Pitts
Project Title: Catullus and the Spectrum of Roman Masculinity: Analyses of Poems 16, 63, and 51

Catullus, a master of hendasyllabics, excelled at his ability to change his style throughout his body of work. Since ars longa, vita brevis, Catullus was moved to create a legacy to withstand the test of time. This sophisticated poet realized he had the capability to play – literally ludere – with his genre and especially with gender. He revolutionized how the Roman world would define masculinity forever. His poetry portrays each gender – masculine, feminine, and neutral – that fit a certain persona that is still distinctly Catullan. However, there were many definitions of what it meant to be a man according to Roman traditions. Since Catullus included all genders in his body of work, traditional Roman men would not have considered him a true male. To be a masculine man – a virilis vir – a Roman must act like a man and cannot allow himself to be even remotely feminine. Any stray from masculinity was enough to define a man as feminine. When analyzing the genders of Catullan poetry, Catullus' narrator is distinctly feminine. He allows himself to be related to such feminine poems – such as his pleading for kisses in poem 5 or his description of his Sapphic romance in 51. No matter the masculine language found in his attack poems – such as 16 – the display of femininity negate this. Catullus' span of gender – from masculine virilis to effeminate effeminatus and finally womanly muliebris – prove that Catullus as a narrator is in fact feminine.

Student Researcher: Claire Reilly
Major: Chemistry
Research Mentor(s): Dr. Janet Asper
Project Title: Stress and Drying Behavior of Synthetic Latex

Latex is a polymer can be harvested from plants, or synthetically made, to create common house hold items like rubber gloves, paints and Band-Aids. Latex is synthesized from a collection of polymer particles suspended in an aqueous medium, and is known to be used for its elasticity and its durability. This research will be exploring the relationship between naturally and/or synthetically made latex films and their stress and drying behavior under different circumstances. These relationships will be related to a product familiar to many college students: contraception or condoms. This project will relate the stress and drying research done by professionals to stress and drying behavior of condoms. The purpose of this research is to determine how the understanding of these characteristics can lead to improvements in condom technology.

Student Researchers: Claire Reilly, Rebecca Na and William Thomas
Major: Chemistry
Research Mentor(s): Dr. Randall Reif
Project Title: Experimental Determination of Iron Content in Common Vegetables

Iron is an essential nutrient for the human body and is the building block for hemoglobin, the protein that carries oxygen from the lungs to the entire body. The recommended amount of iron for the average adult male is about 8 mg each day, and 18 mg for the average adult female. Obtaining the amount of iron necessary in a daily diet can be more difficult if a person has specific restrictions involving meat or chooses to abstain from meat in their diet such as vegetarians or vegans. Insufficient iron intake can lead to fatigue and shortness of breath and in severe cases, iron deficiency anemia, where adequate amounts of hemoglobin proteins for red blood cells are not produced, greatly reducing the cells oxygen carrying capacity. ICP-AES, inductively coupled plasma atomic emission spectroscopy, will be used to determine the concentration of iron in commonly found vegetables and compare these values to the iron concentration of ground beef. This comparison will be used to aid vegetarians in their dietary choices to provide substantial iron intake in their daily diet. We expect our data to be comparable to the USDA National Agriculture Library literature values for the vegetables used in this experiment: kale, spinach, and beets.

Student Researchers: Jordan Riser, Audrey Ricks, Kenneth Bellamy and Megan Luning
Major: English
Research Mentor(s): Dr. Shumona Dasgupta
Project Title: Terrorism and Film

Our project consists of the analysis of South Asian films pre 9/11 and post 9/11. We have watched and analyzed four different South Asian/Bollywood films that deal with terrorism. We will be presenting our conclusions of major themes that are throughout South Asian film and also the role of terrorism in movies before and after 9/11 and the globalizing and instiller effects of terrorism.

Student Researchers: Alexandra Ritter and Lauren Jennison
Major: Biology
Research Mentor(s): Dr. Stephen Gallik
Project Title: Fluorescence Microscopy Study of Protein Diffusion into Liver Cell Nuclei

The nuclear envelope that surrounds the cell's nucleus is penetrated by thousands of nuclear pores. These pores serve as passageways through which molecules can move between the cytoplasm and the nucleus. The permeability characteristics of the nuclear pores have been studied using whole cells, and it has been established that two types of transport through the pores are possible, simple diffusion, a passive process, and an active transport process. The availability of modern fluorescently-labelled proteins ranging in size from 8,000 to 350,000 Daltons has opened an opportunity to study the diffusion of proteins into the nucleus with fluorescence microscopy. The specific objective of the research project described here is to study the passive diffusion of 2 fluorescently-labelled proteins, alpha-bungarotoxin, mol.weight 8,000 Daltons, and bovone serum albumin, molecular weight 66,000 Daltons into nuclei isolated from crude rat liver homogenates rather

than in a whole cell system. The methods used in this study are based on long-established simple techniques used for the isolation of rat liver nuclei from crude rat liver homogenates. Either fluorescently-labeled alpha-bungarotoxin or fluorescently-labeled bovine serum albumin were added to crude rat liver homogenates and incubated for 30 minutes. The nuclei were isolated from the homogenates, washed, and viewed with a fluorescence microscope. The qualitative results suggested that alpha bungarotixin, with a molecular weight of 8000 Daltons, rapidly diffused into the live cell nuclei while bovine serum albumin, with a molecular weight of 66, 000 Daltons, diffused far more slowly. These results are consistent with the results reported in other studies using whole cells rather than homogenized cells and validates the use of crude cell homogenates for the study of protein diffusion into nuclei.

Student Researcher: John Robie
Major: Physics
Research Mentor(s): Dr. George King
Project Title: Railguns and Electromagnetic Propulsion

The purpose of this talk is to describe and explain the physics principles and design of the electromagnetic railgun, and the results of the project. The talk will cover the use of Biot-Savart's Law in determining the magnetic field produced by the rails. It will cover the applications of the Lorentz force on a current carrying wire within the system. It will also describe the general design of an electromagnetic railgun and the engineering challenges involved. Finally, the talk will cover the successes and failures of the design used, as well as areas of future development.

Student Researcher: William Rodriguez
Major: Biology
Research Mentor(s): Dr. Lynn Lewis
Project Title: Study of Bacillus Bacteriophage Lysogeny and Propagation Following Sporulation

The purpose of this study is to determine whether or not previously isolated *Bacillus* bacteriophages from the University of Mary Washington's Phage Hunters program were lysogenic in nature or lytic. I also sought to determine whether a lysogenic *Bacillus* bacteriophage can be reproduced after the host has undergone sporulation and the spores have been exposed to ultraviolet light and regrown on a medium. The host bacterium for this study was *Bacillus thuringiensis subs. Kurstaki* and the medium used to propagate this host, infected with a bacteriophage or other otherwise, was trypticase soy agar/ trypticase soy broth (TSA/TSB). The bacteriophages chosen for this study were UMAWPhantomDancerWR 2014, UMAWChannelFeverKG2014, and UMAWPatriciaKM2014. These three were chosen based on previously observed characteristics that deemed them of interest for further study of their particular lifestyles (lysogenic or lytic). Each lifestyle was determined by first growing bacteria collected from viral plaques created by each bacteriophage in separate TSA plates. These bacteria are potentially lysogens created by the virus. A lysogen is a bacterium that has been infected by a bacteriophage and has instead of being lysed by the phage has had the bacteriophages viral DNA incorporated into its own, saving it from lysis by infection. The spores of these lysogens were then collected and exposed to UV light to determine whether the phages would propagate after sporulation. It was found that UMAWPhantomDancerWR2014 and UMAWPatriciaKM2014 did indeed produce lysogens while UMAWChannelFeverKG2014 did not. All of the lysogens produced by each *Bacillus* bacteriophage could not reproduce the same bacteriophage following UV exposure. The results of this study will be used to better characterize the types of bacteriophages being collected by the Phage Hunter program which will help in later applications of the programs studies.

Student Researcher: Harry Rol
Major: Classics: Latin
Research Mentor(s): Dr. Angela Pitts
Project Title: A Most Fateful Encounter: How Scipio Africanus Defeated Hannibal at Zama

A summary of my senior thesis that goes about answering the question of "How was Hannibal Barca defeated so decisively at the Battle of Zama?" by analyzing the strategy and tactics employed by Scipio Africanus in the events both prior to and during the battle (as depicted by the historical accounts of Livy and Polybius).

Student Researcher: Steven Roper
Major: History
Research Mentor(s): Dr. Claudine Ferrell
Project Title: Red Communists and Silver Screens: The Cold War Through American Film

Always indicative of national mood, film was utilized heavily during the Cold War. In the period of 1945-1991, the United States experienced a shift in concerns and attitudes towards the Cold War that manifested itself in American film. Whereas film's early "Cold Warriors" emphasized the importance of national unity and nuclear readiness in the face of the evil Soviets, later generations began to parody the absurdity of living in fear of total destruction as well as introduce other threats such as the increasingly powerful Maoist China. The films also serve to gauge the nature of the relationship of the United States and the Soviet Union at a given time. Films in the Stalin era such as "The Thing From Another World" and "Invasion USA" paint the Soviets as heartless, destructive monsters while the post-Cuban Missile Crisis films "Dr. Strangelove or: How I Learned to Stop Worrying and Love the Bomb" and "Fail-Safe" paint the Soviets as a nation that can be reasoned with in order to attempt to prevent disaster. While the story of the Cold War is indeed accessible through print, it comes to life when viewed on the silver screens.

Student Researchers: Andrea Sanchez and Sydney Welch
Major: Biochemistry
Research Mentor(s): Dr. Abbie Tomba
Project Title: Identification of Alarm Cue in the Crayfish *Cambarus acuminatus*

Chemical signals are a vital aspect of crayfish interactions. Crayfish use chemical signals to find food, mates and avoid danger. Alarm cues are conspecific damage released chemicals found in crayfish hemolymph, that signal a predation event. Previous research shows that several crayfish species decrease locomotion in the presence of hemolymph. Limited research has been done to identify this molecule. The goal of this experiment is to confirm the presence of an alarm cue in Cambarus acuminatus, and identify the size of the molecule. A paired design was used to determine if C. acuminatus responds to alarm cues. Crayfish were collected from Horsepen Run (Stafford Co. VA). Ten individuals were each exposed to two treatments (food odor alone, and food odor with hemolymph). Food odor increases crayfish's locomotion. A water control was injected prior to each treatment. Crayfish were videotaped for two minutes after control and treatment addition. Then, time that walking legs were moving was measured. To determine the size of the molecule, similar trials were conducted except crayfish were treated with food odor mixed with hemolymph that was either > 30 kDa, 30 >10 kDa, or <10 kDa in size. When treated with food odor the crayfish showed a significantly greater mean change in movement (treatment - control; 39 $\pm$ 7.96 sec $\pm$ SE), than when the hemolymph was present (-25.6 $\pm$ 9.40, $p<0.0004$). Indicating that crayfish decrease movement in response to the hemolymph. No significant difference was seen between the fractions. Prelimanary results suggest that the molecule may be smaller than 30kDa.

Student Researchers: Andrea Sanchez and Tolulope Idowu
Major: Biochemistry / Chemistry
Research Mentor(s): Dr. Kelli Slunt
Project Title: Investigating Genetically Modified foods using Polymerase Chain Reaction

Genetically modified foods were created because farmers needed a way to prevent weeds and diseases from compromising their crops. As the agricultural industry expanded, the size of fields began to grow. Previously used farming techniques were no longer effective, which lead to the use of pesticides and herbicides. Recently, crops that are genetically modified to be either insect resistant or herbicide resistant have been developed. These crops are modified by inserting genes using a plasmid or a gene gun. The gene is then translated and transcribed using a specific promoter sequence, most commonly Cauliflower Mosaic Virus (CaMV 35S). This experiment looks at foods we consume every day, such as Tostito's tortilla chips, Cheetos Puffs and generic brand corn meal to determine if they contain a genetic modification using a technique called Polymerase Chain Reaction that amplifies the CaMV 35s promoter DNA sequence. If a DNA sequence is amplified using PCR with the primer for the promoter sequence than the food product contains a

genetic modification. Results of the study on genetically modified commercial food products will be presented in the poster.

Student Researchers: Riley Scalzo and Virginia King
Major: Biology
Research Mentor(s): Dr. Deborah O'Dell
Project Title: Cell Phone Radiation Induced Gene Expression in Human Glioblastoma Cells

The link between cell phone radiation and the production of brain cancers has not been firmly established, although many governments regulate the amount of radiation permitted in cell phones. Previous studies in Dr. O'Dell's lab indicate an increase in certain oncogenes and a decrease in certain tumor suppressor genes up to 24 hours after a 25 minute exposure to cell phone radiation, followed by a decline in expression by 36 hours, indicating that cell phone radiation can lead to cell cycle changes. Although the changes were reversed, they were not reversed back to pre-exposure levels. We were interested in determining the length of time it took to completely reverse gene expression changes induced by cell phone radiation. We exposed cultured glioblastoma cells to 25 minutes of continuous cell phone radiation. The cells were separated from the cell phone by skeletal, muscle and skin tissue approximating the human skull structure. Whole cell RNA was extracted from the cultured at 24 and 48 hours after exposure and the change in expression was measured using RT-PCR using a commercially available array assessing 84 oncogenes and tumor suppressor genes (Qiagen). The changes in gene expression were analyzed using 2^dCt to measure fold changes. Any gene which showed a change in expression >2 is considered to have significant changes in expression. The results are discussed.

Student Researchers: Rebekah Selbrede and Brittany Simmons
Major: Psychology
Research Mentor(s): Drs. Jennifer Mailloux and Mindy Erchull
Project Title: Interoception and Eating Behavior

Previous research suggests that interoceptive sensitivity, the ability to accurately perceive internal body sensations, is a negative predictor of eating disordered behavior (e.g., Pollatos et al., 2008). The goal of this project was to investigate not only the relationship between interoceptive sensitivity and eating disorder risk, but also relationships between these variables and others that may be related to interoception and/or eating disorder risk, such as loss of control while eating, intuitive eating ability, self-objectification, body surveillance, body shame, and alexithymia. The data will be analyzed to investigate relationships between these variables. Our participants completed a heartbeat counting task, which is an objective and commonly used measure of interoceptive sensitivity, as well as a number of questionnaires.

Student Researcher: Junaid Shahid
Major: Biology
Research Mentor(s): Dr. Deborah Zies
Project Title: Establishment of a Cell Culture System for Measuring the Expression of the Long Non-coding RNA Gas5

Aldosterone, a primary regulator of blood pressure in mammals, functions by complexing with the mineralocorticoid receptor and altering the expression of blood pressure associated genes. It is my hypothesis that Gas5, a newly discovered long non-coding RNA, is also a negative regulator of the aldosterone response. The overall goal of this project is to test this hypothesis by treating mouse IMCD3 cells with aldosterone and measuring changes in Gas5 mRNA expression by real-time PCR. Through my research experience at UF in summer 2014, I was able to learn about long noncoding RNAs, aldosterone, transporter proteins, cell signaling pathways in the kidneys and the molecular techniques used to study them. I gained hands-on experience managing and treating cell cultures in order to perform RNA isolations, RT-PCR, and semi-quantitative and real-time PCR and also western blots. My specific goal here, at UMW, has been to establish the use of these skills and extend the work started at UF. This presentation represents my progress. The establishment of these protocols will help future students investigate the link between Gas5 and Aldosterone. If Gas5 is involved in regulating the aldosterone response then understanding more about

its expression may reveal its effects in blood pressure regulation and facilitate the treatment of cardiovascular disease.

Student Researcher: Amanda Shea
Major: Biology
Research Mentor(s): Dr. Janet Asper
Project Title: Chemical Structures of Fire Safe Polymers and their Applications

Plastics and their derivatives are one of the most commonly used materials in a variety of purposes like packaging of food, in industrial plants and machinery, and in durable and non-durable goods. Plastics are made from fossil fuels that are chemically altered to form a monomer, a single subunit of the plastic, and further altered to combine the monomers to form a polymer, or a multiunit molecule. Polymers have many characteristics, such as high melting temperatures and smoke evolution (release) that can classify them as fire safe. In recent years, there has been a greater need for specifically "fire safe" polymers to be present in aircraft. While these fire-safe polymers are present in fuselage of planes, they are rarely added in homes, where an estimated half of people who die from a house fire die from smoke inhalation alone and around 4000 people die from burns. Economically, easily preventable fires cause almost 12 billion dollars in damage. Chemically, fire safe polymers generally contain either aromatic or heterocyclic compounds within the polymer that increase the polymer's stability, thereby decreasing their chance of igniting in the first place. These polymers can be woven into fibers that can then be used in many household applications, such as protecting heating elements in the stove to insulation of electrical wires and the house itself. The applications of fire safe polymers are endless and could be crucial in decreasing the numbers of victims, deaths, and damage each year by fire.

Student Researcher: Amanda Shea
Major: Biology
Research Mentor(s): Dr. Theresa Grana
Project Title: Isolation and Identification of Nematode Pathogens with PCR techniques

Nematodes are an incredible model organism for labs to use and work on. They have provided many genetic breakthroughs that apply to humans and other species. Our lab had 169 strains of Virginia and University of Mary Washington campus based strains, with around half of them being contaminated by several forms of mold and bacteria. The worms generally live symbiotically with many bacteria and molds; however some have proven to be fatal to our lab's strains. These pathogens create sticky agar and difficult growing environments for the worm strains. This project was built for the intention of isolating and determining the identity of several mold and bacterial pathogens contaminating the worm populations. 16 phenotypically different molds and bacteria were isolated and are currently being identified by PCR techniques. The mold and bacterial DNA were extracted from the organism by boiling the cells to break down the cell wall. DNA was then amplified using several literature-based primers. The extracted DNA was then run through a PCR with the selected primers. Several preliminary gels were unsuccessful, so the protocol was modified. The bands on successful gels will be sent to ACTG, Inc and sequenced. The sequences will then be imported to the BLASTn program to determine the identity of the pathogens. The results from the gels will provide valuable information to the lab on what contaminates are present so lab protocols can be modified for the health of the worm populations. Later projects can expand upon this information to build more long term, complex projects.

Student Researcher: Maria Sitzler-Sawicki
Major: German
Research Mentor(s): Marcel Rotter
Project Title: The Germans' Longing for Italy

In my thesis I will be presenting the topic "The Germans' longing for Italy" or "Germans' Italy-Nostalgia". This paper will cover the development of Germans' longing for Italian culture, art, food, fashion, music, landscapes, beaches and the Country's weather. It will present the historical content of how far in history Germans travelled to the country of their ideals, inspiration and education. This paper will contain facts about

similarities between both countries, as well as their contrarieties. I will present the evidence of development of German's longing, starting at Dürers era in 1494, Winckelmann in 1758, and Goethe in 1786. I will expand my research up until today, including Hitler's and Mussolini's dictatorships, Italian guest workers immigrating to Germany after World War II, Film, Music and Cuisine. My thesis has been backed up through book research, articles, online resources and personal experience. I have lived in Germany for over 30 years and I have strong roots to Italy, the Country of my origin and nativity; therefore I am able to describe both Countries' development also through personal experience. Today, we can still witness Germans longing for Italian history, culture, art, food, music, fashion, education and most of all, vacation. German´s Italy-Nostalgia is still present today, and it has left roots that have been growing for Centuries.

Student Researcher: Olivia Smith
Major: International Affairs
Research Mentor(s): Dr. Surupa Gupta
Project Title: Human Rights in the World Trade Organization

To what extent are international trade and human rights intertwined? Human rights law and international trade law share the goal of human development. Yet, the economics of free trade sometimes does not coincide with the ethics of human rights. The World Trade Organization has the potential to either hurt or help the realization of human rights. What can be done to ensure that the WTO has a positive rather than negative impact? This project seeks to answer these questions by studying the WTO's engagement with the right to food. I argue that the WTO must take on a human rights approach to food issues. To this end, the principle of development serves as a guide.

Student Researcher: Hannah Somers
Major: Environmental Science
Research Mentor(s): Dr. Ben O. Kisila
Project Title: Phosphorous and sediment flux analysis in Aquia Creek, Stafford County, Virginia, USA

The health of waterways around the world are negatively affected by the input of excess sediments and associated nutrients such as nitrates and phosphorous. The presence of nutrients in waterways is necessary for a healthy level of plant growth, but in excess amounts nutrients can cause the process of eutrophication, starving waterways of oxygen and creating dead zones void of wildlife. The study examines the phosphorous levels in the stream waters from surficial runoff and internal sources from stream cut banks in the Aquia Creek Basin in Stafford, Virginia. In addition, field sediment traps, bank erosion pins, Revised Universal Soil Loss Equation (RUSLE) and sediment delivery ratio (SDR) was used in analyzing watershed rill and inter-rill sediment fluxes from the basin as well as internally generated stream bank sediments.

The RUSLE modeling results show that the basin is losing 163, 708 tons/year with a total sediment flux of 25,247 tons/year. Results indicate that low intensity development (30%) and high intensity development (29%) had highest levels of soil loss, while deciduous forest lost the 3rd largest amount (25%). Sediment trap measurements located in deciduous forest, coniferous forest, agricultural, and grassland locations - have thus far resulted in highest levels of soil lost from coniferous forest, followed by grassland. Erosion pin measurements monitor nine different cut banks to determine average soil loss from September 2014 to 2015. Sediment samples were taken to determine total phosphorous at each bank site. Water samples are taken at six different locations bi-weekly, including one auto sampler location, and have thus far resulted in a total phosphorous range of 3.013 ug/g to 95.012 ug/g from periods of low to high discharge rates. All of these parameters will be combined in Fall 2016 to provide a full report on the health of Aquia Creek.

Student Researcher: Carolyn Tarne
Major: Classics
Research Mentor(s): Dr. Angela Pitts
Project Title: Idiosyncracies of Diocletian's Palace in Split, Croatia

Diocletian's Palace, which is located in modern day Split, Croatia, has been the source for much scholarly debate over the years. In my thesis, I examined three different idiosyncrasies that separate Diocletian's Palace from other contemporary imperial palaces. In this examination, I will look specifically at the architectural style

of his successor Galerius with examples from his arch in Thessaloniki and his imperial palace in modern day Serbia. I also addressed some of the contemporary reactions to Diocletian and his palace.

Student Researcher: Rachel Thomas
Major: Biology
Research Mentor(s): Dr. Christopher Gray
Project Title: Mathematical Modeling of Meningitis

An epidemic model of a mock population was utilized to investigate the changes in circumstances in the population, which would cause difference scenarios such as an epidemic or endemic. The infection rate, recovery rate, and relapse rate of meningitis were determined and used to create the epidemic model of meningitis for a simulated population.

Student Researcher: Emmanuel Valdez, Isabelle Malouf, Leah Roth, Hannah Kass, Laura Mangano and Erica Falvey
Major: Biology
Research Mentor(s): Dr. Dianne Baker
Project Title: Operation: Protocol, One Groups Journey in Digitizing and Organizing Their Lab

Every lab uses a multitude of protocols when conducting research, often times keeping track of these protocols can be hard to do. The protocols for our lab had not been updated in a long time, some were only passed down by word of mouth, and others were simply nowhere to be found. There was definitely room for improvement regarding the organization and management of our labs protocols. Not only did we want to update our protocols, we also wanted to have a backup database that could be easily accessible. Our lab chose to use Google Drive as a management tool. Google Drive allows us to store documents, share files, and edit documents as a research team. Google Drive also incorporates Google Docs, Sheets, and Slides, which allowed us to further expand the use of the drive beyond written protocols to keep spreadsheets of breeding pairs and developmental stages. Lastly, Google Drive permits files to be searched with web search engines which allows for viewing access to those that are not in the lab. Digitized protocols were organized in a way that mirrored the hard copy protocols. Protocols were grouped according to what lab the protocol corresponded to. The final product is a Google Drive that is accessible to everyone in the lab and contains all of the protocols that are used as well as other important information such as the care schedule and breeding logs all of which is also present in a hard copy form which are kept in the respective labs. Setting up the Google Drive not only provided much needed organization but also expanded the students' knowledge of the highly practiced lab protocols as they took the first step in what has become an integral part of working in the Yellow Pants Lab.

Student Researcher: Berkley Vollino
Major: Art History
Research Mentor(s): Dr. Marjorie Och
Project Title: Perspectives on Lily Cox-Richards

Exploring the work Lily Cox-Richard and Kara Walker, another contemporary artist, alongside each other is a fascinating activity because it leads to thinking of similarities and differences between the artists' works.

Comparisons between subjects are interesting to explore. Both artists deal with the subject of woman. Because figures are not present in Cox-Richard's work our culture's flawed treatment of women, which is also seen in Walker's work, is emphasized. Cox-Richard's choice to leave out the figure forces viewers to imagine them, suggesting our culture's objectification of women. Walker takes this theme a step further by bringing in race. An African-American artist, she focuses heavily on themes of slavery, violence, and race. In works such as the Sphinx she creates an African-American woman that fits an earlier white American stereotype of black women.

First, many of their works are visually similar. Walker's Sphinx (2014) and Cox-Richard's plaster cast statues share the most obvious comparison. They share a pure white color. The blank slate the artists create encourages the views to apply their own beliefs to the works more easily than if color was added. However, Walker's work is much larger than Cox-Richard's, demonstrating how blown out of proportion Walker feels

the former stereotype was. Despite their smaller size, the work of Cox-Richard dose suggests a human body where Walker's figure is of monumental proportions. Cox-Richard's drawings pair well with Walker's silhouette images. Both possess the contrast between dark and light color and neither are preparatory works. Yet again, Walker's work is much larger.

The artists' works visually underline the themes of the evils of the objectification of the female body and racial stereotypes of the past.

Student Researchers: Megan Wagner, Teresa Fenn, Taylor McConnell and Maura Slocum
Major: Environmental Science
Research Mentor(s): Dr. Melanie Szulczewski
Project Title: Analysis of Soil and Water Samples at an Acid Mine Drainage Site

Acid mine drainage (AMD) is an environmental issue associated with abandoned mines, including a former pyrite mine next to Contrary Creek located in Louisa County, VA. At this site, acid and metals like iron, lead, manganese, arsenic, and zinc are leaching into the soil and creek, affecting the biodiversity and dynamics of this ecosystem. The pH of the soil and water samples were determined with a 1:1 soil to water ratio, and the organic matter content was determined through a loss on ignition method. Metal concentrations in soil and sediment fractions were determined with a sequential extraction analysis method. Metal concentrations of the water, soil and sediment samples were determined using a Thermo Scientific i-CAP 6000 inductively coupled plasma-atomic emission spectrometer (ICP-AES). Analysis of the samples has revealed a high concentration of metals, including arsenic and lead, in the soil coupled with a low pH in the soil and water. Even after a hundred years, AMD continues to affect the soil by making toxic heavy metals bioavailable, and by increasing the acidity of the soil, water, and sediment. Further research will investigate bioremediation efforts using plants that have a high tolerance for acidic and metal-laden soils and water, as well as seasonal variation in metal contamination levels.

Student Researcher: Sharon Wildberger
Major: Environmental Science
Research Mentor(s): Dr. Melanie Szulczewski
Project Title: Hydraulic Fracturing, Arsenic and Selenium: Threats of Pollution in the George Washington National Forest

Arsenic and selenium are naturally occurring elements that can be hazardous in high amounts. Long term exposure or acute short-term exposure to arsenic or selenium can result in health issues such as birth defects, immune system issues, or even cancer. Dangerous amounts of selenium (US EPA limit 50ppb) and arsenic (US EPA limit 10ppb) are present in the drinking water supply in various parts of the United States. While some of these high concentrations can be attributed to nature, a large percentage of them are pollutants from hydraulic fracturing operations. Arsenic, selenium, and other toxic chemicals are usually present in water analyses near fracking sites, and this poses a dangerous threat to people in the surrounding areas since the companies conducting natural gas extraction are not legally required to declare the quantities (or even identities) of chemicals they use in their operations.

Recently, efforts to begin fracking in the George Washington Forest have created concerns about the safety of water in Virginia and Washington D.C. The GW Forest, which expands 1.1 million acres, is the largest national forest on the East Coast of the United States, and sits on top of the Marcellus shale, an oil-rich formation of about 341 trillion cubic miles of natural gas that oil and gas companies are very interested in. Since researchers have consistently found elevated levels of arsenic and selenium in the water supply near fracking zones, there is now a threat of chemical contamination since the GW Forest is the direct water supply for 329,000 people living in the Shenandoah Valley and an additional 4.5 million people in the D.C. metro area. In 2014, the U.S. Forest Service granted permission for a few companies to begin natural gas extractions in parts of the forest, despite protests from environmentalists and citizens concerned about health risks. If operations proceed, the watershed could experience pollution from heavy metals, including arsenic and selenium.

Student Researchers: Eileen Yoon and Joanna Kim
Major: Biochemistry / Biology
Research Mentor(s): Dr. Kelli Slunt
Project Title: Quantitative and Qualitative Analysis of Commerical Chocolates using High-Performance Liquid Chromatography

Chocolates contain a class of purine alkaloids called methylxanthines. The commonly found methylxanthines in chocolates are theobromine and caffeine. In this experiment, methylxanthines from three single-origin chocolates, Ecuador, Cote d' Ivoire, and Ghana, are extracted through Solid Phase Extraction (SPE). The extracted methylxanthines are carried through High-Performance Liquid Chromatography (HPLC) to quantify the content of methylxanthines. In addition, two commerical chocolates, Hershey and Nestle, were carried under the same procedures to quantify the content of methylxanthines. Then, the two commerical chocolates, which considered as unknowns, were analyzed, in comparison to single-origin chocolates, to determine the origin. This experiment allowed to study techniques, SPE and HPLC, that can be used in biochemical researches and laboratories.

Student Researchers: Eileen Yoon and Rachel Goldsmith
Major: Biochemistry / Biology
Research Mentor(s): Dr. Kelli Slunt
Project Title: Assay Development for Phthalates Ligand Binding to Peroxisome Proliferators Receptor

Phthalates used in the manufacturing of eco-friendly plastic water bottles are partially water soluble and leech into the water. Research has found that these plasticizers cause liver cancer in rats. It is possible that interaction between the nuclear receptor Peroxisome Proliferator Activator Receptors (PPAR) and phthalates may lead to the development of liver cancer in rats. To determine if phthalates and their metabolites are binding to PPAR, a reliable method for observing protein-ligand interactions is needed. Differential scanning fluorimetry was used to compare the thermal stabilities of PPAR Ligand Binding Domain (LBD) to PPAR LBD with bound ligands. A protein sample is heated in the presence of a fluorescent dye. As the protein unfolds, the dye binds to exposed nonpolar regions and the fluorescence of the dye changes. A ligand will thermally stabilize the protein and denaturation (i.e. dye binding) would occur at a higher temperature. To test this method, PPARγ LBD was heated in the presence of rosiglitazone, a known PPAR ligand. The resulting fluorescent data showed an increase in melting temperature in the presence of the ligand indicating an increase in thermal stability of the protein due to interaction with the rosiglitazone. The success of these trials in elucidating protein-ligand interaction shows that differential scanning fluorimetry may be a reliable method for determining interactions between PPAR and other ligands, such as phthalates.

Student Researcher: Sherry Young
Major: Geography
Research Mentor(s): Dr. Jackie Gallagher
Project Title: Using GIS to Explore Susceptibility of Slope Failures in Stafford County, Virginia

Stafford County, Virginia has undergone a population explosion within the last two decades resulting in a rapid increase in development, including many new subdivisions. This has led to an increase in slope failures; several within newer subdivisions. The goal of this research was to identify what triggered these failures and areas of the county that may be prone to future failures. Methods used were a review of published research and geologic maps, and the use of GIS to map and analyze slope, aspect, soil types, geology and hydrological characteristics. It was found that particular soil types with mixed layers consisting of clays, silt, and sand on moderate to steep slopes in the Potomac formation were most likely to fail. The soil types identified as contributing to the failures contain montmorillonite clay which has shrink swell properties and soils with varying Ksat values between the soil horizons. Other extenuating factors also possibly contributed to the onset of the failures including intense precipitation from storms, effects from the Mineral earthquake, poor ground water drainage, and overloading of the slopes. A susceptibility map was produced using GIS for Stafford County based on the geologic conditions that were found to be most likely to cause failure.

Student Researcher: Pengcheng Zhang
Major: Physics
Research Mentor(s): Dr. Hai Nguyen
Project Title: Excitation and Detection of Nanoparticles

The upconversion of nanoparticles has many applications in the fields of Biology and medical research, such as single molecule spectroscopy, colloidal dynamics, protein isolation, and controlled investigation of biological processes. The purpose of this project is to study the excitation and detection of nanoparticles with infrared laser beam of wavelength 915 nanometers. Furthermore, this project serves as a preparation and introduction to Dr. Hai's research project on "Quantitative Efficiency Analysis of a Single Optically Trapped Upconverting Nanoparticle". The experimental setup of this projects references many studies on upconverting nanoparticles using laser beams of wavelength 980 nanometers. The advantages of using 915 nm lasers include lower water absorption and deeper tissue penetration, which is ideal for medical applications.

The eventual goal of this project is to prepare and set up the experimental procedures and equipment for the optical trapping of the nanoparticles.

Student Researchers: English 314 Class Members
Major:
Research Mentor(s): Dr. Elizabeth Wade
Project Title: Rappahannock Review: Discussion and Readings from UMW's National, Student-Run Literary Journal

UMW's literary journal, Rappahannock Review, has established a national presence in the literary community over the two years of its existence. This presentation will discuss Rappahannock Review's unique experiential learning environment and the results this semester: two new issues of previously unpublished literature selected, edited, and designed by the students of ENGL 314, a capstone course in the Creative Writing Concentration. For the presentation, the current editors will introduce the journal, its operation, and its successes and challenges as a student-run publication. Next, members of the staff will read selected works of fiction, nonfiction, and poetry from both the regular issue coming out in April and the special theme issue on flight coming out in August. The reading will be followed by a short Q&A. The panel will showcase Rappahannock Review's exciting literary contributions this semester, as well as the work of the students on staff, who learned through hands-on experience with the publishing world and without whom the journal wouldn't exist.

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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