



# *Undergraduate Research Conference*

**April 19, 2013**  
**The Inn at Virginia Tech**

**Office of Undergraduate Research  
Virginia Tech**



<http://www.research.undergraduate.vt.edu>

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## **Sponsors:**

- \* Fralin Life Science Institute
- \* Institute for Society, Culture, and Environment
- \* Virginia Tech Transportation Institute
- \* Office of the Vice President for Research
- \* CLAHS Undergraduate Research Institute
- \* Virginia Bioinformatics Institute
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**Thank you to our sponsors!**

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## The Office of Undergraduate Research Welcomes You to the 11<sup>th</sup> Annual VT Undergraduate Research Conference!

**Office of Undergraduate Research:** Tomalei J. Vess, Director  
Anita Dodson, Senior Program Support Tech

### Mission Statement

To promote, enhance, and expand undergraduate research opportunities.

### Undergraduate Research by the #s in 2011-2012

*Office of Undergraduate Research contact hours, ~1500 with students, ~100 with faculty*

*Tools for Success in Undergraduate Research workshop series in collaboration with University Libraries, 87 participants*

*10<sup>th</sup> Annual Undergraduate Research Conference (April 19, 2012)  
522 participants, 108 student presenters*

*Students enrolled in Undergraduate research credits (4994 and 4994H)  
592 in Fall 2011, 755 in Spring 2012, 46 in Summer one 2012, and 26 in Summer two 2012*

*Office of Undergraduate Research website (www.research.undergraduate.vt.edu)  
107,000 Hits from January through May 2012*

*2012 summer undergraduate researchers on fellowship, 283*

*Student presenters at the first campus-wide Summer Undergraduate Research Symposium, 135*

*15+ Summer Undergraduate Research Programs with 300+ participants*

*2012 summer undergraduate researchers on fellowship, 283*

*Student presenters at the first campus-wide Summer Undergraduate Research Symposium, 135*

*15+ Summer Undergraduate Research Programs with 300+ participants, including 10 NSF REU Sites*

### Learn more at:

[www.research.undergraduate.vt.edu](http://www.research.undergraduate.vt.edu)

[www.facebook.com/OURVT](http://www.facebook.com/OURVT)



*Undergraduate research is an inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline.*

*-National Council on Undergraduate Research, <http://www.cur.org/>*



## Congratulations!

### 2013 ACC Creativity and Innovation Grants

The Atlantic Coast Conference supports undergraduate research and creative scholarship using income generated by the ACC Football Championship Game. Supplemental allocations by individual universities and various grants expand program impact. ACC Creativity and Innovation Fellowship Program supports undergraduates involved in student-driven projects at each of the ACC member campuses. Virginia Tech offers competitive financial awards of up to \$2,000 to support undergraduate research projects or creative works within any of the university's academic disciplines.

<b>Student</b>	<b>Title</b>	<b>Primary Major</b>	<b>Faculty Mentor</b>	<b>Faculty department</b>
Michele Anderson	Utilizing microfiber-enabled lithography to engineer spatiotemporally-diverse tissue microenvironments	Biological Systems Engineering	Warren C. Ruder	Biological Systems Engineering
Kristen Fread	Regulation of Membrane Trafficking Adaptor Proteins	Biochemistry	Daniel G. S. Capelluto	Biological Sciences
Brian Hess	The Effects of Music in Retail Environments	Apparel, Housing, and Resource Management	Irene Leech	Apparel, Housing, and Resource Management
Ashley Lohr	Evaluating the Maximum Lethal Temperature of the Brown Marmorated Stink Bug ( <i>Halyomorpha halys</i> )	Wildlife Science	Thomas Kuhar	Entomology
Cameron Rose	Pesticides and Pollinators: An Examination of Pesticide Sensitivity for Managed Honey Bee Colonies	Biological Sciences	Troy D. Anderson	Entomology
Douglas Smith	Using perception of time and self to discriminate cognitive constructs of impulsivity and mindfulness after meditation training	Psychology	Anthony Cate	Psychology
Sydney Vaughan	The Role of Fibroblast Growth Factor-10 in Maintaining the Neuromuscular Junction	Biochemistry	Gregorio Valdez	VTCRI/Biological Sciences



## Congratulations!

### ACC Meeting of the Minds undergraduate research conference April 4-6, 2013

Each year, usually in late March or early April, 5-10 outstanding undergraduate researchers (accompanied by a faculty/staff member) from each ACC university gather at a host university to present their research, either verbally or as a poster. At most universities the student delegates are chosen through a refereeing process. To be invited to the conference is a real honor.

- Typically:
1. The research is original, student directed, under the advisement of a faculty member.
  2. Abstracts of each research project are gathered in a conference brochure.
  3. Verbal presentations are grouped by broad subject matter categories. They involve 15 minutes of presentation followed by 5 minutes of discussion.
  4. Students presenting their research by poster typically "staff" their presentation and explain their research to dozens of other participants, both students and faculty.
  5. Plenary sessions involve both reflections on the importance of undergraduate research, highlights of research methodologies by distinguished faculty from the host university, and reflections on paths to graduate school and research careers.
  6. All expenses are paid by the ACCIAC (the total budget is \$55,000).
  7. Planning and hosting responsibilities are rotated among the universities.
  8. Each university chooses its delegates.

<b>Student</b>	<b>Major</b>	<b>Project Title</b>	<b>Faculty Mentor(s)</b>	<b>Faculty Department</b>
Kathryn E. Battle	Wildlife Science	Effects of Landscape Characteristics on Activity of <i>Myotis lucifugus</i> within Fort Pickett	Jane Argentina Beatriz Mogollon	Fish and Wildlife Conservation
Kenneth Black	Architecture	Palletecture: Reuse of Materials and Construction with a New Bus Stop Structure	Elizabeth Grant	Architecture
Katlyn S. Griffin	English	Restoration House Restored: Dickens's <i>Great Expectations</i> and the Creation of Miss Havisham's Haunted Mansion	Nancy Metz	English
Carolyn Y. "Carrie" Hughes	Biochemistry Chemistry	Comparative Cellular Behavior of Malignant and Normal Breast Epithelial Cells on Migratory Force and Cellular Shape Index	Amrinder Nain	Mechanical Engineering
William "Ryan" Klima	Electrical Engineering	An Introduction to Tech Transfer: Assessment, Protection, and Licensing of Inventions through Virginia Tech Intellectual Properties	John Geikler	VT Intellectual Properties (VTIP)
Andrea M. Ledesma	History	The Recommended Dose: Diagnosing Social Anxiety in the 1960s	Marion Mollin	History
Huanqing "Quinn" Liu	Computer Science	Hierarchical Neural Network Brain Simulation of Visual Object Recognition (Human Brain Simulation using Computer Science Techniques)	Anthony Cate	Psychology
Lauren A. Withers	Biochemistry	Electroporation of Chinese Hamster Ovary Cells using Microfluidic Devices	Chang Lu	Chemical Engineering



## Congratulations!

### National Conference on Undergraduate Research, April 11-13, 2013

The mission of the National Conference on Undergraduate Research (NCUR) is to promote undergraduate research scholarship and creative activity done in partnership with faculty or other mentors as a vital component of higher education. More than 3000 students from across the nation will present at this year's conference.

<b>Student</b>	<b>Primary Major</b>	<b>Title</b>	<b>Faculty Mentor</b>	<b>Faculty Department</b>
Saivarshith "Varsh" Peddireddy	Biological Sciences	ANKLE INJURY PREVENTION USING SHEAR THICKENING FLUID	Doug Holmes	Engineering Science and Mechanics
Huanqing "Quinn" Liu	Computer Science	HIERARCHICAL TEMPORAL MEMORY SIMULATION USING OOD AND MVC	Anthony Cate	Psychology
Gregory Rodden	Human Nutrition, Foods, and Exercise	CHRONIC LOW-DOSE ENDOTOXIN TREATMENT SUPPRESSES INSULIN SIGNALING AND IMPAIRS INSULIN-MEDIATED GLYCOGEN SYNTHESIS IN SKELETAL MUSCLE CELLS	Matt Hulver	Human Nutrition, Foods, and Exercise
Mark Managuio	Political Science	CAMPUS CLIMATE: PERCEPTIONS OF DIVERSITY AMONG STUDENTS AT VIRGINIA TECH	Martha Glass	Division of Student Affairs
Kaitlyn Andreano	Biochemistry	DISABELED-2 (DAB-2) MODULATES PLATELET- CANCER CELL INTERACTIONS THROUGH ITS SULFATIDE BINDING DOMAIN	Daniel Capelluto	Biological Sciences
Bryce Allen	Biological Sciences	THE ROLE OF CASK IN NEURODEVELOPMENT	Konark Mukherjee	Biological Sciences & VTCRI



## **Goldwater Scholarship Awardee**

### **Julia Button (Biological Sciences, Biochemistry)**

The Barry Goldwater Scholarship and Excellence in Education Program was authorized by the United States Congress in 1986 to honor Senator Barry Goldwater, who served his country for 56 years as a soldier and statesman, including 30 years of service in the U.S. Senate. The creation of this program pays tribute to the leadership, courage, and vision of Senator Goldwater and establishes in his name an endowed recognition program to foster and encourage excellence in science and mathematics.

The purpose of the Barry Goldwater Scholarship and Excellence in Education Foundation, as stated in the enabling legislation, is to alleviate a critical current and future shortage of highly qualified scientists, mathematicians, and engineers. A more realistic statement of the purpose, in today's terms, is to provide a continuing source of highly qualified individuals to those fields of academic study and research.

The Foundation is supported by the Barry Goldwater Scholarship and Excellence in Education Fund, which has been established in the Treasury of the United States. Funding for awards and administrative expenses derives from interest on the Trust Fund, invested in U.S. securities.

## **National Science Foundation Graduate Research Fellowship Awardees with Research Areas**

The National Science Foundation's Graduate Research Fellowship Program (GRFP) helps ensure the vitality of the human resource base of science and engineering in the United States and reinforces its diversity. The program recognizes and supports outstanding graduate students in NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based master's and doctoral degrees at accredited US institutions.

Winston R. Becker, Biomedical Engineering  
Christopher G. Prohoda, Energy Engineering  
Elizabeth A. Godfrey, Civil Engineering  
Patrick S. Goley, Electrical Engineering

## **2013 Posters on the Hill Presenter**

### **Elizabeth Godfrey (Civil Engineering)**

*Amplification in the Washington DC Area During the 2011 Virginia Earthquake*

Posters on the Hill is also a signature national celebratory event for CUR and the undergraduate research community. This prestigious event will be held April 23-24 on Capitol Hill, and aims to help members of Congress understand the importance of undergraduate research by encouraging them to talk directly with the students whom these programs impact.



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**Kick-off Event: Panel Discussion on Graduate School → April 17, 2013**

**SCHEDULE AT A GLANCE**

**April 17, 6:00 – 7:30pm Kick-off Event**

Panel Discussion on Graduate School:  
 A Path to Success

Junior Commons Room,  
 Ambler Johnston  
 Residence Hall

**April 19, Undergraduate Research Conference, Inn at Virginia Tech**

**9:00 – 11:00 am Poster set-up (presenters drop off posters)** Solitude

**10:00 am – 4:00 pm Registration** 2<sup>nd</sup> floor landing

**11:15 am – 12:05 pm Oral Presentations**

Session 1: Life Sciences 1:  
 Fisheries Science, Horticulture, Biology Smithfield

Session 2: Life Sciences 2: Biochemistry and Molecular  
 Biology Drapers  
 Meadow

Session 3: Communication & History Ellett Valley

Session 4: International Studies & Political Science Huckleberry

**12:20 - 2:15 p.m. -- Poster Presentations with “Walking” Lunch**

Session 5 (All disciplines) Solitude

**2:15 – 3:30 p.m. – Oral Presentations**

Session 6: Classical Studies, Literature, Sociology, &  
 Apparel, Housing, and Resource Management Drapers  
 Meadow

Session 7: English and Political Science Huckleberry

Session 8: Engineering Smithfield

Session 9: Life Science and Psychology Ellett Valley

**3:30 - 4:45 p.m. – Poster Presentations & Refreshments**

Session 10: STEM and AHRM Duckpond

**4:45 p.m. – Closing Remarks** Duckpond

\*Detailed schedule, pages 15-20

\*Abstracts begin page 21

\*Index page 75 (by student name), page 85 (by faculty dept.)



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**Kick-off Event: Panel Discussion on Graduate School → April 17, 2013**

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## **Spring 2013 Undergraduate Research Conference Kick-off Event Panel Discussion on Graduate School**

**Wednesday, April 17  
6:00 – 7:30 pm  
Junior Commons Room, Ambler Johnston**

### **A Path to Success: Graduate School**

**Description:** Join us for a graduate school-focused discussion with faculty, university administrators, graduate students, and postdoctoral fellows. Learn how to decide if graduate school is for you, including what type of degree, how to prepare, apply, and plot a successful path.

#### **Moderators:**

**Tomalei Vess (Moderator)**, Director, Office of Undergraduate Research

**Keri Swaby (Moderator)**, Program Coordinator, HHMI Scieneering Program

#### **Panelists:**

**Asem Abdulahad (Post-doctoral fellow)**, Integrated Science Curriculum (Chemistry)

**Tiffany A. Drape (Project Associate)**, Studio STEM: Office of Educational Research and Outreach (Agriculture and Life Sciences)

**Tobias Ecker (Doctoral student)**, Aeospace and Ocean Engineering

**Paola Jaramillo (Doctoral student)**, Mechanical Engineering

**Janet Rankin (Professor and Dean)**, Human, Nutrition, Foods, and Exercise; the Graduate School

**Dane Webster (Associate Professor)**, School of Visual Arts and co-head of the Image Studio in the Institute for Creativity, Arts, and Technology (ICAT)

VT Graduate School, <http://graduateschool.vt.edu/index.html>



## Panelist Bios:



### **Asem Abdulahad**

Asem Abdulahad is a postdoctoral associate in the newly developed Integrated Science Curriculum offered by the College of Science here at Virginia Tech. After earning his B.S. in Chemistry from Morehouse College in Atlanta, GA, Dr. Abdulahad attended Rensselaer Polytechnic Institute in Troy, NY where he studied and developed novel methods for characterizing polymeric materials. As a part of the Long research group in the Department of Chemistry, Dr. Abdulahad is currently working towards

developing semi-synthetic nanoparticles for drug delivery to Retinoblastoma cells and transmucosal tissues.



### **Tiffany A. Drape**

Tiffany A. Drape is the Project Associate with Studio STEM in the Office of Educational Research and Outreach at Virginia Tech. She received her B.S. and M.A.T. from Cornell University, five years' experience in middle and high school as an agriscience teacher and adjunct in the SUNY system. Drape earned her Ph.D. from Virginia Tech in Agriculture and Life Sciences. Her work focuses on the effects of after school interventions in STEM subjects and how the use of technology integration helps or hinders those interventions. Previous research included how students and faculty integrated technology into their classrooms and how student engagement changed as a result of technology diffusion. Address: Virginia Tech, School of Education, Office of Educational Research and Outreach, 217 East

Eggleston Hall (0302), Blacksburg, VA 24061, USA; telephone: (540) 231-6468; email: [tdrape@vt.edu](mailto:tdrape@vt.edu)



**Tobias Ecker**

Tobias is a doctoral student in the department of Aerospace and Ocean Engineering. He obtained a B.Eng. in Mechanical Engineering from the University of Applied Sciences Trier, Germany in 2008 and a M.S. in Aerospace Engineering from Virginia Tech in 2011. He received a Fulbright scholarship in 2009 and a scholarship extension in 2010. His research interests include turbo machinery, multiphase flows, biomedical flows and laser based flow diagnostics for high speed flows. Tobias is a founding member and treasurer of the Interdisciplinary Research Honor Society (IDR), active in the Blue Ridge chapter of the Fulbright Alumni Association and interdisciplinary and Fulbright related events at Virginia Tech.



**Paola Jaramillo**

Ms. Jaramillo completed her A.S. in Engineering Science at Norwalk Community College in 1999. She transferred to the University of Hartford where she received her B.S. in Biomedical Engineering and B.S.M.E in 2003. Ms. Jaramillo was later accepted at Rutgers University where she completed her M.S in Mechanical Engineering by 2008. She later worked for the Connecticut's Center for Next Generation Manufacturing between 2008 and 2009. In the fall 2009, Ms. Jaramillo was accepted at Virginia Polytechnic Institute and State University where she is currently pursuing her PhD in Mechanical Engineering with concentration on biomedical control systems. Her doctoral work

focuses specifically on the development of treatments for muscle atrophy, in particular, application of functional electrical stimulation and electromagnetic stimulation with feedback.



**Janet Rankin**

Janet Walberg Rankin is a Professor in the Department of Human Nutrition, Foods, and Exercise at Virginia Tech. She received her academic training at Duke University (B.S. in Zoology 1977) and University of California at Davis (Ph.D. in Nutrition 1982). She has taught courses in Exercise Physiology, Preventive and Therapeutic Value of Exercise, Sports Nutrition, and Exercise Metabolism. She was awarded the Certificate of Teaching Excellence in 1993.

Research from her laboratory is related to sports nutrition or interventions for obesity. The overarching goal of current research in her laboratory is to clarify the optimal nutritional strategy to



reduce inflammation and related health complications. Specific interventions evaluated include variations of dietary macronutrient mix, energy balance, specific foods, and dietary supplements.

On campus, Dr. Rankin served as Chair of the Food, Nutrition, and Health Initiative during 2001. She was Acting Department Head for the department of Human Nutrition, Foods, and Exercise in 2002. She was appointed as Associate Director in August 2003 and then Interim Director in October 2003-July 2006 of the new Institute for Biomedical and Public Health Sciences at Virginia Tech. Since 2010, she has served as Associate Dean of the Graduate School in a 50% appointment.

She has been highly involved in the professional organization, American College of Sports Medicine, and its regional chapter. She was elected to the Executive Board and later was President of the Southeast Chapter of American College of Sports Medicine (ACSM). She is currently a Fellow, served as Vice President, and is now President of ACSM. Dr. Rankin has served as a panelist for NASA Peer Review Services and USDA Intramural grant review of Diet and Disease Prevention and Health Promotion proposals. She was on the writing team for the revision of the ACSM position stand on exercise and obesity and on the Institute of Medicine committee charged with making recommendations related to use of dietary supplements in military personnel. She was a member of the Science Advisory Board for the Gatorade Sports Science Institute from 1996-2008.



### **Dane Webster**

Dane Webster is an Associate Professor in the School of Visual Arts (SOVA) within the College of Architecture and Urban Studies (CAUS) and teaches various courses in 3D computer animation. Prof. Webster is also the co-head of the Image Studio, a research group within the new Institute for Creativity, Arts, and Technology (ICAT).

**Statement:** As an artist, I'm passionate about creating worlds, building experiments that unfold within the virtual space. My experimental short films and installations like "With Delicate Risk" and "Always Uncoupled"\* investigate creation myths, evolution, and the simple reactive qualities of a virtual biological form. My "Organica" still images are abstract designs influenced by my interpretations of the microscopic realm. And elements of this investigation are even found in my purely escapist short films such as "Idea Development" and "Sixty Second Tragedy." While on the surface, the stories are about simple characters confronting a problem; under the hood, as an artist I get to be an amateur scientist, building worlds within the computer, exploring the use of virtual physics, anatomy, light and sound. As a scholar, I investigate my own ideas about the intersection of arts and sciences.



As a practitioner, I'm often partnering with researchers and scholars from outside of the arts. Entering into these collaborative, cross-disciplinary projects gives me the opportunity to learn something about a range of topics that I wouldn't normally encounter. Using my skills in computer animation, I develop visualizations for disciplines such as history, science, architecture, and education. These projects help students learn about the history of Native Americans, administrators visualize proposals for building projects, and engineers investigate new bio-inspired forms.

\*examples of the work mentioned in my statement can be found [adanewbster.com](http://adanewbster.com)



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**11:15 am - 12:05 p.m. – Oral Presentations**

**Session 1: Life Sciences 1 (Smithfield)**

**Morgan Brizendine (Fisheries Science) p. 21**

*Distribution of stonerollers (Campostoma spp.) in three Virginia watersheds*

**Victoria Neff (Horticulture) p. 21**

*Comparisons of Auxin Application Methods and Rates on Rooting of Perennial Cuttings*

**Session 2: Life Sciences 2 (Drapers Meadow)**

**Richard Carmean (Biochemistry) p. 22**

*Novel Biodegradable Phosphonium-Based Polyesters for Gene Delivery*

**Joseph Conduff (Biochemistry) p. 22**

*The Quest for Homopolymers of Cholesterol-PEG*

**Bowen Meng (Biological Sciences) p. 23**

*Elucidating the function and localization of the ATPases responsible for pili production in *Sinorhizobium meliloti**

**Session 3: Communication and History (Ellett Valley)**

**Alyssa Bedrosian (Communication, Spanish) p. 24**

*The Use of Packard's Needs in the 2009 Doritos Ad Campaign*

**Mark Bowes (History) p. 24**

*The Second Battle of Cedar Creek: Preserving History in the Shenandoah*

**Victoria Heath (History, Political Science) p.25**

*Cutting Deep: The Examination of Female Genital Mutilation Among Somali Communities in Kakuma, Kenya*

**Session 4: International Studies and Political Science (Huckleberry)**

**Tea Ivanovic (International Studies) p.26**

*External Pressures and Domestic Changes: The Council of Europe, The European Union, and the National Minorities in Vojvodina*

**Elizabeth "Jade" Womack (International Studies) p. 26**

*Breast is Best*



**2:15 am – 3:30 p.m. – Oral Presentations**

**Session 6: Classical Studies, Literature, Sociology, and Apparel, Housing, and Resource Management (Drapers Meadow)**

**Hannah Bochain (Classical Studies) p. 28**

*Literary Competition and Filiation in Classical Latin: The Sapphic Evolution*

**Tom Minogue (Literature, Language, and Culture) p. 28**

*Stones, Bones, and Spoils: Impact of the Murray Correspondence on  
Conception of Identity in Childe Harold*

**Kelsey Dominick (Apparel, Housing, and Resource Management) p. 29**

*Versatile Vixen*

**Mia Simms (Sociology) p. 29**

*#WhatIWore: Fashion Decisions of Undergraduate Females*

**Holland M. Vasquez (Psychology) p. 30**

*Factors Influencing Attitudes Towards Homosexuality*

**Session 7: English and Political Science (Huckleberry)**

**Chelsea Gillenwater (English, Communication) p. 31**

*Musical Trends in Animated Programming*

**John Gillespie (English; Literature, Language, and Culture; History) p. 31**

*Victory for the Craft: The Craft/Micro Brewing Revolution in the American  
Beer Industry*

**Katlyn Griffin (English) p. 32**

*Restoration House Restored: Dickens's Great Expectations and the  
Creation of Miss Havisham's Haunted Mansion*

**Joshua Entsminger (International Studies) p. 32**

*Are Relations Concepts? Practice and the Personal in a Philosophy of  
Relation*

**Session 8: Engineering (Smithfield)**

**Ali S. Alhamaly (Mechanical Engineering) p. 33**

*Performance Analysis of a Transonic Fan*

**Eric C. Anderson (Mechanical Engineering) p. 33**

*The use of twist coupled carbon fiber blades to maximize pitch under  
simulated operating conditions*

**Joseph W. Ferrara (Mechanical Engineering) p. 34**

*A virtual aerospace crashworthiness assessment platform*

**Virginia E. Hagen-Gates (Engineering Science and Mechanics) p.34**

*Droplet Leaf Dynamics*

**David G. Mackanic (Mechanical Engineering) p. 35**

*Novel Cathode Materials for Li-air Batteries*

**Session 9: Life Science and Psychology (Ellett Valley)**

**Kristen I. Fread (Biochemistry) p. 36**

*Regulation of endosomal membrane trafficking adaptor proteins*

**Christian L. Hawthorne (Psychology) p. 36**

*Does Chaos in the Home Environment Relate to Attention and Effortful Control in  
Head Start Preschoolers?*

**Zachary L. Mannes (Psychology) p. 37**

*How parents influence their children's alcohol intake: A downtown study*





**12:20 – 2:15 p.m. – Session 5**  
**Poster presentations (Solitude)**

**Pratt Research Scholars (CALs) p. 38**

1. **Elizabeth J. Boott (Animal and Poultry Sciences; Dairy Science) p. 39**  
*Improved Nitrogen Efficiency in Lactating Dairy Cattle Through a Better Representation of Amino Acid Requirements*
  2. **Wangui C. Gichane (Crop and Soil Environmental Sciences; International Studies) p. 39**  
*Exploring the Forage Potential of Teff for Heifers under Two Management Schemes*
  3. **Chris M. Harrison (Agricultural Technology, Applied Agricultural Management option) p. 40**  
**Matt T. Lawrence (Agricultural Technology, Applied Agricultural Management option)**  
*Implementing and Sustaining a Rotational Grazing System in Southwest Virginia*
  4. **Yi Lin Lee (Agricultural Sciences) p. 40**  
*Virginia Grown Teff for Aquaculture: Potential for a Value Added Market*
  5. **Colleen R. McIntyre (Animal and Poultry Sciences, Biological Sciences) p.41**  
*Changes in Hypothalamic EZH2 Activity Associated with Fasting in Broiler Chicks*
  6. **Rebecca M. Naramore (Animal and Poultry Sciences) p. 41**  
*The Effect of Corn Gluten in Lambs*
  7. **Nicole E. Paris (Animal and Poultry Sciences) p. 42**  
*Expression of digestive enzymes and nutrient transporters in the intestine of Eimeria maxima infected chickens*
  8. **Jaime K. Rutter (Animal and Poultry Sciences) p. 42**  
*Using n-alkanes to estimate herbage composition of a diet*
  9. **L. R. "Taylor" Scott (Animal and Poultry Sciences) p. 43**  
*Postmortem effects of ractopamine supplementation in swine*
  10. **Lauren M. Sheehan (Animal and Poultry Sciences) p. 43**  
*Effect of Supplementation of Dietary Nutrients on Chicken Peptide Transporter 1 In Vitro*
- .....

**HHMI Sciencering Program p. 44**

11. **William G. Burks (Mechanical Engineering) p. 45**  
**Michelle D. Tran (Biological Sciences)**  
*Development of Controlled Electromagnetic Stimulation System to Aid Patients Suffering from Vocal Fold Paralysis*
  12. **Peter M. Burnham (Biochemistry) p. 45**  
*Prediction of Host Proteins Essential for Viral Replication through Network Based Computational Methods*
  13. **Linda O. Chitayapuntagul (Chemistry) p. 46**  
*Effects of Particulate Iron, Natural Organic Matter, and pH on Lead Corrosion*
  14. **Nicholas B. Geroux (Biological Sciences) p. 46**  
*Water quality in private drinking water systems*
  15. **Karan Mathur (Biochemistry) p. 47**  
*The Role of Nanomaterials In Medical Products and Their Environmental Impacts*
  16. **Daniel E. Neighbors (Biological Systems Engineering) p. 47**  
*Identification of Arabidopsis thaliana mutants containing increased biomass and cellulose*
  17. **Christine A. Pankow (Environmental Sciences) p. 48**  
*The Effects of Copper Piping on Opportunistic Pathogens in Premise Plumbing*
- .....



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## HHMI Sciencering Program

18. **Ashley R. Taylor (Mechanical Engineering) p. 48**  
*Early Detection of Cerebral Palsy through Quantification of Infant General Movements*
  19. **Daniel M. Torre (Environmental Science) p. 49**  
*Variability of Net Ecosystem Metabolism Due to Surrounding Environment*
  20. **Nima Vahidi (Biochemistry) p. 49**  
*Integration of a bacterial component in a well established wound healing model*
- .....

## Liberal Arts and Human Sciences p. 52

21. **Shawn S. Ghuman (Communication) p. 53**  
*Communication Lab Focus Group Research Project*
  22. **Kelly A. Gilmartin (Apparel Product Development and Merchandising Management) p. 53**  
*Society*
  23. **Kelly H. Kaiser (Communication) p. 54**  
*Consumer Framing of SeaWorld Trainer Attack*
  24. **Cassie T. Lintelman (Apparel Housing and Resource Management) p. 54**  
*Work Hard, Play Hard*
  25. **Nora M. McGann (English) p. 55**  
*The hunger for life that gnaws in us all: Black Boy and Richard Wright: the Life and Times*
  26. **Courtney J. Murphy (Apparel, Housing, Resource Management) p. 55**  
*The Modern Nomad Breaking Barriers*
  27. **Morgan L. Sellers, Corinne Sharp, and Clancy Fry (Human Development) p. 56**  
*Multi-Intervention Approach for International Graduate Students*
  28. **Mary C. Swanton (Human Development) p. 56**  
*Measuring Temperament in Middle Childhood*
- .....

## Agriculture and Life Sciences

29. **Matthew K. Nguyen (Biochemistry, Biological Sciences) p. 58**  
*Development of an environmentally friendly method for making silicon-carbon bonds in water*
  30. **Michael Talanian (Biological Sciences) p. 58**  
*Maternal Diet and Genetic Implications in Offspring*
  31. **Scott J. Neil (Animal and Poultry Sciences) p. 59**  
*Phosphorus status of grazing beef cattle in Virginia's Chesapeake Bay Watershed*
- .....

## Pathogens and Disease

32. **Whitney H. Beasley (Biochemistry) p. 60**  
*Locomotion Rates of Snails Infected with *Metagonimoides oregonensis**
  33. **Katherine M. Broadway (Biological Sciences) p. 60**  
*Minimum Requirements for Flagellotropic Bacteriophage 7-7-1 Infection of *Agrobacterium* sp. H13-3*
  34. **Luis Torres (Biological Sciences) p. 61**  
*Rotavirus Co-infection Reassortants and its effect on Strain Viability and Fitness*
  35. **Julia Button (Biological Sciences, Biochemistry) p. 61**  
*Timed Chemotherapy for Astrocytomas*
- .....



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## Neuroscience and Psychology

- 36. **Sarah E. Adams (Neuroscience, Psychology) p. 62**  
*High Autism Spectrum Individuals Use Configural Information More than Neurotypical Individuals When Recognizing Faces*
  - 37. **Sean Dougherty (Biological Sciences) p. 62**  
*Enhancing axon regeneration with optical stimulation*
  - 38. **Lauren Anderson (Psychology) p. 63**  
*Actively Caring to Prevent Aggression and Bullying in Middle Schools*
  - 39. **Jessica C. Cea (Psychology) p. 63**  
*Factor Structure of Perceived Rewards among High School Students*
  - 40. **Jack B. DiTrapani (Psychology) p. 64**  
*Family/Child Characteristics and Responses to Treatment for Children with Oppositional Defiant Disorder*
  - 41. **Angelica S. Melvin (Psychology) p. 64**  
*Emotion Lability and Improvements in Child Outcomes Following Treatments for Oppositional Defiant Disorder*
  - 42. **Aimee M. Tolbert (Psychology, Sociology) p.65**  
*Exploring the Differences Between Children with the Comorbid Diagnosis of Oppositional Defiant Disorder and Fear of the Dark Compared to Children with Oppositional Defiant Disorder*
  - 43. **Lucy D. Tamberrino (Psychology, Chemistry) p. 65**  
*Effect of Mild Cognitive Impairment on Care Partner Depressive Symptoms*
- .....

## Physics and Engineering

- 44. **James R. Mayberry (Physics) p. 66**  
*Equilibrium Properties of Ising Metamagnetic Films*
  - 45. **Andrew A. Christovich (Mechanical Engineering) p.66**  
*Creating Damascus Steel through the Incorporation of Carbon Nanotubes*
  - 46. **Patrick S. Goley (Electrical Engineering) p. 67**  
*Electrical Characterization of Oxide-Semiconductor Heterointerfaces*
  - 47. **Peter D. Nguyen (Electrical Engineering) p. 67**  
*Effects of Thermal Annealing on Oxide-Semiconductor Heterointerfaces*
  - 48. **Ethan F. Robinson (Mechanical Engineering) p. 68**  
*Developing a Novel Method for Testing Ultra-lightweight Structures*
  - 49. **Ryan L. Tomas (Chemical Engineering) p.68**  
*Protein-Directed Synthesis of Au Nanoparticles*
- .....

## Architecture and Landscape Architecture

- 50. **Kenneth A. Black (Architecture) p. 69**  
*Dimensional Architecture: An Exploration of Parallel Frames*
- 51. **Kaitlin S. Shealy (Landscape Architecture) p. 69**  
*Growing Together: a study of participatory design*



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**3:30 – 4:45 p.m. – Session 10**  
**Poster presentations (Duckpond)**

**Liberal Arts and Human Sciences**

- 52. Cara C. Davis (Apparel, Housing, and Resource Management; Housing Option) p. 57**  
*Housing Design for Natural Disaster Preparedness*

**HHMI Sciencering Program**

- 53. Meredith M. McGlynn (Mathematics) p. 50**  
*Educators' Views on the Benefits and Drawbacks of Video Game Usage for Learning and Instruction*
- 54. Joel Oser (Biochemistry) p. 50**  
*Silver Nanoparticles: Sulfidation and Toxicity*
- 55. Bishwamoy Sinha Roy (Electrical Engineering) p. 51**  
*Optoperforation through Femtosecond Laser to facilitate Exogenous Material Uptake*
- 56. Christine Lambiase (Chemistry) p. 51**  
*Bio-molecular Materials and Systems*

**Life Sciences**

- 57. Emily A. Berckman (Biochemistry) p. 70**  
*Antiproliferative Extracts of *Barringtonia racemosa**
- 58. Ivonne E. Cedillos (Biological Sciences) p. 70**  
*Parasitized Plethodontid Salamander and *H. versicolor* Locomotor Abilities*
- 59. Michael Krug (Biochemistry) p. 71**  
*Nuclear-to-Cytoplasmic Partitioning of the Nescient helix-loop-helix 2 Protein*
- 60. Jancarla M. Ocampo (Biological Sciences) p. 71**  
*Parasite dispersal: when do larval trematode parasites leave their first intermediate hosts?*
- 61. Carolyn M. Shirey (Biochemistry) p. 72**  
*Role of S257 in the sliding mechanism of NADP(H) in *Aspergillus fumigatus* SidA*
- 62. Meredith Swartwout (Biological Sciences) p. 72**  
*Diversity and protective function of bacteria on the skin of spring peepers (*Pseudacris crucifer*)*
- 63. Emily A. King (Agricultural and Applied Economics) p. 73**  
**Kevin H. Hunt (Agricultural and Applied Economics)**  
*The Changing Effects of the Virginia Coal Industry at the State and County Level*

**Mathematics and Engineering**

- 64. Mohamed Mohamedali (Chemical Engineering) p. 74**  
*Processing of Alumina Particle Strengthened UHMWPE Matrix Composites*
- 65. Jun woo Park (Mechanical Engineering) p. 74**  
*Effect of Surface Blowing on Flow and Heat Transfer of Spherical Particles*



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## 11:15 am - 12:05 p.m. – Oral Presentations – Session 1

### Life Sciences (Smithfield)

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#### Morgan Brizendine

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##### *Distribution of stonerollers (Campostoma spp.) in three Virginia watersheds*

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There is much debate about the distribution of central stonerollers (*Campostoma anomalum*) and largescale stonerollers (*Campostoma oligolepis*) in Virginia. While the distribution of central stonerollers is consistently described, the distribution of largescale stonerollers is either ignored or is limited to Tennessee drainages (Etnier and Starnes 1993; Jenkins and Burkhead 1994). In this study, we collected and evaluated specimens from the Clinch River, New River, and Upper James watersheds in Virginia. We measured and weighed each specimen and performed circumferential and lateral line scale counts. Additionally, we noted the presence or absence of anal fin banding in males, nasal tubercle patterns in males, and mouth shape of both sexes. The sum of circumferential and lateral line scale counts is arguably the singular best way to distinguish between these two species because largescale stonerollers consistently have larger scales than central stonerollers (Burr and Smith 1976; Etnier and Starnes 1993). Largescale stoneroller lateral line and circumferential sum counts usually range from 74-82 scales while central stoneroller sum counts range from 83-102 scales (Burr and Smith 1976). Based on our results, we conclude that all populations in these watersheds are central stonerollers.

**Mentor: Dr. Don Orth; Fish and Wildlife Conservation**

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#### Victoria Neff

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##### *Comparisons of Auxin Application Methods and Rates on Rooting of Perennial Cuttings*

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While the basal dip of individual cuttings is the most common method of applying auxin to enhance rooting of ornamental plant cuttings, but there are time- and labor-saving alternatives. To compare these methods, unrooted cuttings of four perennial species (*Coreopsis* x hybrid, *Eupatorium maculatum*, *Euphorbia* x *martinii*, and *Phlox divaricata*) were treated with indole-3-butyric acid (IBA) as a basal dip, foliar spray, and an immersion solution at three rates (500, 1000, 1500 mg·L<sup>-1</sup>) plus controls. Rooting response (rooting percentage, root dry weight (DW) was measured and readiness for transplant was evaluated at two intervals. Measurements were taken at two harvests 21 and 28 days after treatment (DAT) for *Euphorbia*, *Eupatorium*, and *Phlox*; for *Coreopsis*, 14 and 21 days DAT. All *Phlox* cuttings rooted by 21 DAT for all treatments. *Coreopsis* had 100% rooting by second harvest and 92% on control and immersion treatments. *Euphorbia* had a higher rooting percentage with spray and immersion application methods during first harvest, and by second harvest rooted 100% with all treatments excluding control and dip at 500 mg·L<sup>-1</sup>. *Euphorbia* responded best with immersion at 1500 mg·L<sup>-1</sup> and dip at 1000 mg·L<sup>-1</sup> by the second harvest compared to the control and other treatments.

**Mentor: Dr. Holly Scoggins, Horticulture**

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## 11:15 am - 12:05 p.m. – Oral Presentations – Session 2

### Life Sciences 2 (Drapers Meadow)

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**Richard Carmean**

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*Novel Biodegradable Phosphonium-Based Polyesters for Gene Delivery*

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Synthesis of phosphonium based polyesters is inherently advantageous. The degradability of the polymer backbone through hydrolysis is possible by enzymes present in the human body. The smaller monomers are biocompatible adding to the biodegradability. The phosphonium based monomer was synthesized in a green fashion so not to contaminate the body with harmful solvents. The comonomer, succinic acid, is natural and found in biological processes such as the citric acid cycle; succinate is an influential intermediate in the electron transport chain. PEG is widely used in most drug delivery vehicles and is even known to deliver pharmaceutical drugs without other comonomers. In addition to its biocompatibility, PEG offers colloidal stability and ensures the polyplex is water dispersible. The ability to control the molecular weight of the charged block alters the charge density and can reduce the toxicity of the polyester. The use phosphonium based polyesters will potentially lead to less toxic and more efficient drug delivery vehicles.

**Mentor: Dr. Timothy Long, Chemistry**

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**Joseph Conduff**

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*The Quest for Homopolymers of Cholesterol-PEG*

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Sterol surfactants, a class of poly(ethylene glycol) (PEG) lipids, find many uses in topical formulations (e.g. cosmetics and skin creams) and in drug delivery (e.g. micelles, protective coatings for “stealth” liposomes and excipients to prevent protein aggregation). Cholestanyl-PEG, a member of this class, is a polydispersed polymer (i.e. contains a distribution of many chain lengths). As modern safety standards require information on all components of a mixture, what is the best method for isolating and identifying these components (homopolymers)? Chromatography, a powerful separation method, can be used to achieve these goals. The key is finding the optimal solvent systems by using thin layer chromatography and next applying column chromatography to separate and isolate the homopolymers. The identity of the homopolymer is confirmed by nuclear magnetic resonance spectroscopy and mass spectrometry. The challenge is finding solvent systems that provide adequate resolution between homopolymers that have nearly identical properties. After extensive trial and error, solvent systems with various ratios of toluene and acetone separated homopolymers with chain lengths of 3, 4, and 5. The next phase of the project will involve testing the biological properties (hemolysis, membrane aggregation) of the homopolymers, and comparing them to those of the polydispersed polymer.

**Mentor: Dr. Richard D. Gandour, Chemistry**

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## **Bowen Meng**

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### *Elucidating the function and localization of the ATPases responsible for pili production in *Sinorhizobium meliloti**

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*Sinorhizobium meliloti* is a gram-negative nitrogen fixing alpha proteobacterium that is agriculturally important as it establishes a symbiotic relationship with its host plant, *Medicago sativa* (alfalfa). Previous data in the lab demonstrated that the type IVb pili found in *S. meliloti* to play an important role in the symbiotic process. Four ATPases, *cpaE1*, *cpaE2*, *cpaF1*, and *cpaF2* are thought to be responsible for the assembly and disassembly of the structural subunit (pilin) of pili. Our current research focus is to make deletions in the ATPase genes, using overlap extension PCR and homologous recombination, to observe changes in pilin production via immunoassays. Another approach is to fuse fluorescent proteins to the ATPases to visualize their localization in the cell and elucidate where the pili are being assembled. Through understanding the role of these ATPases in relation to pili organization, it is then possible to observe any changes in the ability for *S. meliloti* to form an effective symbiosis with alfalfa. The overall aim of the project is to better understand the *S. meliloti* – host interaction and thereby apply these findings to develop strains that are better able to nodulate and thereby reduce our dependence on synthetic nitrogen fertilizers.

**Mentor: Dr. Birgit Scharf, Biological Sciences**



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**11:15 am - 12:05 p.m. – Oral Presentations – Session 3**

**Communication and History (Ellett Valley)**

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**Alyssa Bedrosian**

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*The Use of Packard's Needs in the 2009 Doritos Ad Campaign*

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In 2009, Doritos launched an advertising campaign that invited Doritos' consumers to participate in an ad creation competition for the Super Bowl. If the winner could win the top spot in USA Today's ad meter, the contestant would win \$1 million from Doritos. This research paper analyzes how Vance Packard's eight hidden needs were used in the advertising campaign. In 1957, Packard identified the following eight needs that are targeted through advertising: emotional security, reassurance of worth, ego-gratification, creative outlets, love objects, sense of power, sense of roots, and immortality. This paper will discuss the needs that were used and how effective they were in the campaign, as well as the needs that were not targeted and why they were not targeted. Suggestions and ways to improve the campaign will also be discussed. As advertising continues to become more prevalent in our society, it is essential to analyze how it targets consumers and how consumers can prevent themselves from being misled or deceived by advertisements. Therefore, this research is relevant and important to the world we live in today.

**Mentor: Dr. Beth Waggenpack, Communication**

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**Mark Bowes**

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*The Second Battle of Cedar Creek: Preserving History in the Shenandoah*

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As we commemorate the sesquicentennial of the Civil War, celebrations and events are being planned across the nation to honor the 600,000 plus Americans who died in that terrible conflict. There has been a concerted effort to preserve some of the great battlefields of the war, Gettysburg, Manassas, Shiloh, and others, but very little has been done to preserve the ground on which a pivotal battle was fought in the Shenandoah Valley, the Battle of Cedar Creek. This project sought to highlight the decisiveness of that battle through comparisons to what is almost universally considered to be a decisive battle, the Battle of Atlanta. It uses several contemporary documents to assert the battle's importance to those who participated in it. Then the project shifted gears a little bit, seeking to chronicle the story of the limited efforts to preserve the battlefield and associated structures. The Cedar Creek battlefield is one of the most threatened battlefields in the nation, a fact acknowledged by several preservation organizations. Such organizations have only relatively recently began to push for the preservation of Cedar Creek and it remains severely threatened.

**Mentor: Dr. Peter Wallenstein, History**





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## **Communication and History (Ellett Valley)**

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**Victoria Heath**

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*Cutting Deep: The Examination of Female Genital Mutilation Among Somali Communities in Kakuma, Kenya*

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The World Health Organization estimates that 100 to 140 million women and girls worldwide have undergone some form of FGM. The prevalence of this practice and the type conducted varies by several factors, including ethnicity, region, religion and culture. Certain Somali communities that traditionally perform FGM tend to continue the practice when migrating to other countries within Africa. This is a particular problem with the movement of Somali refugees to the Kakuma and Dadaab refugee camps in Kenya. Despite the efforts of community leaders, governments, international bodies, FGM still remains prominent in the Somali community. FGM is illegal under Kenyan legislation such as the Children's Act (2001) and the Prohibition of Female Genital Mutilation Act (2011), but it still continues. This research focuses on FGM and the Somali refugee community in Kakuma, Kenya. It explores the history of FGM in the greater Somali population and the efforts that have been made to eradicate the practice. I will argue that the most effective way to eradicate FGM among these communities, particularly within the camp, is to approach the issue from all angles, implement a 'behavioral change model,' and establish a grassroots, cooperative effort between everyone in the community. Sources used in this study include information I obtained during my stay at the Kakuma Refugee camp in May to June of 2012 as well as government and NGO reports.

**Mentor: Dr. Brett Shadle, History**



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## 11:15 am - 12:05 p.m. – Oral Presentations – Session 4

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### International Studies and Political Science (Huckleberry)

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#### Tea Ivanovic

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*External Pressures and Domestic Changes: The Council of Europe, The European Union, and the National Minorities in Vojvodina*

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There have been recent efforts to establish legally binding institutions on the notion of human rights for minority groups, although this process is slow and limited. Only in 1992 has the General Assembly (GA) of the United Nations adopted the Declaration on the Rights of Persons Belonging to National or Ethnic, Religious and Linguistic Minorities. The increasing importance of international organizations, along with the international community's diminishing tolerance for human rights violations is causing an increase in the breadth and depth of human rights laws in recent years. The proposed research will address the question of whether it possible to enforce human rights laws of protecting national minorities, and will use a case study of the Vojvodina province in northern Serbia. Vojvodina is an autonomous multi-cultural and multi-ethnic province in Northern Serbia, established in 1944 in the FPR Yugoslavia (Savezna Federativna Republika Jugoslavija (SFRJ)), representing approximately 1.93 million of Serbia's 7.19 million people. The region is the most diverse part of Serbia with over 25 ethnicities and 6 official languages. The historically diverse region is a center for national minorities that has had a traditional struggle with one the one hand respecting the majority population, while at the same time abiding to the international human rights laws applicable to the various national and ethnic minorities that inhabit the region. This research will provide an analysis of the specifically troublesome nature of community life that the region copes with.

**Mentor: Dr. Yannis Stivachtis, Political Science**

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#### Elizabeth “Jade” Womack

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#### *Breast is Best*

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As birth rates declined in the “developed world” after the baby-boom era, the infant formula producing company, Nestlé, responded by creating a market in the “developing world.” Following suit, the company was deemed an anathema and considered culpable for purporting information to mothers in developing countries through aggressive advertising methods. As a result, a boycott was held between the 1970 and 1984 that symbolically ended after UNICEF and WHO passed an International Code of Marketing of Breast-Milk Substitutes. The author studied to what extent was the code successful in order to curb some of the pernicious advertising to mothers in the developing countries which resulted in poor infant formula preparation—both as a result of the demographics of these women (typically without adequate sanitation and education) and the advertising techniques of infant formula companies. Through examined articles, journals, audits, and reports from Nestlé, third parties, and various governments, the author concluded that even with a code being passed, it was a failure. By examining the physiological nature of breastfeeding, the creation of a status symbol—purchasing infant formula, and the lives of these women, the findings pose a question to the ethical responsibility of multinational corporations in developing countries.

**Mentor: Dr. Peter Wallenstein, History**

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**2:15 – 3:30 p.m. – Oral Presentations – Session 6**

**Classical Studies, Literature, Sociology, and Apparel, Housing, and Resource Management (Drapers Meadow)**

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**Hannah Bochain**

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*Literary Competition and Filiation in Classical Latin: The Sapphic Evolution*

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The goals of the project were to discover the ways in which competition and admiration of other poetic work influenced composers of Latin poetry over time, looking specifically at the Sapphic poems of Catullus, Horace, and Statius. The relationship between poems and poets is often discussed in thematic terms, but we can also trace literary allusion and filiation through formal and lexical paths. The purpose of the study was to determine through observations of these formal and lexical patterns the relationship between poets and its effects on shaping poetic standards in the Classical Roman world. To determine interplay among poets, the poems were first scanned for metrical and accentual variations. What was discovered through the scansion was that Catullus, the first to bring the Sapphic form out of its original Greek and into Latin, had a “rougher” interpretation of the form, lacking the set caesura that appears in later Sapphics. Horace, composing his Sapphics slightly later, adjusted the form to better fit the longer syllables and stronger stress accents of the Latin language. By the time Statius writes, the Horatian Sapphic form becomes a set meter hardened by rules, and it lacks the manipulation of beat found in earlier poems.

**Mentor: Dr. Andrew S. Becker, Foreign Languages and Literature**

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**Tom Minogue**

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*Stones, Bones, and Spoils: Impact of the Murray Correspondence on Conception of Identity in Childe Harold*

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The eleven-year relationship between Lord Byron and his publisher John Murray is one well documented in the scholarly world. As Andrew Nicholson describes in his preface to *The Letters of John Murray to Lord Byron* “anecdotal, informative, playful and teasing” (Nicholson XVIII) are the fashions of the letters between the two men; they give a sense of a writer-publisher relationship that surpassed, but was sometimes reliant on, the monetary aspect of the publishing enterprise. In short, Murray “knew how to read Byron...catch at his humour: his anxieties, frustrations, anger, illnesses or depressions” (Nicholson XVIII) in a way that encouraged the author in his experiences during the period from 1812 to 1817, when the publication of *Childe Harold’s Pilgrimage* was ongoing. This travel can be divided into three swaths of time: Byron’s return home from Greece in 1812, the travels leading up to his summer with Percy Bysshe and Mary Shelley at Lake Geneva the summer of 1816, and his ventures across Venice and Rome thereafter. As Byron himself says “with these countries, and events connected with them, all my really poetical feelings begin and end” (Blackstone 45) those poetic feelings provide the substance of how Mr. Murray was profoundly affected during their discourses of ink.

**Mentor: Dr. Peter Graham, English**

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## **Classical Studies, Literature, Sociology, and Apparel, Housing, and Resource Management (Drapers Meadow)**

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**Kelsey Dominick**

*Versatile Vixen*

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The objective of this creative scholarship project was to create a collection of versatile apparel for a new label called Versatile Vixen designed and developed by myself. The target market for this collection is a woman in her late twenties or early thirties who has begun to work in the industry and seeking to invest in a wardrobe that can suit any occasion. This simple 3-quarter sleeve dress appropriate for the workplace can be converted into a sleeveless shift dress, a beaded lace sleeved summer dress, or a sequined sleeve dress appropriate for a night out on the town. A pattern for the prototype was prepared using draping technique. For the construction of the garment, both machine and hand sewing techniques were utilized. The outcome of the construction of the garment was achieved by creating different sets of interchangeable sleeves that changes the look of the ensemble entirely. The versatility of this garment provides economically conscientious apparel buyers with multiple options.

**Mentor: Dr. J. Kim, Apparel, Housing and Resource Management**

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**Mia Simms**

*#WhatIWore: Fashion Decisions of Undergraduate Females*

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Clothing is the most personal form of outward expression that we as individuals display on a daily basis. So far there has been little research conducted formally regarding clothing decisions of young adult females in their undergraduate years, and what prompts them to make daily clothing choices. My objective is to investigate the degree to which undergraduate females at Virginia Tech make to their daily clothing choices. More specifically, my research will determine to what extent outward appearance is a tool by which the individual makes efforts to conform (fitting in) versus distinction (standing out) and comfortability (of one's clothes) versus "feeling good" as a result of looking-good guide students daily choices regarding what to wear to class. The expected outcomes of this project are a better understanding of what and how students do to express themselves purposefully or otherwise over the course of a semester. I have used self-journaling, journaling through observation, and a survey of 15-20 participants. I argue that students mostly dress for comfort and convenience and so far I have found that my research supports this hypothesis.

**Mentor: Dr. Anthony Kwame Harrison, Sociology, Africana Studies**



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## **Classical Studies, Literature, Sociology, and Apparel, Housing, and Resource Management (Drapers Meadow)**

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**Holland M. Vasquez**

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### *Factors Influencing Attitudes Towards Homosexuality*

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Although there has been a drastic increase in both the acceptance of homosexual relations and support for homosexual civil liberties, the number of hate crimes targeting gays and lesbians has remained consistent. FBI hate crimes data serves as poignant reminders that although the United States has moved towards the acceptance of homosexuality, there is still a portion of population not only opposed, but a portion vehemently opposed. While there is a paucity of literature examining this peculiar phenomenon, researchers have assayed various demographic variables that influence attitudes towards homosexuality. Research has consistently identified gender, educational background, political ideology, and religiosity as salient factors that influence prejudice towards homosexuality. In comparison to gender, educational background, and religiosity, political ideology exerts the greatest influence over attitudes towards homosexuality. Furthermore, research has demonstrated the need to examine acceptance of homosexual relations and support for homosexual civil liberties separately. As attitudes are not always uniform, support for homosexual civil liberties should be broken down into gay marriage and adoption by gays and lesbian couples. Current literature can be utilized to generate support in an effort to bring about social change in the United States. Further research is needed in order delineate the incongruence between attitudes and behaviors.

**Mentor: Dr. Gregory S. Longo, Psychology**



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## 2:15 – 3:30 p.m. – Oral Presentations – Session 7

### English and Political Science (Huckleberry)

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**Chelsea Gillenwater**

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*Musical Trends in Animated Programming*

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Since Walt Disney first married musical storytelling to animation in Snow White and the Seven Dwarfs and Fantasia, the narrative style of musical theatre has found a home in animated programming. Musical performances seem to have settled easily into animated content, primarily due to the expressive, naturally exaggerated style of animation, which lends itself well to the dramatic situations and larger-than-life characters common in musical theatre. For a majority of animated shows, musical numbers have often served as parodies of existing songs and genres, adopting theatrical tropes for the sake of satirizing popular culture. However, recent trends in animation have given rise to a new era of musical storytelling. Today, cartoons are pushing further into the realm of musical theatre by wholeheartedly adopting a theatrical form of storytelling, exemplified by “Phineas and Ferb,” which draws upon long-established musical genres and traditions, and “Adventure Time,” which often employs simple melodies and instrumentation in order to highlight major character development. This reveals not only a trend toward more complex and nuanced songwriting in animated programs but also a significant shift toward shows with strong, emotional cores that are perfectly suited to musical theatre. Animation seems to be shifting from satirical to sincere storytelling, and the musical trends in these shows have evolved along with them.

**Mentor: Dr. Michael Saffle, Religion and Culture**

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**John Gillespie**

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*Victory for the Craft: The Craft/Micro Brewing Revolution in the American Beer Industry*

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My research for this semester will be an exploration of the development and expansion of the American Micro-Brewing Industry after 1978. I will be conducting a case study of a single American Micro-Brewing company, currently operating in Roanoke, Virginia: Roanoke Railhouse Brewery. 1978 is identified as the “low point” of American Brewing, when the fewest number of breweries were still active in the United States and the market seemed to be shut off to any new entrants. This subject gives us an example of an industry where anti-homogenized, high quality, luxury items suddenly emerged on a market that had been without them for decades. I will use secondary sources and firsthand accounts of several micro-breweries that started at that time to show that actions of the major players in the industry previous to the 1970s had made the market primed for a craft emergence. An analysis of the primary evidence collected from Roanoke Railhouse Brewery in relation to the personal accounts of other micro brewers will show the challenges that faced these entrepreneurs in the modern beer industry, and how they overcame them by promoting the quality and the relatable nature of their beer. I will prove that the rise of craft brewing was the result of massive, untapped, market demand in the 1970s, and the subsequent development of different brewing methods and product variation which allowed small scale brewers to meet that demand in a way that was viably profitable and sustainable.

**Mentor: Dr. Heather Gumbert, History**



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## English and Political Science (Huckleberry)

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### **Katlyn Griffin**

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#### *Restoration House Restored: Dickens's Great Expectations and the Creation of Miss Havisham's Haunted Mansion*

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My research explores the topographical, biographical, and thematic relationship between the Satis House of Charles Dickens's *Great Expectations* and the Elizabethan home in Rochester, Kent that prompted the novelist's imagination. I argue that Satis House, as based in the social and historical context of the real-life Restoration House, embodies two of the novel's major themes—haunting and imprisonment—and acts as the novel's constant. My goal for this project was to bring a slightly different context to Dickens's inspiration for the creation of Satis House. While many people have taken a factual approach to Restoration House, few people have explored how Dickens applied his connection to the house to his characters. The characters of *Great Expectations*, namely Pip, Estella, and Miss Havisham, are haunted and trapped by Satis House because Restoration House fascinated Dickens, their creator. This paper began when we read *Great Expectations* in my senior seminar class, and I was fascinated by Dickens's use of Satis House in the novel. When I discovered the historical inspiration for the house and Dickens's personal connection, I decided to make that my paper's focus and use thematic, secondary criticism about Satis House to support that argument.

**Mentor: Dr. Nancy Metz, English**

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### **Joshua Entsminger**

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#### *Are Relations Concepts? Practice and the Personal in a Philosophy of Relation*

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The eleven-year relationship between Lord Byron and his publisher John Murray is one well documented in the scholarly world. As Andrew Nicholson describes in his preface to *The Letters of John Murray to Lord Byron* "anecdotal, informative, playful and teasing" (Nicholson XVIII) are the fashions of the letters between the two men; they give a sense of a writer-publisher relationship that surpassed, but was sometimes reliant on, the monetary aspect of the publishing enterprise. In short, Murray "knew how to read Byron...catch at his humour: his anxieties, frustrations, anger, illnesses or depressions" (Nicholson XVIII) in a way that encouraged the author in his experiences during the period from 1812 to 1817, when the publication of *Childe Harold's Pilgrimage* was ongoing. This travel can be divided into three swaths of time: Byron's return home from Greece in 1812, the travels leading up to his summer with Percy Bysshe and Mary Shelley at Lake Geneva the summer of 1816, and his ventures across Venice and Rome thereafter. As Byron himself says "with these countries, and events connected with them, all my really poetical feelings begin and end" (Blackstone 45) those poetic feelings provide the substance of how Mr. Murray was profoundly affected during their discourses of ink.

**Mentor: Christian Matheis, Philosophy**

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## 2:15 – 3:30 p.m. – Oral Presentations – Session 8

### Engineering (Smithfield)

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**Ali S. Alhamaly**

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*Performance Analysis of a Transonic Fan*

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My undergraduate research project is concerned with characterizing the performance of a transonic fan for a turbofan propulsion engine. My primary effort has been to understand the fundamental principles of fluid mechanics and thermodynamics that govern transonic fan performance, and how the blade geometry affects this performance. Specific performance metrics include the ability to produce a flow field with desirable characteristics in terms of pressure ratio, mass flow and efficiency. The goal of the project is to model the complex nature of the flow inside the fan passage in order to quantify these performance metrics. The aerodynamics of the fan rotor were modeled using a turbomachinery analysis code called AxCom. Given information about the geometry and configuration of the engine inlet and fan blades, AxCom solves for the flow field inside the fan passage over the operating range of the fan. It then presents a performance prediction of the fan as pressure maps and efficiency maps. In addition, information about the total pressure losses and the behavior of the flow with respect to minimum loss conditions (the design operating point) is presented to gain insight about the operation of the fan under off-design conditions. My presentation will show the geometry of the modeled fan, the predicted flow field, and the results of my research investigation. The model predictions will be compared with available experimental results.

**Mentor: Dr. Walter O'Brien and Anthony Ferrar, Mechanical Engineering**

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**Eric C. Anderson**

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*The use of twist coupled carbon fiber blades to maximize pitch under simulated operating conditions*

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The effect of symmetric, anisotropic composite wind turbine blades on passive twist coupling under operating conditions was investigated. Current designs use motors either at the hub or throughout a rotor blade to twist the blade and improve power generation. The ideal laminate is one that provides adequate bending stiffness while inducing twist under operational loads. It was found through finite element analysis of a carbon-fiber/polymer composite that implementing ply tailoring in a five-meter-long wind turbine blade results in bending-twist coupling. A composite wind turbine rotor blade model was constructed and meshed with 9272 elements using the finite element program Abaqus. It was then subjected to simulated centripetal, drag and lift conditions. The ideal laminate orientation was found to be  $[(25)_2/0_2]_S$ , as this provided adequate stiffness and torsional rotation ability of up to 11 degrees. This laminate orientation provides adequate bending stiffness, with tip deflections falling within the design space. First-ply composite failure analysis predicted failure will occur at the root of the blade. Under the load conditions studied, the factor of safety for first-ply failure was approximately two.

**Mentor: Dr. John Kennedy, Mechanical Engineering**



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**Joseph W. Ferrara**

*A virtual aerospace crashworthiness assessment platform*

An investigation into the effects of water ditching on an aircraft structure was conducted. It is believed that through the proposed methodology, future designs can better withstand such impact scenarios. Ditching involves complex fluid-solid interaction which requires an in-depth knowledge of finite elements and the physics of impact before it can be effectively constructed. Through this approach, full sized virtual simulations can push the boundaries for designing crashworthy structures. It is the objective of this research to develop a methodology that can determine a range of attitudes an aircraft can assume to reduce the structural damage sustained, hence providing enhanced passenger safety.

The evolution of the methodology will be through modelling of a detailed, scaled-down passenger aircraft, and validated through a stringent set of physical tests. An advanced experimental rig was constructed to control the aircraft's conditions prior to water impact. The comparison between the simulation and experimental results of the scaled model proved that the numerical model closely represented the experiments. Through dimensional analysis the plane will be scaled up to represent the physics of a full scale crash. The validated methodology can significantly enhance our understanding of the complex and nonlinear behavior of an aircraft in the event of water ditching and help contribute to advanced crashworthiness design for future generations.

**Mentor: Dr. Javid Bayandor, Mechanical Engineering**

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**Virginia E. Hagen-Gates**

*Droplet Leaf Dynamics*

Leaves range from superhydrophobic surfaces which shed water droplets, to superhydrophilic surfaces that absorb the water. A new design for harvesting rain drop energy could be developed by investigating the dynamics of droplet impacts on leaves. Elastic beams were used to model leaves, one was coated with a hydrophobic spray, non-wetting case, and the other was left untreated, wetting case. An apparatus was set up so that droplets could be released from varying heights and collide with the beams whose lengths varied from 15mm to 150mm. Using a high speed camera each impact was recorded and later analyzed. We have shown that when the droplet oscillation frequency matches the beam vibration frequency critical damping occurs for the hydrophilic beam case. The torque at the base of each beam was approximated and shows that a hydrophilic beam undergoes more torque from a droplet impact than a non-wettable beam over a wide range of beam lengths. This indicates that plants may use hydrophobic coatings to minimize stress from droplet impacts. For a piezoelectric raindrop energy harvester this result indicates that a design with a wettable beam will maximize energy recovery from a droplet.

**Mentor: Dr. Sunny Jung, Engineering Science and Mechanics**



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**David G. Mackanic**

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*Novel Cathode Materials for Li-air Batteries*

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Li-air batteries have the potential to demonstrate a 10x greater gravimetric energy density than traditional Lithium-Ion batteries. The production of lithium-air batteries will allow for significant progress to be made towards the reduction of fossil fuel use. In particular, lithium air batteries will play an important role in developing practical electric vehicles. One of the most prominent problems associated with the development of Li-air batteries is the cathode material. It is necessary to find a cathode material that has a large surface area for lithium oxidation to occur. In this work, porous cathodes are prepared using novel electrospun carbon fiber mats, and the performance is compared to that achieved by using conventional carbon powders.

Batteries comprised of a Li anode, a Li-salt electrolyte, and the porous cathode are assembled and tested in a Swagelok cell. Galvanostatic charge/discharge tests are conducted and the energy density and discharge times are compared. Multiple charge-discharge tests will be conducted to observe the durability of the battery. It is expected that higher surface area cathode materials such as the novel electrospun mats will exhibit higher energy density than electrodes prepared from typical carbon powders. Testing is currently being conducted.

**Mentor: Dr. Michael Ellis, Mechanical Engineering**



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## 2:15 – 3:30 p.m. – Oral Presentations – Session 9

### Life Science and Psychology (Ellett Valley)

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**Kristen I. Fread**

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*Regulation of endosomal membrane trafficking adaptor proteins*

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Tollip and Tom1 are adaptor proteins engaged in the endosomal pathway that help to recruit and transport cargo for their degradation in lysosomes. Tollip simultaneously binds to endosomal phosphatidylinositol 3-phosphate (PtdIns(3)P), allowing it to associate to endosomal membranes, and to Tom1. The association of Tollip and Tom1 to endosomal membranes is negatively regulated by ubiquitin. The major goal of the project is to understand why Tom1 directly binds to endosomal membrane-bound Tollip. For the first time, both full-length Tollip and Tom1 proteins have been purified to homogeneity. Data indicate that both proteins form stable tetramers, oligomerization states that increase their affinity for their binding partners. To test Tom1 contribution in Tollip-PtdIns(3)P association, protein-lipid overlay assays and surface plasmon resonance experiments are currently developed and research is in progress. Together these findings will contribute to our understanding of how Tollip and Tom1 cooperate with each other to precisely coordinate endosomal cargo transportation.

**Mentor: Dr. Daniel Capelluto, Biological Sciences**

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**Christian L. Hawthorne**

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*Does Chaos in the Home Environment Relate to Attention and Effortful Control in Head Start Preschoolers?*

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Children enrolled in Head Start centers are likely to display more externalizing behaviors and less attention skills (Gabriella & Breznitz, 1992; Miech, Essex, & Goldsmith, 2001), making it crucial to examine how best to support the development of children in low-income families. A chaotic home environment, which is more likely to be found in low-income families, may interfere with the development of attention due to frequent distractions in chaotic homes. Furthermore, children who have attention problems are likely to have problems with effortful control, which involves the ability to change attention and behavior as needed (Eisenberg, Smith, & Spinrad, 2011). This study investigates the relation of chaos in children's home environment with their attention and effortful control in a sample of children from Head Start centers. It was predicted that children in more chaotic home environments would be more likely to display less attention and thus less effortful control. Parents and 3-5 year old children ( $n = 96$ , mean child age = 56.10,  $SD = 7.18$ ) were recruited from six Head Start centers in the New River Valley. Parents completed a questionnaire on the level of household chaos, and children were observed in two tasks to measure attention and effortful control. Effortful control was significantly related to attention and chaos. The importance of these findings for examining factors associated with children's effortful control in low-income families will be discussed.

**Mentor: Dr. Cynthia L. Smith, Human Development**

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**Zachary L. Mannes**

*How parents influence their children's alcohol intake: A downtown study*

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Tollip and Tom1 are adaptor proteins engaged in the endosomal pathway that help to recruit and transport cargo for their degradation in lysosomes. Tollip simultaneously binds to endosomal phosphatidylinositol 3-phosphate (PtdIns(3)P), allowing it to associate to endosomal membranes, and to Tom1. The association of Tollip and Tom1 to endosomal membranes is negatively regulated by ubiquitin. The major goal of the project is to understand why Tom1 directly binds to endosomal membrane-bound Tollip. For the first time, both full-length Tollip and Tom1 proteins have been purified to homogeneity. Data indicate that both proteins form stable tetramers, oligomerization states that increase their affinity for their binding partners. To test Tom1 contribution in Tollip-PtdIns(3)P association, protein-lipid overlay assays and surface plasmon resonance experiments are currently developed and research is in progress. Together these findings will contribute to our understanding of how Tollip and Tom1 cooperate with each other to precisely coordinate endosomal cargo transportation.

**Mentor: Dr. E. Scott Geller, Psychology**



## College of Agriculture and Life Sciences

### Pratt Senior Research Scholars

Funding for the Pratt Senior Research program is made available through a bequest of John Lee Pratt, a native Virginian, cattle owner, and, at one time, the CEO of General Motors. The Pratt endowment provides nearly \$1 million a year to the college. Of that, about \$150,000 is earmarked for scholarships and the senior research fellow program. The remainder is used for research equipment, bringing visiting scholars to Virginia Tech, and for graduate students' research and stipends. The program promotes the study of animal nutrition across departments throughout the college.

<b>Student</b>	<b>Major(s)</b>	<b>Faculty Mentor</b>
Elizabeth J. Boott	Animal and Poultry Sciences; Dairy Science	Mark Hanigan
Wangui C. Gichane	Crop and Soil Environmental Sciences; International Studies	Ozzie Abaye
Chris M. Harrison	Agricultural Technology, Applied Agricultural Management option	Rachel Kohl
Matt T. Lawrence	Agricultural Technology, Applied Agricultural Management option	Rachel Kohl
Yi Lin Lee	Agricultural Sciences	David Kuhn
Colleen R. McIntyre	Animal and Poultry Sciences, Biological Sciences	D. Michael Denbow
Rebecca M. Naramore	Animal and Poultry Sciences	Mark McCann
Nicole E. Paris	Animal and Poultry Sciences	Eric Wong
Jaime K. Rutter	Animal and Poultry Science	Ronald Lewis
L. R. "Taylor" Scott	Animal and Poultry Sciences	David Gerrard
Lauren M. Sheehan	Animal and Poultry Sciences	Eric Wong



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## College of Agriculture and Life Sciences Pratt Senior Research Scholars

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### 12:20 – 2:15 pm, Session 5: Poster presentations (Solitude)

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#### 1. Elizabeth J. Boott

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##### *Improved Nitrogen Efficiency in Lactating Dairy Cattle Through a Better Representation of Amino Acid Requirements*

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In accordance with the current National Research Council (NRC) requirements of the total dietary nitrogen fed to dairy cattle, only 25% is deposited in milk protein. The majority of excess nitrogen produced by dairy cattle is due to amino acids being broken down after they are absorbed from the gastrointestinal tract of the animal. Approximately 2/3rd of absorbed amino acids are catabolized and used for energy. A better understanding of amino acid metabolism, regulation of protein synthesis, and true amino acid requirements in dairy cattle is therefore necessary to feed less dietary protein without compromising milk production. The objective of this study is to determine how the mix of amino acids being absorbed by the dairy cow affects her efficiency of use of specific amino acids for milk protein. The ultimate goal of the study is to improve current NRC equations that are used to determine amino acid requirements of dairy cattle. I hypothesize that only a small fraction of labeled amino acids will be recovered in milk protein, a large amount of nitrogen will be de-aminated into urea or found in fecal matter, and the largest animal, Cow 4337, will have the most amount of nitrogen going into muscle and less into milk protein, blood, urine, and/or feces.

**Mentor: Dr. Mark Hanigan; Dairy Science**

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#### 2. Wangui C. Gichane

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##### *Exploring the Forage Potential of Teff for Heifers under Two Management Schemes.*

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Livestock producers often minimize input costs by relying on cool-season grasses while at the same time, expose themselves to risks associated with fluctuating forage yields. Use of warm season grasses such as teff (*Eragrostis tef*), diversifies farming and helps cope with drought. The objective of the experiment was to evaluate teff as potential summer forage for heifers. The grazing experiment was conducted between June-September with two grazing treatments, grazing only (no hay was harvested) and hay/graze (hay then graze re-growth) with four replications. Teff was planted on a prepared seedbed at a rate of 12.0 lbs/acre on 22 acres total. About 5-6 heifers (average about 550 lbs each) were assigned to each pasture block. Animals were weighed at the beginning and end of the grazing season and full weights taken every 28 days. Forage samples were taken for quality determination. Total biomass measured for the graze only and hay/graze treatments averaged 1.0 tons/acre and 0.45 tons/acre respectively. In the grazing only treatments, the animals average daily gain (ADG) between the paddocks was 0.94 lbs/day compared to the animals in the hay/graze treatment which was 1.33 lbs/day. The number of grazing days however was higher for the grazing only treatments (about 300 days) compared to the hay/graze treatment (about 175 days). With higher average daily gain and hay, the hay/graze treatments seem to be more profitable than the grazing only treatments.

**Mentor: Dr. Ozzie Abaye, Amber Hickman, and Benjamin Tracey; Crop and Soil Environmental Sciences**



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### **3. Chris M. Harrison and Matt T. Lawrence**

#### *Implementing and Sustaining a Rotational Grazing System in Southwest Virginia*

Feed is one of the most substantial costs in any livestock operation. Volatile grain markets and rising fuel prices have caused farmers to explore every opportunity to reduce feed cost. To counter high feed costs, livestock operators should consider implementing more efficient use of low cost feed. To this end, we have designed a rotational grazing system that will allow rationing a diverse pasture. Numerous paddocks with a short grazing period and long resting period will ensure adequate regrowth of forage. Our goal is to provide substantial and nutritive forage year round. Achieving this goal requires attentive management and inexpensive temporary fencing. To establish a highly nutritious, yet low cost feed, we permanently rested and renovated the pasture with several different species of grasses and legumes. Thus far the renovation was successful, as we have observed an enormous difference in the density and diversity of the pasture. A forage stick, pre and post weights of cow/calf units and overall forage growth will be used to monitor progress. Although our project is not yet complete, we hope to observe substantial weight gain per cow/calf unit while providing quality pasture and extending the grazing season, thus reducing feed costs.

**Mentor: Dr. Rachel Kohl; Applied Agricultural Technology**

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### **4. Yi Lin Lee**

#### *Virginia Grown Teff for Aquaculture: Potential for a Value Added Market*

Teff (*Eragrostis tef*) is a grain originating and domesticated in Ethiopia touted for its high level of lysine (important amino acid for fish in aquaculture). The objective of this study was to determine if teff could be a suitable ingredient for tilapia feed replacing fishmeal or soymeal. Feeding trials were implemented in 24 tanks in a recirculating aquaculture system configuration for fish (tilapia). Eight experimental diets (in triplicate) were formulated and pelleted including a control and seven experimental diets using teff to replace fishmeal and soybean meal. Fish performances on the various diets were assessed daily for survival and weekly for growth. Two four-week trials were conducted. In the first trial, the specific growth rates (SGR) and food conversion ratios (FCR) were considered to be very good for all diets. In the second trial, half of the tanks on one-side of the RAS system failed. However, results from the remaining twelve tanks suggested that teff flour was a suitable ingredient for replacing fishmeal and soybean meal. This trial will be repeated to reaffirm the results. Future studies will be needed to determine if fishmeal and soy meal can be completely replaced with teff.

**Mentor: Dr. David Kuhn, Food Science and Technology; Dr. Ozzie Abaye, Crop and Soil Environmental Sciences; Daniel P. Taylor, Food Science and Technology**





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## 5. Colleen R. McIntyre

### *Changes in Hypothalamic EZH2 Activity Associated with Fasting in Broiler Chicks*

The environment an animal is exposed to early in life plays a role in the adaptability of that animal when re-exposed to those same stressful conditions. While the mechanism of this epigenetic adaptation in poultry is unknown, it has been shown that “preconditioning” poultry with nutritional stress early in development can induce long-lasting phenotypic changes in the birds. The mechanisms for epigenetic changes are complex and involve modifications in the expression of certain genes. Previous studies in our lab showed that fasting broiler chicks for 24 hours at 3 days-of-age increased methylation of histone 3 at lysine 27 (H3K27) and H3K27 methyltransferases (HMTs) were increased after fasting in the paraventricular nucleus. This effect was also evident at 10 (D10) and 40 days-of-age (D40). In the present study, the effects of inhibiting the histone methyl-transferase EZH2 in chicks under various feeding regimes were observed. EZH2 was inhibited by injecting EZH2 antisense into the 3rd cerebroventricle. Injection of the antisense decreased EZH2 mRNA level and the downstream product dimethylated H3K27 (H3K27Me2). However, the fasting-induced EZH2 surge was not eliminated by EZH2 antisense injection. Therefore, although EZH2 is a key epigenetic histone modification factor, it sustained little “molecular memory” following fasting. Our data suggests that phenotypic changes in the bird after nutritional stress are mainly preserved by other factors in the HMT complex.

**Mentor: Dr. D. Michael Denbow, Animal and Poultry Sciences**

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## 6. Rebecca M. Naramore

### *The Effect of Corn Gluten in Lambs*

Increases in the price of corn have pressured cattle and sheep producers to utilize by-product feeds as a substitute for corn as a supplement to forage diets. Corn gluten feed (CGF) is a readily available by-product that is widely used in Virginia. However there is little information available related to feeding high levels of CGF and its impact on nutrient digestibility. The objective of this study is to determine nutrient digestibility when grass hay is supplemented with different amounts of CGF. Nine Suffolk wethers (45 kg) were fitted with a fecal collection bag and fed a chopped grass hay diet during period one and chopped grass hay with .45, .90 or 1.35 kg/d of CGF during period two. Each period consisted of a 16d adjustment and a 5d collection. Total feed intake, feed refusal and total fecal output were recorded during each collection periods with 10% retained for laboratory analysis. Retained samples were analyzed to determine dry matter (DM), crude protein (CP), acid detergent fiber (ADF) and neutral detergent fiber (NDF). The two higher CGF levels resulted in higher ( $P < .01$ ) daily DM intakes. However, DM digestibility was not affected ( $P > .20$ ) by CGF supplementation. In general, CGF supplementation improved CP digestibility. The improvement peaked at the .90 kg/d supplementation level. All supplement levels improved ( $P < .01$ ) NDF digestibility over grass alone. Conversely, ADF dig was unaffected ( $P > .20$ ) by supplementation. No negative effects of CGF noted, but positive impacts peaked at .90 kg/d.

**Mentor: Dr. Mark McCann, Animal and Poultry Sciences**



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## 7. Nicole E. Paris

### *Expression of digestive enzymes and nutrient transporters in the intestine of Eimeria maxima infected chickens.*

Avian coccidiosis is caused by the protozoan *Eimeria*, which causes destruction of intestinal epithelial tissue, resulting in decreased feed efficiency and weight gain. The objective of this study was to determine changes in gene expression of 20 digestive enzymes and macro and micro transporters in the intestine, in chickens infected with *Eimeria maxima*. In this study jejunal tissue from uninfected and infected chickens was harvested, RNA was extracted, and gene expression was evaluated by real time PCR. Data was statistically analyzed using the ANOVA JMP program. Our results showed that expression of the amino acid transporters EAAT3 and bo+AT were downregulated, while LAT1 and ASCT1 were upregulated. The antimicrobial peptide LEAP-2 was downregulated. Thirteen digestive enzymes and nutrient transporters showed no significant changes in gene expression. These results suggest a model that upon infection with *Eimeria maxima*, LEAP-2 is downregulated. In response, changes in the expression of amino acid transporters would result in a decrease in the intracellular pools of the energy source (glutamate) and essential amino acids, which may lead to death of the cell and pathogen.

**Mentor: Dr. Eric Wong, Animal and Poultry Sciences**

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## 8. Jaime K. Rutter

### *Using n-alkanes to estimate herbage composition of a diet*

Managing cattle diets is central to pasture-based feeding systems. Reliably quantifying diet choices in grazing environments is difficult. Plants differ in their n-alkane profiles, allowing their use to distinguish the contents of herbage mixtures. Our objective was to use n-alkanes to estimate composition of herbage mixtures. Three plants species – smooth broome (SB), switchgrass (SG) and red clover (RC) – were maintained as pure or combined into 2 and 3- species mixtures. Three pure and 7 mixed diets were formed, and concentrations of n-alkanes were determined with gas chromatography. Each sample was evaluated by two technicians twice. Diet composition was predicted using a non-negative least-squares procedure. The utility of the n-alkanes to distinguish pure and mixed diets was assessed with principal component analysis, and the alignment of actual and predicted compositions using ANOVA. The n-alkane profiles of pure SB and RC were most distinct. Therefore, mixtures of these species could be better delineated than those involving SG. Samples comprised of two-thirds SG had larger measurement error for n-alkane concentrations. Predicted and actual diet compositions agreed. However, the accuracy of those predictions differed between diets and technicians ( $P < 0.01$ ). N-alkanes were useful to predict diet composition; however, refinements are needed to improve accuracy.

**Mentor: Dr. Ronald Lewis, Animal and Poultry Sciences**



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## 9. L.R. (Taylor) Scott

### *Postmortem effects of ractopamine supplementation in swine*

Ractopamine HCl (RAC) is a commonly used feed additive in the porcine diet. It acts by binding to beta-adrenergic cell-surface receptors to repartition energy away from fat tissue towards lean development. It was hypothesized that glycogenolysis will be greater in pigs supplemented with RAC due to altered muscle metabolism ante- and postmortem. To test this hypothesis, 18 market weight barrows were randomly assigned into three feeding groups: control (basal diet), RAC short (one meal six h prior to slaughter), and RAC long (five days). RAC was included in the diet at 9 ppm. Pigs were offered 2.6 kg of feed twice a day at 12 h intervals. Animals were slaughtered and samples were excised from the longissimus dorsi at 0, 30, 60, 120, 180, and 1440 min postmortem. Muscle pH, lactate, glucose 6-phosphate, glucose, and glycogen were analyzed at all time-points. Back fat thickness, dressing percentage, loin eye area, and meat color ( $L^*$ ,  $a^*$ ,  $b^*$ ) were measured at 1440 min postmortem. Glycogen of the RAC long treatment was lower ( $P < 0.05$ ) than the control at 0 min. The RAC short treatment produced lower ( $P < 0.05$ ) pH and greater ( $P < 0.05$ ) lactate than the control at 120 min and a higher ( $P < 0.05$ )  $L^*$  at 1440 min. Other metabolites and carcass characteristics were not significantly different. The effect of RAC supplementation on postmortem metabolism and meat quality was minimal.

**Mentor: Dr. David Gerrard and Eric England, Animal and Poultry Sciences**

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## 10. Lauren M. Sheehan

### *Effect of Supplementation of Dietary Nutrients on Chicken Peptide Transporter 1 In Vitro*

The peptide transporter, PepT1, is responsible for intestinal uptake of di and tripeptides and is important for growth and development. Between embryonic days 18 to day of hatch, PepT1 expression increases in the small intestine as the chick ingests amniotic fluid. Previous attempts to change PepT1 expression by supplying the prenatal chick with supplemental dietary nutrients, known as in ovo feedings, were unsuccessful. The objective of this project was to supply various dietary nutrients to intestinal segments in vitro and examine PepT1 expression. Embryonic day 19 chickens ( $n=4$ ) were obtained and killed by cervical dislocation. Jejunal segments were sectioned and placed in medium containing peptides (Glycylsarcosine, carnosine, pepticase) and a PepT1 inducer (WY14643) for 6 and 24 hours. RNA was extracted and cDNA was synthesized. The relative quantification method of real time PCR analyzed expression of PepT1. Tissues placed in medium showed decreased PepT1 expression at 6 hours, which increased at 24 hours. Although the differences were not significant, the increase between 6 and 24 hours suggests that the intestinal tissue recovers as it adapts to the environment. None of the administered nutrients were shown to significantly affect PepT1 gene expression.

**Mentor: Dr. Eric Wong, Animal and Poultry Sciences**



## HHMI Scieneering Program

*Learning, Discovery, and Engagement the Intersections of Science, Engineering, and the Law*



The Office of the Vice President and Dean for Undergraduate Education, under a prestigious Howard Hughes Medical Institute Science Education Grant, introduces the novel and innovative Scieneering program. The program is designed to engage undergraduates in

coursework and research at the intersection of science, engineering and/or law, such that they develop the knowledge and abilities to address societal needs that require skills beyond any single discipline. The program aims to increase the number of Virginia Tech undergraduates involved in biomedical and scieneering research as well as those interested in further education and careers at the interface of science, engineering and law.

<b>Student</b>	<b>Major</b>	<b>Faculty Mentor</b>
William G. Burks	Mechanical Engineering	Alexander Leonessa
Peter M. Burnham	Biochemistry	T. M. Murali
Linda O. Chitayapuntagul	Chemistry	Marc Edwards
Nicholas B. Geroux	Biological Sciences	Leigh Anne Krometis
Christine Lambiase	Chemistry	Donald Leo
Karan Mathur	Biochemistry	Sean McGinnis
Meredith M. McGlynn	Mathematics	Michael A. Evans
Joel G. Oser	Biological Systems Engineering	Peter Vikesland
Daniel E. Neighbors	Biochemistry	Glenda Gillaspay
Christine A. Pankow	Environmental Science: Water Resources option	Amy Pruden Marc Edwards
Bishwamoy Sinha Roy	Electrical Engineering	Giti Khodaparast
Ashley R. Taylor	Mechanical Engineering	Al Wicks Andre Muelenaer
Daniel M. Torre	Environmental Science	Durelle T Scott IV
Michelle D. Tran	Biological Sciences	Alexander Leonessa
Nima Vahidi	Biochemistry	Bahareh Behkam



## HMI Scineering Program

### 12:20 – 2:15 pm, Session 5: Poster presentations (Solitude)

#### 11. William G. Burks and Michelle D. Tran

##### *Development of Controlled Electromagnetic Stimulation System to Aid Patients Suffering from Vocal Fold Paralysis*

Each year, 7.5 million Americans suffer from vocal fold paralysis, leading to difficulty swallowing, coughing, and shortness of breath. This research project focuses on the development of electromagnetic stimulation to be used as rehabilitative therapy for the millions of individuals suffering from vocal fold paralysis. Our current research focuses on using electromagnetic induction as a means to stimulate BioMetal Fibers (BMF), which simulates muscle and a Proportional-Integral position-controlled algorithm to modulate stimulation. Various wave function trajectories were applied to the BMF guided by the gains  $K_p$  and  $K_i$  of the controller. Results indicated that the implementation of adequate gains allowed the BMF contractions to follow closely the desired set trajectories. Based on these findings, we can proceed to implement skeletal muscle in our experimental setup and test the muscle's response and controller effectiveness due to electromagnetic stimulation. As a result, the clinical ramifications of this research would mean a less intrusive, more controlled method of stimulation therapy for patients compared to the existing high-risk corrective surgical procedures.

**Mentor: Dr. Alexander Leonessa, Mechanical Engineering**

#### 12. Peter M. Burnham

##### *Prediction of Host Proteins Essential for Viral Replication through Network Based Computational Methods*

Viruses have small genomes and require host proteins in order to replicate themselves. Viral Dependency Factors (VDFs) are a group of human proteins essential for the replication of a virus, but not essential to the survival of the host cell. We have developed network based algorithms which rely on the underlying protein-protein interactions in the human proteome to make predictions about potential Influenza Dependency Factors (IDFs) and HIV Dependency Factors (HDFs) using siRNA screens available in the literature. Both algorithms we used achieved high precision and recall with cross validation when predicting both IDFs and HDFs. Many of the IDFs we predicted are known to interact with Influenza. In addition, many of these predicted IDFs also appeared as HDF predictions or were known HDFs. Our results suggest there is a large overlap in VDFs for HIV and Influenza. Moreover, our method can be extended to predict Viral Dependency Factors missed by siRNA screening for a wide range of viruses. By identifying potential Viral Dependency Factors essential for the replication of multiple viruses, which may be distantly related, we can uncover candidates for novel antiviral treatments that have the potential to treat a wide range of viruses while avoiding traditional viral resistance.

**Mentor: Dr. T.M. Murali, Computer Science**



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### 13. Linda O. Chitayapuntagul

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#### *Effects of Particulate Iron, Natural Organic Matter, and pH on Lead Corrosion*

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Water utilities have controlled the release of lead from plumbing materials by adjusting the pH and alkalinity to reduce lead(II) solubility (Sheiham & Jackson, 1981). Two other potentially important factors in lead contamination of water not extensively studied are iron corrosion, phosphate, and natural organic matter (NOM) at relatively high pH. This research attempted to improve understanding of these issues relative to the holistic operation of water pipe networks by determining 1) the effect of NOM and phosphate on iron corrosion in low alkalinity and high pH (pH > 8.3) waters, 2) the effect of NOM and phosphate on lead release in the aforementioned water, and 3) the effects of iron particulates on lead release from water mains.

Phase 1 of the experiment tested orthophosphate, NOM, and pH effects on iron corrosion. After documenting the results, this water was used as the influent water for testing lead corrosion in Phase 2 (simulating real systems where water first flows through iron pipes then contacts lead pipes). Lead corrosion was also tested without prior iron contact. Three different base waters were tested at a pH of 8.3, 9.7, and 10.4. The lower pH of 8.3 had 1200% more iron release to water than the highest pH of 10.4. The particulate iron released from iron pipe increased lead release from lead pipe by nearly 250%. Phosphate had little effect on lead release.

**Mentor: Dr. Marc Edwards, Civil and Environmental Engineering**

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### 14. Nicholas B. Geroux

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#### *Water quality in private drinking water systems*

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The quality of water in private water systems is of some concern due to the extensive negative effects of poor water quality on human health and the minimal regulation of private water systems. The Virginia Household Water Quality Program (VAHWQP) allows private water system owners to volunteer to have their water tested for several different contents such as fecal indicator bacteria, lead, copper, etc. This study focused primarily on fecal indicator coliform presence. Test results were returned confidentially, and participants were advised what measures to take in order to develop a better understanding of what their water treatment needs are. In addition, participants filled out demographic surveys when bringing their water samples. Demographic information and sample data was compared to find the relationship between demographic characteristics (i.e. income, age of well, county, etc.) and total coliform presence. The analysis of these relationships revealed factors that could facilitate increased risk of fecal coliform presence in private drinking water systems.

**Mentor: Dr. Leigh Anne Krometis, Biological Systems Engineering**



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## 15. Karan Mathur

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### *The Role of Nanomaterials In Medical Products and Their Environmental Impacts*

Nearly every medical product used by healthcare providers and patients consists of nanomaterials designed to improve the efficacy of these products. However, consumers are rarely given sufficient information regarding the products and their potential impacts on the body as well as the environment. The goal of this project is to devise a database that accumulates a list of these products and provides information about the type of nanomaterial it consists of, its dimensions, function, positive and negative impacts, and proper usage. There are some inventories of nanomaterials in consumer products, but they are lacking in details and usefulness for various stakeholders. This research will focus on one or more aspects of improving nanomaterials inventories and the understanding of possible human and environmental impacts due to these nanomaterials. Another goal of this project is to inquire whether there are agencies that regulate the use of nanomaterials in medical products, and if so, is there a difference in regulation for products used by healthcare providers compared to those purchased directly by the consumer. The results of this study highlight the plethora of nanomaterials and the mechanism by which they improve existing medical products and devices. An improved inventory that focuses on detailing the affects of these nanomaterials will be published as a result of this project.

**Mentor: Dr. Sean McGinnis, Materials Science and Engineering**

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## 16. Daniel E. Neighbors

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### *Identification of Arabidopsis thaliana mutants containing increased biomass and cellulose*

The objective of this research is to identify mutant *Arabidopsis* plants with increased biomass and cellulose. Cellulose can be broken down into monomers of glucose and then fermented to ethanol for biofuel use, therefore, a plant with elevated cellulose may help increase biofuel production efficiency. A genome-scale model of *Arabidopsis*, called AraGEM, was used, in silico, to identify Gene Candidate 1 (GC1) as a loss-of-function candidate for increasing cellulose concentration. Heterozygous (possible homozygous) gc1 mutants were identified and grown to observe their phenotype. These gc1 mutants accumulate more biomass as seen at selected days after germination. The Updegraff cellulose quantification method was optimized and used in preliminary work to determine whether gc1 mutants accumulate more cellulose as compared to wildtype plants. Our results indicate that more gc1 and wildtype plants need to be examined before a conclusion can be reached concerning cellulose in gc1 mutants. These findings could offer an improvement in biofuel production as well as a new strategy for bio-engineering.

**Mentor: Dr. Glenda Gillaspay, Biochemistry**



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## 17. **Christine A. Pankow**

### *The Effects of Copper Piping on Opportunistic Pathogens in Premise Plumbing*

The purpose of this project is to observe the effects of copper piping on the growth of *Legionella pneumophila* (LP), an opportunistic pathogen found in drinking water. During the distribution of potable water from water treatment plants, disinfectant residuum is lost. Plumbing materials have been found to affect the growth and density of microbial populations. Copper is being investigated because it is a common piping material and may have the potential to discourage microbial growth through copper-silver ionization, wherein copper ions form ionic bonds with the bacterial cells, causing the proteins to denature. To study these potential effects, simulated water heaters equipped with copper and cross-linked polyethylene (PEX) coupons are being monitored for total bacterial and LP levels with quantitative polymerase chain reaction (qPCR) analysis on DNA extracts of water samples. Influent water is Blacksburg tap water that has undergone granulated activated carbon biofiltration and was spiked with various amounts of Acetate and Glucose. Copper levels were monitored with inductively-coupled plasma (ICP) analysis. Preliminary results indicate that an increase in dissolved copper is associated with a decrease in LP growth. These results provide important insight into the premise plumbing factors that encourage or inhibit LP growth, and to possible engineering controls.

**Mentor: Dr. Amy Pruden and Dr. Marc Edwards, Civil and Environmental Engineering**

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## 18. **Ashley R. Taylor**

### *Early Detection of Cerebral Palsy through Quantification of Infant General Movements*

Approximately 17 million people worldwide suffer from Cerebral Palsy. While there is no cure for this disease, ameliorative therapies are most helpful when identification is made early. Current diagnostic techniques are expensive, subjective, and often inaccurate until the child reaches 4-5 years of age. By using micro-electromechanical accelerometers, the movements of infants can be quantified. Analyzing these quantified movements can accurately predict Cerebral Palsy. Small accelerometers were placed on the limbs of infants, in order to assess the specific frequencies and phase displacement of an infant's general movements. Signal processing with high-speed data acquisition allows observation of high-frequency motions, possibly undetected by the human eye. Using this data, models can be developed that differentiate between a normal infant and an infant with atypical neurological responses. This research is focused on the development of sensors for use in a clinical setting to diagnose Cerebral Palsy in infants. The testing apparatus has been approved by the Institutional Review Board (IRB) for a clinical study on ten infants during spring of 2013. While this sensor development is not a cure for Cerebral Palsy, it is a step towards early diagnosis, which could ultimately lead to better lives for persons with Cerebral Palsy.

**Mentor: Dr. Al Wicks, Mechanical Engineering; Dr. Andre Muelenaer, Virginia Tech Carilion School of Medicine, Department of Pediatrics**





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## 19. Daniel M. Torre

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### *Variability of Net Ecosystem Metabolism Due to Surrounding Environment*

The surrounding environment of a stream ecosystem plays an important role on the biological processes and reactions which effect water quality in systems. In order to study the variability of net ecosystem metabolism in different environments, several parameters were measured daily in five minute intervals. The parameters measured as part of the study include temperature, dissolved oxygen concentration, pH, carbon dioxide concentration, and conductivity. To test the influence of surrounding environments on stream metabolism, sondes were deployed at two different stream sites, forested and agricultural. The data was collected using a Campbell's scientific datalogger, taking measurements every ten seconds and averaging the values over five minute intervals. From the data collected, dissolved oxygen and carbon dioxide patterns were studied with respect to time and temperature over the course of a day. These measurements will be used to calculate gross primary production, respiration and ultimately net ecosystem metabolism to conclude whether the system is autotrophic or heterotrophic, and what role surrounding environment plays on the site.

**Mentor: Dr. Durelle T. Scott IV, Mechanical Engineering**

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## 20. Nima Vahidi

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### *Integration of a bacterial component in a well established wound healing model*

The wound healing process is one of the most intricate and complicated processes that takes place within the human body. Our focus is centered on the inflammatory phase of wound healing during which bacteria and debris are phagocytized and the wound stimulates processes to regenerate the damaged tissue. The goal is too not only limit the exposure of a wound to the commonly present bacteria at wound sites, but also aid in the body's natural remodeling and healing process as to minimize scar formation. In collaboration with the STEP laboratory at Virginia Tech, we have expanded upon a previously developed wound healing assay to further develop the assay to include a bacterial component which helps to model the natural wound environment and the healing process. Our model includes two substrate platforms covered by a confluent layer of fibroblast cells separated by a 1 mm gap to illustrate an artificial wound. A nanofiber scaffold is then placed over the platform which mimics a bandage applied to any common wound. Pathogenic bacteria are then introduced in the environment and the wound healing process is studied as a function of number of bacteria and antibiotic dosage in the environment.

**Mentor: Dr. Bahareh Behkam, Mechanical Engineering**



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## HHMI Scineering Program

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### 3:30 – 4:45 pm, Session 10: Poster presentations (Duckpond)

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#### 53. Meredith M. McGlynn

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##### *Mathematics Educators' Views on the Benefits and Drawbacks of Video Game Usage for Learning and Instruction*

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In the new era of digital media, there have been suggestions that students now need new methods to learn. One of these methods has been to teach through video games, but educators have mixed feelings about this. First, there is uncertainty about whether video games can be used as effective teaching tools. Next is how well they work at teaching the material, and if students learn proper problem-solving skills while using the games. There has been enough research to start giving suggestions about what makes for good game play, and what are some of the drawbacks. I will first show how video games can be used to teach any subject and how students are already immersed in media. Then I will show how it can be used to teach math and the benefits it brings, then suggest ways to overcome the barriers of current drawbacks.

**Mentor: Dr. Michael A. Evans, School of Education**

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#### 54. Joel Oser

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##### *Silver Nanoparticles: Sulfidation and Toxicity*

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There are a rising number of products that contain silver nanoparticles (AgNPs). Nanoparticle dissolution could pose significant effects on aquatic ecosystems. The dissolution of AgNPs produces toxic Ag<sup>+</sup>, because of this, it is imperative to find out AgNPs' effects on the environment. AgNPs will pass through a wastewater treatment facility before entering back into the environment. In a wastewater plant, AgNPs will be converted to silver sulfide. Nanosphere lithography (NSL) was used to produce uniform AgNP arrays on glass substrates. AFM was used to evaluate morphological changes. AgNP arrays were exposed to wastewater sludge for 1-6 days. The measured growth factor of 1.2 was consistent with AgNP conversion into silver sulfide. The NSL pattern remains discernable after the height increase, showing that this is a heterogeneous reaction. Following exposure to sludge, the AgNP arrays were exposed to NaCl to measure dissolution sulfidation. Over a two-week period, there was no decrease in measured height of the particles. This data suggests that after sulfidation, the release of Ag<sup>+</sup> from the AgNPs into the ecosystem is extremely hindered.

**Mentor: Dr. Peter Vikesland, Civil and Environmental Engineering**

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## 55. Bishwamoy Sinha Roy

### *Optoperforation through Femtosecond Laser to facilitate Exogenous Material Uptake*

While cellular studies of plants promise a more complete botanical understanding, current cellular manipulation techniques are too detrimental. The project implemented optoperforation to inject cells without causing damage. Basically, a femtosecond laser created holes on the cell wall, facilitating uptake of an exogenous solution. The cells were analyzed for vitality after injection, retention of exogenous solution, and transfection. Materials included a Zeiss LSM510 microscope, a femtosecond pulsed laser, and root cells. The experiment involved four steps. First, the cells were placed in a solution containing cascade-blue fluorescent molecule and m-cherry vacuole-targeted plasmid. Second, the cells were shot with 60 mW laser pulses, ionizing the surrounding liquid. The ionized electrons dissociated the molecules on the cell wall, creating holes. Retention and vitality depended on the size of the holes, which depended on the power of the laser. Third, the cells were imaged under the microscope. The cells in which cascade-blue fluoresced were deemed successful. Fourth, successful cells were imaged 72 hours post injection. Fluorescence of the cascade-blue molecule signaled retention and vitality, and fluorescence of the m-cherry plasmid in the vacuole signaled transfection. The results showed retention of the cascade blue molecule, proving the viability of optoperforation. However, sporadic fluorescence of the m-cherry protein provided inconclusive transfection results.

**Mentor: Dr. Giti Khodaparast, Physics**

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## 56. Christine Lambiase

### *Bio-molecular Materials and Systems*

The research that I have been performing focuses on creating a more proficient cochlear implant. I have specifically been focusing on the difference between cochlear implants and hearing aids and how they can be improved. The main issue that is present is background noise and the frequencies that the sound waves are heard. By creating a sound specific cochlear implant the problem of choppy hearing can be eliminated. The cochlear implant would closely mimic the hair cells in the ear so the signals would stimulate the nerve endings, almost identical to normal hearing. This is done in lab by creating substrates that can hold PEG-DMA hydrogels connected to electrical wire. The hydrogels are then hydrated with lipids and manipulated together to form a bilayer. An electrical signal can then be sent between the two which would mimic the signals sent to the nerve fibers then to the brain. A hair is now being placed into the hydrogel mold to test if blowing on the hair will show electrical signals. From my research paper findings I have seen that depending on the level of hearing loss a person may need a hearing aid or a cochlear implant. They both have problems with background noise and when being used they hear sounds in large frequency ranges rather than separating them into smaller ones. These new cochlear implants would be able to differentiate between specific sound waves to make hearing clearer.

**Mentor: Dr. Donald Leo, Mechanical Engineering**



## Undergraduate Research Institute College of Liberal Arts and Human Sciences

The College of Liberal Arts and Human Sciences Undergraduate Research Institute (URI), formed in 2005, aims to expose undergraduates with majors or minors in the College of Liberal Arts & Human Sciences to investigation, inquiry, and creative expression in the liberal arts and human sciences fields. It aids undergraduates by:

- Maintaining a database of available research opportunities
- Providing information on research conferences
- Coordinating the awarding of student grants directly related to undergraduate research
- Coordinating a recognition program for student researchers and faculty mentors related to undergraduate research
- Providing information and resources for undergraduate researchers and faculty mentors

The current CLAHS Undergraduate Research Faculty Committee members are: Jason Crafton (Music), Bradley Hertel (Sociology), Nancy Metz (English), Diana Ridgwell (Undergraduate Academic Affairs), Cynthia Smith (Human Development), Debra Stoudt (Foreign Languages and Literatures), and Peter Wallenstein (History)

<b>Student</b>	<b>Major</b>	<b>Faculty Mentor</b>
Alyssa F. Bedrosian	Communication, Spanish	Beth Waggenpack
Hannah L. Bochain	Classical Studies	Andrew S. Becker
Mark A. Bowes	History	Peter Wallenstein
Cara C. Davis	Apparel Housing and Resource Management	Kathleen Parrott
Kelsy E. Dominick	Apparel Housing and Resource Management, International Studies	Jihyun "J" Kim
Joshua L. Entsminger	International Studies	Christian Matheis
Clancy Fry	Human Development	Mark Benson
Shawn S. Ghuman	Communication	Brandi Quesenberry
Chelsea Gillenwater	English, Communication	Michael Saffle
John P. Gillespie	English, History	Heather Gumbert
Kelly A. Gilmartin	Apparel Product Development and Merchandising Management	Jihyun "J" Kim
Katlyn S. Griffin	English	Nancy Metz
Victoria L. Heath	History	Brett Shadle
Tea Ivanovic	International Studies	Yannis Stivachtis
Kelly H. Kaiser	Communication	Hannah Shinault
Cassie T. Lintelman	Apparel Housing and Resource Management	Jihyun "J" Kim
Nora M. McGann	English, French	Shoshana Knapp
Thomas R. Minogue	Literature, Language, Culture	Peter Graham
Courtney J. Murphy	Apparel, Housing, Resource Management	Jihyun "J" Kim
Morgan L. Sellers	Human Development	Mark Benson
Corinne Sharp	Human Development	Mark Benson
Mia A. Simms	Sociology	Anthony Kwame Harrison
Joshua T. Smith	Political Science, Communication	Brandy Faulkner
Mary C. Swanton	Human Development	Cynthia L. Smith
Elizabeth "Jade" Womack	International Studies	Peter Wallenstein



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## Undergraduate Research Institute College of Liberal Arts and Human Sciences

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### 12:20 – 2:15 pm, Session 5: Poster presentations (Solitude)

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#### 21. Shawn S. Ghuman

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##### *Communication Lab Focus Group Research Project*

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The goal of the Communication Lab focus group research project was to further understand the primary reasons students used the CommLab and uncover themes on how to better engage and support the VT student population. The use of student-run focus groups allowed CommLab “coaches” to gain experience with qualitative research methods, and hone their leadership, communication and critical-thinking skills. Additionally, the post-experiment analysis helped the researchers draw conclusions about student perceptions and expectations regarding peer speech tutoring. After analyzing the results, changes are being implemented to better meet VT student needs and expectations. For example, we learned that the primary and most effective method of advertisement comes through professor endorsements while the use of social media was not perceived as particularly effective or desirable. Furthermore, results highlighted the importance of developing tutor-client interpersonal relationships and the impact that dynamic has when working with a diverse group people and covering a broad range of topics. Overall the focus groups provided CommLab with an opportunity to better understand why students utilize their service and what the clients hoped to gain from their peer tutoring experience.

**Mentor: Brandi Quesenberry, Communication**

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#### 22. Kelly A. Gilmartin

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##### *Society*

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Inspired by the iconic sophisticated east coast leisure style of Grace Kelly of the 1950’s mixed with the Marie Antoinette 18<sup>th</sup> century Rococo period, the Society collection was created. Pastels and feminine colors with gold accents, emulate the regality of being queen of France and an elite costal society woman. This collection is a ready-to-wear line of women’s American sportswear consisting of classic silhouettes with a modern edge for spring/summer 2014.

A woman wearing Society likes modest clothing that is professional but comfortable. She would most likely be seen volunteering for her charity’s annual auction, attending brunch, going shopping, or watching her daughter’s dance recital. A society woman has a husband and children. Her and her family summer at their beach house every year. Her main concern is looking expensive and powerful while still being able to run around.

The intended target market for the line is college-educated and upper middle class women in their mid-thirties and values quality timeless pieces. What separates Society from other high profile designer that service top 2% of the population is that Society’s price points will range in the better pricing category.

**Mentor: Dr. J. Kim, Apparel Product Development and Merchandising**



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### 23. Kelly H. Kaiser

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#### *Consumer Framing of SeaWorld Trainer Attack*

When a public relations professional is considering how to manage an issue for an organization, consumers' opinions should be a main concern because consumer opinions dictate how an organization responds to an issue. In 2006, at the San Diego SeaWorld a trainer was attacked by one of the killer whales in the park. The attack was caught on video and is being used in OSHA court hearings against the park. 155 user comments were analyzed from three online news sources for this research. The comments were split in to the five categories to represent how SeaWorld consumers framed the issue. The research showed that there were more negative comments posted than positive comments. In the negative comments, the consumers' mindset was that the organization was at fault. These consumers said they did not support SeaWorld and what the organization stood for. When this occurs, organizations should make sure to release positive things about the organization and issue to counter the negative comments that were read. The paper concludes with recommendations for future public relations professionals.

**Mentor: Hannah Shinault, Communication**

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### 24. Cassie T. Lintelman

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#### *Work Hard, Play Hard*

Nearly everyone has heard the saying 'work hard, play hard' yet this philosophy isn't demonstrated in the collections presented to women ages 35-50. As the workforce is more saturated with women it is essential to create a business look for what society likes to call 'the modern day woman'. Yet we seem to be overlooking the life of this woman outside of her workplace. For my research I aimed to create the 'play hard' side of a workingwoman's wardrobe. Through extensive research of my target market I designed a collection based on what she does outside of her career. I created a structured suede jacket with bold accents in leather sleeves and thick embroidery. The focus of the jacket is it's high neckline adding structure and edge. I accented the jacket with a form-fitted dress that accentuates the body types of these women providing them with an alternative to the pantsuits and pencil skirts they dub appropriate during the workweek. The final outcome of my project was a look that would give any woman this age a feeling of youth and escape from the drab of workplace attire that is constantly being presented to them season after season.

**Mentor: Dr. J. Kim, Apparel Product Development and Merchandising**



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## 25. Nora M. McGann

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### *The hunger for life that gnaws in us all: Black Boy and Richard Wright: the Life and Times*

The goal of this project was to find similarities and differences in Wright's semi-fictional autobiography and Rowley's biography of Wright, and to propose possible reasons for discrepancies. To juxtapose and analyze the two texts, I first read them both in their entirety, and highlighted sections that overlapped or diverged from each other. I concluded that though both Richard Wright's *Black Boy* and Hazel Rowley's *Richard Wright: The Life and Times* chronicle Wright's life and journey as a black American, Wright's semi-fictional account of his life includes a sense of his growth as a writer and his awareness in his vocation. While factual and orderly, Rowley's biography lacks Wright's desperate need to make writing his link to the wider world. Rowley's biography captures the facts and details about Wright's life that *Black Boy* lacks. However, Wright's effortless prose and narrative voice add character and earnestness to his poignant and disturbing account of a young boy hungering for a life he knows he deserves and flawlessly captures the spirit of the hunger for life that gnaws in us all.

**Mentor: Dr. Shoshana Knapp, English**

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## 26. Courtney J. Murphy

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### *The Modern Nomad Breaking Barriers*

The purpose of my project is to design a business casual men's line that challenges the general stereotype toward sartorial men being gay. The Spring/Summer 2014 line is geared towards a target market of college-educated young adult men in their mid to late 20s who embrace a modern nomadic lifestyle. Their lives are full of questioning and searching for their identities and individuality. My target market may hold a profession in the creative and/or entertainment industry as a music talent scout who travels to different festivals in search of the next hit bands. Design inspiration for this line stems from music, skate and surf festivals such as Bamboozle and Warped Tour. With the target market's annual salary ranged from \$30,000 to \$40,000 in mind, the line is moderately priced. The line consists of casual pieces emphasizing individuality and eccentric styles that can be dressed up with a change into fitted trousers or a blazer. My line encourages expression of one's true identity without conforming to social norms. Ultimately, I strived to design a line that liberates the wearer from stereotypes with carefree, clean-cut, sophisticated designs. All of my designs were created using Adobe Illustrator and Photoshop, and SnapFashun.

**Mentor: Dr. J. Kim, Apparel Product Development and Merchandising**



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## 27. Morgan L. Sellers, Corinne Sharp, and Clancy Fry

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### *Multi-Intervention Approach for International Graduate Students*

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Bronfenbrenner's (1986, 2002) theory of human development posits a key role of interpersonal processes in the adaptation of individuals nested within contexts and cultural traditions. This project uses a multi-level program of intervention aimed at an impact on the appreciation of international diversity and enhancement of international graduate students at Virginia Tech. The project represents the collaboration between The Virginia Tech Human Development Department and the Cranwell International Center. The program involved graduate students, undergraduates, and faculty of the Department of Human Development (HD), graduate students in the colleges of Liberal Arts and Human Sciences (CLAHS), and the Cranwell International Center. The program was built upon a successful pilot program launched in the HD Department in the spring of 2011. The projects included: A course for international students to develop their professional skills, a cultural tour, a brochure educating the public on plagiarism, a faculty workshop, a guest panel, a plagiarism discussion, a series of small grants to graduates, and a mentoring program. These key aims derive from three prominent themes in the research literature on international graduate students in U.S. universities: multiple challenges, mentor relationships, and professional development. The nature of the multiple challenges that international graduate students face suggests the department as the ideal setting for intervention.

**Mentor: Dr. Mark Benson, Human Development**

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## 28. Mary C. Swanton

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### *Measuring Temperament in Middle Childhood*

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I examined children's temperament, defined as individual differences in emotional reactivity and regulation that are biologically based and related to later personality (Rothbart, 2007). Temperament is thought to be composed of multiple constructs, which were used as the basis for the development of the Temperament in Middle Childhood Questionnaire (TMCQ). Past work has established the reliability of temperament measures with younger children, but the reliability of the TMCQ has yet to be fully established. I will use the TMCQ responses from parents, children, and teachers to see if the subscales are reliable measures of temperament in middle childhood. Additionally, through the use of factor analysis, I seek to replicate the three factors found with younger children. This study will also examine which factors and/or subscales teachers can reliably assess. Though past research has used teacher responses to assess children's temperament at other ages (Valiente et al., 2003), this is the first study that used teacher TMCQ responses to measure temperament in middle childhood. In this study, parents (n=109) completed the 157-item TMCQ. Parents gave permission for children's primary teachers (n = 98) to also complete the TMCQ. Experimenters worked with children (n = 95) in the lab to complete a portion of the TMCQ. The results from this study will help to establish the TMCQ as a reliable measure of children's temperament in middle childhood.

**Mentor: Dr. Cynthia L. Smith, Human Development**

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## Undergraduate Research Institute College of Liberal Arts and Human Sciences

**3:30 – 4:45 pm, Session 8: Poster presentations (Huckleberry)**

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**52. Cara C. Davis**

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*Housing Design for Natural Disaster Preparedness*

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In 2011, over \$52 billion dollars was lost to damages from natural hazards in the United States. Most of this cost was in the residential sector because of the large number of houses and their inability to withstand severe weather and geological activity. This project is an investigation of construction methods and design characteristics applied to new and existing homes to better support residential wood structures against natural hazards. I will be focusing on two locations because of their affinity for natural hazards: Anchorage, Alaska and Houston, Texas. Anchorage is prone to flooding, heavy snow, permafrost, earthquakes, tsunamis, wildfires, coastal erosion, and nearby volcanoes. Houston, holding fourth on the list of greatest risk for natural disasters, is subject to hurricanes, flooding, tornados, subsidence, hail, and wildfires. I have utilized online mitigation sources, government agencies, contacted specialists, and used research to compile the information needed to understand the danger of living in hazard-prone areas. I will design a floor plan for these two U.S. locations and explain the techniques and products to create a hazard resistant home. Along with a floor plan, a product list of materials and construction methods to best withstand the hazards of the area will be provided.

**Mentor: Kathleen Parrott, Apparel, Housing and Resource Management**



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## Agriculture and Life Sciences

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### 12:20 – 2:15 pm, Session 5: Poster presentations (Solitude)

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#### 29. Matthew K. Nguyen

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##### *Development of an environmentally friendly method for making silicon-carbon bonds in water*

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Organosilicon compounds have unique chemical characteristics that have medicinal applications. One example is Karenitecin®, an anticancer drug by BioNumerik that is in international phase three clinical trials for use in patients with progressed ovarian cancer. Thus, the preparation of organosilicon compounds is an area of intensive research. Our goal is to develop a mild and environmentally friendly method for the formation of silicon-carbon bonds using water as a reaction solvent. The eco-friendly development of  $\beta$ -silylated alleneoates can simultaneously lead to unique and versatile structural motifs that may be used in the synthesis of complex drug-like molecules and to the reduction of hazardous chemical by-products that harm the environment. Herein, we report a mild, inexpensive, and green protocol for the installation of the dimethylphenylsilyl group on the  $\beta$ -carbon of electron-deficient alleneoates. We will discuss progress made toward evaluating the scope of the  $\beta$ -silylation reaction. In the presence of a catalytic amount of copper(II) (1 mol %) and amine base (5 mol %) at room temperature, the transformation proceeds efficiently in water within two hours, and produces the product in moderate to good yields.

**Mentor: Dr. Webster Santos, Chemistry**

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#### 30. Michael Talanian

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##### *Maternal Diet and Genetic Implications in Offspring*

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Maternal environment can influence body weight and health of the offspring. A study completed in December 2012 showed that body weight, body fat, food intake, cholesterol and triglyceride levels are altered in offspring whose mother's diet was different than their own. These results included groups in which the mother was on high fat diet (HFD) with offspring on low fat diet (LFD), as well as mothers on LFD with offspring on (HFD). Based on these data, observed differences are now being studied on the molecular level, by measuring differential gene expression, in an attempt to discover underlying causes related to the changes in body weight and body fat parameters. The experimental conditions of immediate interest are LFD to LFD, LFD to HFD, HFD to LFD and HFD to HFD (mother's diet to offspring diet). HFD to LFD mice ate significantly more food grams and calories than LFD to LFD mice, which could indicate they have a drive to consume more calories, based on the maternal environment. LFD to HFD mice had significantly higher cholesterol levels than HFD to HFD mice, suggesting that HFD to HFD animals had tolerance to HFD, with respect to maintaining cholesterol profiles. QPCR using hypothalamic RNA from all four groups will now be used to measure expression of mRNAs involved in feeding, body weight regulation and cholesterol levels. The results of these studies should identify possible molecular pathways in the etiology of offspring nutritional obesity.

**Mentor: Dr. Deborah Good, Human, Nutrition, Foods, and Exercise**



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### 31. **Scott J. Neil**

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#### *Phosphorus status of grazing beef cattle in Virginia's Chesapeake Bay Watershed*

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Phosphorus loads in the Chesapeake Bay are a focus of environmental concern. Major research and extension efforts have focused on concentrated animal feeding operations (mainly dairy and poultry); however 400,000 beef cows are located in Virginia's Chesapeake Bay watershed counties. The objective of this study was to document phosphorus (P) supplementation in free choice minerals, soil test P, forage P and manure P levels of grazing beef cows in Virginia's Chesapeake Bay watershed. Thirty-four producers from two counties cooperated with sample collection (n=80) and completed a questionnaire related to their management practices. Soil test P values were characterized as Low (14%), Medium (29%), High (27%) and Very High (13%) based on Virginia Cooperative Extension Soil Test guidelines. Phosphorus content of pasture forage grab samples (mean= .36%, SD = .10) was correlated to soil phosphorus levels (r=.42), but manure total P was lowly related (r=.05) to soil P values. Forage P content did not have an impact on mineral selection by producers. Manure TP increased as mineral P content increased, .54, .65, .80 and .88% respectively. All farms surveyed required little or no phosphorus supplementation in regard to cow nutrient requirements. Sixty five% of participating cattlemen were receptive to modifying their P supplementation based on forage test results while only 6% were opposed to any modification.

**Mentor: Dr. Mark McCann, Animal and Poultry Science**



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## Pathogens and Disease

**12:20 – 2:15 pm, Session 5: Poster presentations (Solitude)**

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**32. Whitney H. Beasley**

*Locomotion Rates of Snails Infected with Metagonimoides oregonensis*

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Parasites with complex multi-host life cycles will often alter a host's behavior to increase their odds of transmission. Ultimately, the change in behavior of one individual host can affect the success of infection in the next host. The parasite in this study, *Metagonimoides oregonensis*, uses stream snails and salamanders as intermediate hosts to reach its definitive host, raccoons. The purpose of this project was to determine if there is a connection between locomotion/microhabitat selection of *Elimia proxima* (=Goniobasis) snails and infection rates. These rates of locomotion could offer an explanation of how the trematode uses snails to further its own life cycle. The project had two different stages. The first was an observation to actuate movement rates and direction of the snails. This included capturing snails, marking, and releasing them. The second stage was a mark-release-recapture after which snails were dissected to classify infection. The average distances that the snails traveled were not significantly different between infected and uninfected snails. However, the variance of movement rates was significantly different (0.0479). Infected snails were both very active and moved a lot or were sessile with only a small amount of movement.

**Mentor: Dr. Lisa Belden, Biological Sciences**

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**33. Katherine M. Broadway**

*Minimum Requirements for Flagellotropic Bacteriophage 7-7-1 Infection of Agrobacterium sp. H13-3*

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*Agrobacterium* sp. H13-3 is a soil dwelling, Gram-negative, motile bacterium known host to bacteriophage 7-7-1. This phage is flagellotropic, meaning it infects bacteria by attaching to their flagella, traversing down to a phage receptor at the flagellum base and injecting its DNA. This project aims to determine what characteristics of the flagellum are utilized by phage 7-7-1 for infection. The characteristics investigated were the effect of flagella rotation and length by creating *fla* and *motA* deletion strains, which produce bacteria with shorter flagella and bacteria which cannot rotate their flagella. A time course plaque assay showed that deletion strains yielded bacteria resistant to 7-7-1, meaning intact flagellin subunits and actively rotating flagella are essential characteristics of host bacteria for phage infection. Additionally, the host range of this phage was tested against other members of the *Rhizobiaceae* family. Culture lysis tests showed that *Agrobacterium* sp. H13-3 is the only host for 7-7-1. In conclusion, phage 7-7-1 has a narrow host range and requires not only intact but rotating flagella to infect. This research has shed light on two essential features of motile cells that flagellotropic viruses utilize in order to infect and effectively lyse their bacterial host. Future studies aim to identify the mechanism by which phage travel along the flagella filament, as well as phage receptors on the bacterial cell surface.

**Mentor: Dr. Birgit Scharf, Biological Sciences**



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#### 34. Luis Torres

##### *Generation and Analysis of Rotavirus Reassortant Strains*

Rotaviruses (RVs) are contagious pathogens that cause diarrhea and vomiting in young children. They consist of non-enveloped virion particles that encapsidate an 11-segmented, double-stranded RNA genome. RVs can reassort their 11 genes during host cell co-infection—a feature that is predicted to increase strain diversity and drive viral evolution. However, comparative genomic studies have shown that most RV strains belong to one of two co-circulating genogroups (Wa-like or DS-1-like), which do not readily reassort gene segments. We hypothesize that genetic exchange between these two RV genogroups is limited because reassortant strains have decreased fitness and cannot compete with parental strains. To test this hypothesis, we co-infected monkey kidney cells with an equal multiplicity of the genogroup prototype strains Wa and DS-1, thereby allowing gene reassortment to occur under experimental conditions. The viral progeny were harvested from the cell supernatant and were serially diluted for clonal separation using plaque assays. Of the 70 plaques that formed in this experiment, approximately 40 of them were very small in size and are predicted to contain reassortants. To determine the gene constellation of the small-plaque clonal isolates, the viral RNA genome was extracted using Trizol and the each gene was genotyped to be either Wa-like or DS-1-like using reverse transcription PCR. Ongoing and future experiments aim to identify several reassortant strains that can be further tested in the laboratory for growth and fitness defects. It is our hope that this research will provide a clearer understanding of RV evolution and served as a scientific foundation for the development of next generation vaccines.

**Mentor: Dr. Sarah McDonald, VTCRI Department of Biomedical Sciences and Pathobiology**

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#### 35. Julia Button

##### *Timed Chemotherapy for Astrocytomas*

Chronotherapy, circadian-based chemotherapy, seeks to discover the optimal timing for drug administration according to the natural rhythms of anti-cancer mechanisms, ultimately resulting in fewer adverse effects on healthy cells and more potent results on cancerous cells. Numerous chronotherapy-based clinical trials have been conducted on different types of cancers. This approach, however, has not been tested on brain tumors, specifically astrocytomas. Astrocytomas are commonly treated with temozolomide (TMZ), a DNA alkylating agent that induces DNA double strand breaks, which triggers apoptosis. Ideally, the drug would be administered at times of the day when healthy cells are able to optimize DNA repair and tumor cells are most sensitive to it. The aims of our study are to chart the effect of TMZ treatment on tumor cell number and growth as a function of its time of administration and to determine whether the induction of DNA damage alters the expression of core clock genes, specifically Per2, in glioma cells. Our data supports the hypothesis that timing of drug administration does indeed affect tumor cell number and tumor growth. We believe this research will have a translational relevance by minimizing the toxic side effects of TMZ and maximizing its therapeutic benefit for astrocytoma patients.

**Mentor: Dr. Erik Herzog, Washington University in St. Louis; Department of Biology**



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## Neuroscience and Psychology

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### 12:20 – 2:15 pm, Session 5: Poster presentations (Solitude)

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#### 36. Sarah E. Adams

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##### *High Autism Spectrum Individuals Use Configural Information More than Neurotypical Individuals When Recognizing Faces*

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Individuals with Autism Spectrum Disorder (ASD) show impaired recognition of faces and facial expressions. Face recognition deficits are believed to result from a lack of configural/holistic processing and a shift toward feature-based recognition strategies. Using a face recognition paradigm that controls for individual differences in task difficulty, we show that high ASD individuals, in fact, use configural information more than neurotypical individuals, utilizing nose- and mouth-related distances more than other face dimensions. These results suggest that high ASD individuals will outperform neurotypical observers when recognizing faces in which nose- and mouth-related distances are diagnostic of identity or facial expression. In addition, the face recognition paradigm we show that low ASD individuals utilize eye shape, eye-nose and nose-mouth distance more than high ASD individuals. These results suggest that low ASD individuals will outperform high ASD individuals when recognizing faces in which eye shape and eye-related distances are essential to recognition.

**Mentor: Dr. Noah Schwartz, Christopher Newport University Neuroscience Program**

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#### 37. Sean Dougherty

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##### *Enhancing axon regeneration with optical stimulation*

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Regeneration of axons in cut nerves is enhanced with exercise, but the mechanism is not clear. We hypothesize that increased neuronal activity will result in an enhancement of axon regeneration. Optogenetic methods were used to increase neuronal activity prior to nerve injury. In thy-1-ChR2 mice a subset of sensory and motoneurons contained the light-sensitive cation channel, channel rhodopsin (ChR2). Axons in nerves of these mice were activated using blue light-emitting diodes (LEDs) to generate action potentials. The sciatic nerve in these mice was cut and repaired by end-to-end anastomosis using fibrin glue. In one group of mice, the proximal segment of the nerve was optically stimulated for one hour prior to transection. In a second group, the axons were electrically stimulated. A third group was unstimulated. Axon regeneration and muscle reinnervation were assayed by measuring compound muscle action potentials (M responses) evoked by either electrical or optical stimulation above the injury site. Measurements were made at 3 and 6 weeks after nerve repair. Increased neuronal activity enhanced axon regeneration. Amplitudes of M responses, both optical and electrical, were significantly larger in animals treated with increased activity than in unstimulated controls. Treatment with optical stimulation produced an enhancement of M response amplitude that was comparable to that found with treatment with electrical stimulation.

**Mentor: Dr. Arthur English, Emory University, Cell Biology Department**

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### 38. Lauren Anderson

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#### *Actively Caring for People in Middle Schools: Enhancing character strengths to increase prosocial behavior*

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In the middle-school setting, it is particularly challenging for students to fulfill social goals and feel connectedness and belongingness (Lipsitz, Jackson, & Austin, 1997). This study evaluated the *Actively Caring for People* (AC4P) approach to increase character strengths among students. AC4P character strengths were selected based on the objective to create a more interconnected culture in two middle schools. Student assessments were distributed four times throughout the study, once every three weeks on the day before the corresponding intervention. This approach aimed to enhance a student's growth mindset to develop skills to more effectively perform prosocial recognition, act on their moral courage, express gratitude and feel a sense of belonging. Trained University "AC4P coaches" provided six in-class lessons on AC4P character strengths weekly to enhance character development through engaging activities.

**Mentor: Dr. E. Scott Geller, Psychology**

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### 39. Jessica C. Cea

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#### *Factor Structure of Perceived Rewards among High School Students*

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Assessments of bullying-prevention interventions should include a perceived "rewards scale" to evaluate the change in students' perceptions of prosocial and bullying rewards as a function of the school-based intervention. Prior research has focused specifically on assessing the target behaviors: observations of bullying, victimization due to bullying, and interpersonal bullying towards others. This study was the first step in a process of developing a rewards scale by gathering students' perceptions of the consequences for bullying and prosocial behavior in high schools.

This study was made up of two phases: item generation and exploratory factor analysis. Item generation will be from hundreds of high-school students from the Northern Ohio area. As part of the exploratory factor analysis phase, a new sample of high-school students in Northern Ohio were recruited to complete a survey, based on the item generation phase, on the perceived consequences for bullying, actively-caring, aggressive, and prosocial behaviors. The generated items were placed randomly to form a complete measure of students' perceived consequences. An exploratory factor analysis will be conducted to determine the factor structure for bullying and prosocial consequences before the Virginia Tech Undergraduate Conference in April.

**Mentor: Dr. E. Scott Geller, Psychology**



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#### 40. **Jack B. DiTrapani**

##### *Family/Child Characteristics and Responses to Treatment for Children with Oppositional Defiant Disorder*

Past studies suggest that the gender of a child with disorders such as ADHD could significantly influence the effectiveness of treatments provided (Gershon, 2002). As part of a larger NIMH-funded treatment project under Drs. Ollendick and Dunsmore, this study considered whether the efficacy of a treatment for children with Oppositional Defiant Disorder (ODD) is influenced by the gender or other demographic variables of the participant. Fifty-five children with ODD symptoms were provided treatment. Treatment consisted of ten weekly therapy sessions to address children's emotion management and parents' strategies for working with children. This investigation was conducted to test the inclusiveness and generalizability of the treatment being given, and to explore whether additional treatments for gender or demographic variables may need to be considered. Results suggested a limited influence of family demographics; however, child gender and family environment were associated with child outcomes. Mothers reported greater improvements in emotional lability for females ( $r = .32$ ,  $p = .02$ ), while males reported more on internalizing behaviors ( $r = -.27$ ,  $p = .04$ ).

**Mentor: Dr. Julie Dunsmore, Psychology**

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#### 41. **Angelica S. Melvin**

##### *Emotion Lability and Improvements in Child Outcomes Following Treatments for Oppositional Defiant Disorder*

Children's emotion regulation and susceptibility to abrupt emotion changes are influential in their adjustment across development (Beauchaine, Gatzke-Kopp, & Mead, 2007). For under-regulated children, such as those with Oppositional Defiant Disorder (ODD), greater difficulties in managing emotion experiences may contribute to additional difficulties in other domains (e.g., internalizing symptoms; Boylan, Vaillancourt, Boyle, & Szatmari, 2007). Sixty-three families participated in a ten-week, NIMH-funded treatment program for children with ODD symptoms, under Drs. Ollendick and Dunsmore. Across pre-treatment, mid-treatment, and post-treatment time points, mothers reported on children's disruptive behaviors and emotion lability and negativity, using the Disruptive Behavior Disorders Rating Scale (Pelham, Gnagy, Greenslade, & Milich, 1992) and Emotion Regulation Checklist (Shields & Cicchetti, 1997). Across time points, children reported on their personal adjustment internalizing symptoms, using the Behavior Assessment Scale for Children-2 (Kamphaus & Frick, 2005). Results suggest that children's baseline disruptive behaviors predicted mid-treatment emotion lability and negativity, which predicted post-treatment outcomes in internalizing symptoms and personal adjustment.

**Mentor: Dr. Julie Dunsmore, Psychology**





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#### **42. Aimee M. Tolbert**

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##### *Exploring the Differences Between Children with the Comorbid Diagnosis of Oppositional Defiant Disorder and Fear of the Dark Compared to Children with Oppositional Defiant Disorder*

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Children with Oppositional Defiant Disorder were frequently hostile, stubborn, and negative towards their parents. This behavior could be displayed before bedtime with children that were afraid of the dark. The purpose of this study was to delineate the differences between children with oppositional defiant disorder and children with the comorbid diagnosis of oppositional defiant disorder (ODD) and the fear of being in the dark alone (D/A). Children with the comorbid diagnosis of ODD and D/A phobia often acted oppositional towards their parents during the day, and sought support from their parents during the night. This study strove to determine the differences in their family environment, the amount of parental stress, the severity of their disorder, parenting styles, and parent-child interactions. Results found that there was a significant difference in the degree of help, support, and commitment from the child's family between the ODD group and the ODD and D/A group.

**Mentor: Dr. Thomas Ollendick, Psychology**

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#### **43. Lucy D. Tamberrino**

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##### *Effect of Mild Cognitive Impairment on Care Partner Depressive Symptoms*

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Some older adults experience early memory loss that is distressing to themselves and family members. Exploring the reasons why some caregivers of people with Mild Cognitive Impairment (MCI) show more depressive symptoms than other caregivers is an important focus in research today. Finding the differences and similarities among caregivers will help clinicians create effective treatments to help spouses dealing with this new support role. I conducted a mixed methods study examining whether coping methods and feelings of burden and mastery are related to depressive symptoms in 80 care partners of individuals with MCI. Interviews included open-ended questions and structured instruments. The analysis began by using regression to evaluate whether scores on mastery, burden, and coping scales predicted scores on a depression scale. Results showed that those with more depressive symptoms experience a lower sense of mastery and a higher sense of burden, but did not differ on use of coping methods. To understand these findings better, I performed a qualitative analysis to compare answers to the open-ended questions from the 17 spouses who reported the most and the 15 who reported the fewest depressive symptoms. The qualitative analysis revealed common perspectives related to mastery, burden, and coping regardless of high or low depressive symptoms.

**Mentor: Dr. Rosemary Blieszner, Human Development**



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## Physics, Engineering, and Nanoparticles

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### 12:20 – 2:15 pm, Session 5: Poster presentations (Solitude)

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#### 44. James R. Mayberry

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##### *Equilibrium Properties of Ising Metamagnetic Films*

Artificial antiferromagnets have attracted attention lately due to the potential for technological applications. We model these systems as thin, Ising metamagnetic films and study their equilibrium properties using Monte Carlo simulations. In variance with previous work but in agreement with the experimental systems, we consider films comprised of "sets" of planes, with an antiferromagnetic coupling between sets and a ferromagnetic coupling within sets. This allows us to consider different situations by varying the number of planes in each set. Studying the magnetization density and response functions as a function of temperature and magnetic field, we determine the corresponding phase diagrams. We discuss how a change of the number of planes in each changes the equilibrium phase diagram. This work is supported by the US National Science Foundation through grants DMR-0904999 and DMR-1205309.

**Mentor: Dr. Michel Pleimling, Physics**

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#### 45. Andrew A. Christovich

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##### *Creating Damascus Steel through the Incorporation of Carbon Nanotubes*

The goal in this work is to discover a method for incorporation of carbon nanotubes within steel. It is known that this should be possible because of the historical record from the Middle Ages, yet extensive research using modern methods has been unable to replicate this outcome. Based on earlier work by Dr. Goodell, it is known that carbon nanotubes (CNTs) can be produced using specific heating regimes to heat plant fibers. This project aims to find the appropriate temperatures, metal catalysts, and processing steps that will permit the carbon nanotubes derived from wood fiber to be generated in-situ within steel. It should also be possible to align the carbon nanotubes together inside the steel to produce superior mechanical properties in the metal. The first step in the process is "pre-carbonizing" fiber to be incorporated into low-carbon 1018 steel. Then by placing the pre-carbonized fiber between steel sheets and heating it in an oxygen-evacuated environment, it will be possible to carburize the metal at the same time as generating CNTs. I am currently rolling sheet-steel with pre-carbonized fiber under different heating regimes. The next stage of research after thoroughly examining the samples with electron microscopy for CNTs will be to move on to generating CNTs that can persist within molten steel.

**Mentor: Dr. Barry Goodell, Sustainable Biomaterials**



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#### 46. Patrick S. Goley

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##### *Electrical Characterization of Oxide-Semiconductor Heterointerfaces*

Oxide-semiconductor heterointerfaces are commonly used in semiconductor devices. They are especially critical in metal-oxide-semiconductor field-effect transistors (MOSFETs) in restricting current flow from the gate/control terminal. It has been demonstrated that the quality of these interfaces has a pronounced influence over the performance characteristics of MOSFETs, namely, on-current magnitude, on/off current ratio, subthreshold slope, and drain induced barrier lowering (DIBL). Therefore, the goal of this project is to demonstrate several methods for precisely and reproducibly characterizing the quality of oxide-semiconductor heterointerfaces. These characterization methods include the capacitance-voltage technique, current-voltage measurements, and the conductance method. From the body of raw data generated by these methods, several key qualitative characteristics may be extracted, including, frequency dispersion, hysteresis, interface trap density ( $D_{it}$ ), inversion behavior, and oxide leakage current. Higher  $D_{it}$  values in particular, have been shown to degrade transistor performance by increasing sub-threshold slope and DIBL. This work uses the above characterization methods to evaluate two metal-oxide-semiconductor capacitors (MOSCAPs). We analyze MOSCAPs since they are structurally similar and exhibit similar characteristics to MOSFETs, and are easier to fabricate and measure. Specifically, this work characterizes a  $HfO_2/Si$  MOSCAP and a  $ZrO_2/Al_2O_3/InGaAs$  MOSCAP.

**Mentor: Dr. Mantu Hudait, Electrical and Computer Engineering**

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#### 47. Peter D. Nguyen

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##### *Effects of Thermal Annealing on Oxide-Semiconductor Heterointerfaces*

Most modern electronic devices utilize metal-oxide-semiconductor field-effect transistors (MOSFETs). In an effort to drive electronic device performance, MOSFETs are being continually downscaled. Unfortunately, increased downscaling leads to increased leakage current from electron tunneling in the oxide-semiconductor heterointerface. This problem can be remedied by replacing the native semiconductor oxides with high-k gate dielectrics. Unfortunately, high-k oxides often suffer from oxide defects, which negatively affect MOSFET performance. Various methods, like thermal annealing, are being considered as possible solutions to eliminate these oxide defects at the oxide-semiconductor heterointerface. The goal of this paper is to demonstrate the effects of thermal annealing on oxide-semiconductor heterointerfaces to improve device performance. To study these effects, the temperature-dependent capacitance-voltage (C-V) measurement was investigated. From this measurement, oxide characteristics were extracted and analyzed. It was found that the post-deposition thermal annealing is required to eliminate these defects. As a result, MOSFET device performance improved. Thermal annealing and the C-V method were used on metal-oxide-semiconductor capacitors (MOSCAPs), which are structurally similar to MOSFETs, but are easier to fabricate and measure. In this paper, thermal annealing was performed on  $HfO_2/Si$  and  $ZrO_2/Al_2O_3/InGaAs$  MOSCAPs and the results will be reported in this conference.

**Mentor: Dr. Mantu Hudait, Electrical and Computer Engineering**



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#### 48. Ethan F. Robinson

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##### *Developing a Novel Method for Testing Ultra-lightweight Structures*

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Ultra-lightweight structures offer many advantages when compared to traditional structures, especially for space applications. However, these structures can be problematic because their low mass makes exciting and measuring them a challenge. If a faster and more accurate testing method could be developed, these structures could be prototyped more effectively. The first step in this research is to aim a pneumatic valve with a split output at both a microphone and a thin-film membrane (an ultra-lightweight structure); a large, rapid voltage is applied to the valve which causes a burst of air to be released that simultaneously impacts the membrane and the microphone. During the impact and for some time after, both the air impact pressure and the vibration of the membrane are measured. The vibration of the membrane is measured using a Scanning Laser Doppler Vibrometer that measures the velocity of a mesh of points on the membrane. The microphone outputs a voltage which is directly proportional to the impact pressure of the air. Using the laser and microphone data, a relationship is built between the air pressure applied to the membrane and the membrane's reaction. Once this task is accomplished, this data will be compared to data collected using a boundary excitation technique on the membrane, and a vibro-acoustic model of a thin-film membrane will be updated as needed. The expected outcome of this research is a new excitation technique for testing ultra-lightweight structures.

**Mentor: Dr. Pablo Tarazaga; Center for Intelligent Material Systems and Structures, Mechanical Engineering**

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#### 49. Ryan L. Tomas

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##### *Protein-Directed Synthesis of Au Nanoparticles*

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The purpose of this experiment was to test the ability of Consensus Tetratricopeptide Repeat (CTPR) proteins in directing the synthesis of Au nanoparticles. We hypothesized that amino acid tyrosine, abundant in CTPR sequence, binds Au to form nanoparticle precursor. We have examined effects of protein concentration and length, and nature of reducing agent on Au nanoparticle morphology. Various Good's buffers were used to stabilize the pH and reduce the complex to create Au nanoparticles. The morphology and arrangement of the nanoparticles were then examined with Transmission Electron Microscopy (TEM) and UV-vis absorption. TEM shows nanoparticles with irregular morphology, ranging from flowers to spheres. Further spectroscopic analysis is ongoing to investigate the interactions between CTPR and Au precursor and effects of CTPR on nanoparticle morphology.

**Mentor: Dr. Tijana Grove, Chemistry**

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## Architecture and Landscape Architecture

**12:20 – 2:15 pm, Session 5: Poster presentations (Solitude)**

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**50. Kenneth A. Black**

*Dimensional Architecture: An Exploration of Parallel Frames*

This thesis work is an intervention into the reuse of pallets that are common in construction in an attempt to develop a position about technologies in building sciences and how they can affect the design of architecture and the surrounding environment. A system of bays for a parallel frame design will use pallets as a diaphragm and as modules to create space. This shell will create an environment at the scale of the user, in response to the user, the context, and the module. The direct use of intact pallets as a module regulates and informs the passage of environmental conditions through the building envelope, in this instance as a series of cabins for the Mountain Lake Biological Station in Newport, Virginia. It is discovering and using this potential that demonstrates the versatility of a material. It was the discovery of its potential that shaped the perception of the pallet and building envelope. From this initial project of cabins, an exploration of Structuralism, a type of philosophy of architecture, will be conducted in reference to the pallet and its modular characteristics. Using this method, a town of related structures will be designed with pallets as a module or element of construction.

**Mentor: Dr. Elizabeth Grant, Architecture**

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**51. Kaitlin S. Shealy**

*Growing Together: a study of participatory design*

Active citizen participation in design and planning processes is commonly seen as a good practice. Participation is often viewed as one of the foundations of democracy, and involves citizens playing an active role dealing with communal and governmental issues. As the academy continues to shift, the focus has moved towards a renewed value on civic inclusion to develop greater connections with communities that are served by universities. Through the use of community gardens, many cities have implemented policies to improve access to once vacant land. Community gardening is not a new idea, but its use as a community catalyst has proven to be effective in establishing spaces that foster social interaction and community building. Landscape architecture is the art of designing valuable places for people and communities. The purpose of this project is to gain a better understanding of how community gardens can catalyze and direct positive change in an urban neighborhood, to determine and catalog the impacts of community participation in the design process, and to learn about their importance to small-scale urban food production. This project documents and contextualizes community participation and engagement in the development of a community garden for the Mountain View neighborhood located in Roanoke, Virginia.

**Mentor: Dr. Cermetrius Bohannon, Landscape Architecture**



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## Life Sciences, Mathematics, and Engineering

### 3:30 – 4:45 pm, Session 10: Poster presentations (Huckleberry)

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#### 57. Emily A. Berckman

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##### *Antiproliferative Extracts of *Barringtonia racemosa**

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As stated by the National Cancer Institute, 41.24% of people born today will be diagnosed with some form of cancer during their lifetime. Finding a way to cure this disease has been in the spotlight for many years, and natural products have been investigated for drug development. Today more than half of the drugs approved to treat cancer are either natural products or natural product derivatives. As part of an ongoing investigation of natural products in collaboration with the International Cooperative Biodiversity Group (ICBG) to find new anticancer compounds, the bark of *Barringtonia racemosa* (Lecythidaceae) was chosen for investigation due to its antiproliferative activity against human ovarian cancer cells (A2780 cell line, IC<sub>50</sub> 13 mg/mL). The bark specifically have been linked to antinociceptive and antifungal properties while the fruits of the plant have been used in small villages of southern India to treat various illnesses.<sup>3</sup> The active components were isolated through bioassay guided fractionation utilizing various techniques such as liquid-liquid partitioning, size-exclusion chromatography, solid phase extraction, and high pressure liquid chromatography (HPLC). The structures have been identified to be terpenoids with varying substituents. This was determined on the basis of spectroscopic methods such as <sup>13</sup>C-NMR, <sup>1</sup>H-NMR, and mass spectroscopy.

**Mentor: Dr. David Kingston, Chemistry**

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#### 58. Ivonne E. Cedillos

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##### *Parasitized Plethodontid Salamander and *H. versicolor* Locomotor Abilities*

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Many parasites are transmitted via trophic dynamics, where an infected host is consumed by the subsequent host in the life cycle. Parasites that alter the behavior of the intermediate hosts in ways that make them more likely to be consumed might be selected for over time. *Metagonimoides oregonensis* is a stream trematode common to Appalachian headwaters that infects raccoons as definitive hosts, followed by a snail first intermediate host, and a variety of plethodontid salamander second intermediate hosts, in which they form a cyst that is then consumed the raccoons. We tested the effects of metacercariae encystment on locomotor ability in grey treefrog tadpoles (*Hyla versicolor*). We exposed individuals to either 0, 20, or 60 cercariae with each treatment divided into either 1 week or 7 week post-exposure locomotor trial groups. Treefrog tadpole locomotor performance was not affected by cercariae exposure treatment at either time point (1 week p=0.544 and 7 weeks p=0.728), but we also did not find any evidence of infection occurring following our exposures in grey treefrog tadpoles, indicating they may not be a suitable second intermediate host for this parasite in our region.

**Mentor: Dr. Lisa Belden, Biological Sciences**

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### 3:30 – 4:45 pm, Session 10: Poster presentations (Huckleberry)

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#### 59. Michael Krug

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##### *Nuclear-to-Cytoplasmic Partitioning of the Nescient helix-loop-helix 2 Protein*

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Signals of energy availability converge on central nervous system neurons, where changes in gene expression translate into energy homeostasis. Nescient helix-loop-helix 2 (Nhlh2), a neuronal basic helix-loop-helix transcription factor, plays a key role in controlling gene expression. Negative energy balance causes a significant decrease in Nhlh2 expression, whereas positive energy signals such as increased leptin secretion by fat, leads to an increase in Nhlh2 mRNA levels. New work from our laboratory suggests that post-translational modifications of Nhlh2, such as phosphorylation or acetylation, could shuttle the protein between the nuclear and cytoplasmic compartments. In this study Nhlh2 nuclear-to-cytoplasmic localization was assessed in conditions of serum-deprivation, serum-enrichment and leptin stimulation, to determine if changes in energy signals changed localization of the Nhlh2 protein. Western results show that Nhlh2 protein has slower migrating bands, indicative of post-translational modifications, and these bands are present more prominently in the serum-deprived, than in the leptin- or serum-treated conditions. A human Nhlh2 mutation that causes a significant structural change in the Nhlh2 protein secondary structure still shows post-translational modifications, and similar localization. Future work to characterize secondary modification in Nhlh2 is necessary to understand their role in cellular partitioning.

**Mentor: Dr. Deborah Good, Human Nutrition, Foods, and Exercise**

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#### 60. Jancarla M. Ocampo

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##### *Parasite dispersal: when do larval trematode parasites leave their first intermediate hosts?*

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In the complex life cycles of parasitic trematodes, larval trematodes (cercariae) are shed from their snail first intermediate host and swim in search of a suitable second intermediate host. There should be selection pressure for cercariae to leave their first intermediate host snails when they are most likely to encounter their second intermediate hosts. Furthermore, because different trematode species have different second intermediate hosts that may be active at different times of day, cercarial shedding patterns over the course of a day should vary among trematode species. In this experiment, we investigated daily cercarial shedding patterns for five trematode species. First intermediate infected snail hosts (N=2-20/trematode species) were exposed to natural light and temperature, and the number of cercariae that they released was quantified every hour for 24 hours. *Echinostoma trivolvis* cercariae were only shed in the afternoon when light intensity and temperature peaked. Several trematode species released most of their cercariae in the early to late morning (*Echinoparyphium* spp., *Metagonamoides* spp., and xiphidiocercariae from *Helisoma* snails). Finally, xiphidiocercariae from *Physa* snails were shed only between dusk and dawn. This study demonstrates that each trematode species has a unique diurnal cercarial shedding pattern, and this increases our understanding of the life cycles of these trematode species.

**Mentor: Dr. Lisa Belden, Biological Sciences**

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### 3:30 – 4:45 pm, Session 10: Poster presentations (Huckleberry)

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#### 61. Carolyn M. Shirey

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##### *Role of S257 in the sliding mechanism of NADP(H) in Aspergillus fumigatus SidA*

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The flavin-dependent *Aspergillus fumigatus* Siderophore A (Af SidA) catalyzes the NADPH and oxygen dependent hydroxylation of L-ornithine to form N5-hydroxyornithine. In this reaction, NADP<sup>+</sup> remains bound throughout the catalytic cycle and is essential for formation and stability of the C4a-hydroperoxyflavin intermediate. Crystallographic data suggests that S257 is involved in hydrogen bonding with the pyrophosphate group of NADP(H). The role of this residue in catalysis was probed by site directed mutagenesis. AfSidAS257A mutant displayed an increase in O<sub>2</sub> consumption rate; however this mutant also showed a decrease in the rate of ornithine hydroxylation, suggesting uncoupling of the reaction. Rapid reaction kinetics confirmed that the C4a-hydroperoxyflavin intermediate is unstable. Fluorescence studies showed that NADP<sup>+</sup> binds to the mutant protein in a mode different from the wild-type. The results suggest that interaction with S257 is important to position NADP<sup>+</sup> in the correct orientation to stabilize the C4a-hydroperoxyflavin intermediate. Supported by NSF MCB-1021384.

**Mentor: Dr. Pablo Sobrado, Biochemistry**

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#### 62. Meredith C. Swartwout

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##### *Diversity and protective function of bacteria on the skin of spring peepers (*Pseudacris crucifer*)*

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Symbiotic bacteria provide benefits to many animals. For example, bacteria in the human gut aid with digestion and provide immune support. Symbiotic bacteria can also provide protection against pathogens like the amphibian chytrid fungus, *Batrachochytrium dendrobatidis*. Experiments have demonstrated that some amphibians with protective skin bacteria can survive infection by the fungus, while amphibians without them die. In this study, we surveyed the skin microbes of spring peepers (*Pseudacris crucifer*) - a species which appears to be resistant to chytrid - to determine if peepers harbor bacteria with fungus-inhibiting properties. In March 2012, we swabbed twelve spring peepers to obtain a sample of the bacterial community from their skin. We isolated bacteria from the swabs and used in vitro challenge assays to determine the inhibitory properties of these bacteria. Seventy-five unique bacteria were isolated, 12 of which showed significant inhibition of Bd (>90% reduction in fungal growth). Eleven out of 12 peepers had at least one inhibitory bacterium. Our results suggest that spring peepers host diverse skin bacteria that may help protect them against the chytrid fungus. Studying patterns in bacterial diversity and community composition provides insight into the symbiotic relationships between these bacteria and their frog hosts.

**Mentor: Dr. Lisa Belden, Biological Sciences**

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## **3:30 – 4:45 pm, Session 10: Poster presentations (Huckleberry)**

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### **63. Emily A. King and Kevin H. Hunt**

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#### *The Changing Effects of the Virginia Coal Industry at the State and County Level*

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The Virginia coal industry is an integral part of the Virginia economy and coal-producing counties within the state. This industry is undergoing stress caused by technical changes in the industry, market forces and regulations. Coal production in Virginia has declined in the last 20 years by 39% and coal employment by 51%. These declines have had particularly adverse effects on Buchanan, Dickenson, Lee, Russell, Scott, Tazewell, and Wise counties. The objectives of this study are: (i) to assess the importance of the coal industry to the state and local economies; (ii) to evaluate the relative importance of the different factors in driving change in the coal economy; and (iii) to analyze how these changes will affect the coal industry and rural counties dependent on coal. The study examines overall historical trends in coal production, employment and value of revenues in Virginia and statistically evaluates the relationship between changing wages, prices and external conditions and coal production. It uses detailed data on coal production and employment by mine size to analyze how changes in the industry have affected mines of different sizes. Data on county-level employment and revenues are used to understand the degree of dependence of the different coal-producing counties on coal. Simulations are employed to examine how forecasted changes in regulations and economic conditions will affect the state and local economies.

**Mentor: Dr. Jeffrey Alwang, Agricultural and Applied Economics Department**



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## 3:30 – 4:45 pm, Session 10: Poster presentations (Huckleberry)

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### 64. Mohamed Mohamedali

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#### *Processing of Alumina Particle Strengthened UHMWPE Matrix Composites*

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In polymers and polymer matrix composites, particle reinforcements as well as cold rolling can affect strengthening by interfering with the motion of the dislocations throughout the material. This study looks into this phenomena in alumina reinforced ultra-high molecular weight polyethylene (UHMWPE) as its polymer chains alter due to the particle reinforcement and its crystal structure rearrangement during cold rolling. Understanding these behaviors can improve awareness of the mechanics surrounding polymer composites, improving characterization techniques. This study investigated relationships between particles, cold rolling, milling time, and overall strengthening in alumina reinforced UHMWPE. Tensile tests were done on hot pressed sheets with varying alumina concentrations. The measured data supports that material strength increased as rolling and particle concentration was increased. This data provides preliminary analysis but a further in-depth statistical analysis is needed.

**Mentor: Dr. Alex Aning, Materials & Science Engineering**

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### 65. Jun woo Park

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#### *Effect of Surface Blowing on Flow and Heat Transfer of Spherical Particles*

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Accurate prediction of forces acting on particles moving through a fluid is important in many engineering and environmental applications, including fuel particles in spray combustors, coal-based oxy-fuel combustion chambers, coal and biomass gasifiers, and so on. These problems exhibit a wide range of complexities including particles of different shapes and sizes, emanating gases through their surfaces due to internal chemical reactions. The main aim of the current project is to help understand the effect of surface blowing on the drag and heat transfer phenomena in such particles, by means of high-resolution direct numerical simulations. An in-house CFD code is used to simulate uniform flow over a sphere for a range of Reynolds numbers (5-100) and surface blowing ratios (0-1.0). For each simulation, profiles of velocity components, pressure, and temperature are compared and analyzed to understand their influence on the observed drag and heat transfer coefficients. Comparisons to existing works in literature reveal that the drag coefficient predictions are in very good agreement. The results are used to construct useful drag and Nusselt number curves to study the effect of surface blowing on these quantities.

**Mentor: Dr. Danesh Tafti and Nagendra Krishnamurthy, Mechanical Engineering**

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**Presenters by last name:**

<b>First Name</b>	<b>Last Name</b>	<b>Primary Major</b>	<b>Research title</b>	<b>Primary Mentor</b>	<b>Primary Mentor Dept.</b>	<b>Page #</b>
Sarah E.	Adams	Neuroscience (Christopher Newport University)	High Autism Spectrum Individuals Use Configural Information More than Neurotypical Individuals When Recognizing Faces	Noah Schwartz	Neuroscience Program (CNU)	62
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Eric C.	Anderson	Mechanical Engineering	The use of twist coupled carbon fiber blades to maximize pitch under simulated operating conditions	John Kennedy	Mechanical Engineering	33
Lauren	Anderson	Psychology	Actively Caring to Prevent Aggression and Bullying in Middle Schools	E. Scott Geller	Psychology	63
Whitney H.	Beasley	Biochemistry	Locomotion Rates of Snails Infected with <i>Metagonimoides oregonensis</i>	Lisa Belden	Biology	60
Alyssa F.	Bedrosian	Communication	The Use of Packard's Needs in the 2009 Doritos Ad Campaign	Beth Waggenspack	Communication	24
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Mark A.	Bowes	History	The Second Battle of Cedar Creek: Preserving History in the Shenandoah	Peter Wallenstein	History	24
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Jessica C.	Cea	Psychology	Factor Structure of Perceived Rewards among High School Students	E. Scott Geller	Psychology	63
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Linda O.	Chitayapuntagul	Chemistry	Effects of Particulate Iron, Natural Organic Matter, Orthophosphate, and pH	Marc Edwards	Civil and Environmental	46

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Andrew A.	Christovich	Mechanical Engineering	Creating Damascus Steel through the Incorporation of Carbon Nanotubes	Barry Goodell	Sustainable Biomaterials	66
Joseph H	Conduff	Biochemistry	The Quest for Homopolymers of Cholesterol-PEG	Richard D. Gandour	Chemistry	22
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Wangui C.	Gichane	Crop and Soils Environmental Science	Exploring the Forage Potential of Teff for Heifers under Two Management Schemes.	Ozzie Abaye	Crop and Soils Environmental Science	36
Chelsea	Gillenwater	English	Musical Trends in Animated Programming	Michael Saffle	Religion and Culture	31
John P.	Gillespie	English	Victory for the Craft: The Craft/Micro Brewing Revolution in the American Beer Industry	Heather Gumbert	History	31
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Tea	Ivanovic	International Studies	External Pressures and Domestic Changes: The Council of Europe, The European Union, and the National Minorities in Vojvodina	Yannis Stivachtis	Political Science	26
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Karan	Mathur	Biochemistry	The Role of Nanomaterials In Medical Products and Their Environmental Impacts	Sean McGinnis	Materials Science and Engineering	47
James R.	Mayberry	Physics	Equilibrium Properties of Ising Metamagnetic Films	Michel Pleimling	Physics	66
Nora M.	McGann	English	"The hunger for life that gnaws in us all": Black Boy and Richard Wright: the Life and Times	Shoshana Knapp	English	55
Meredith M.	McGlynn	Mathematics	Mathematics Educators' Views on the Benefits and Drawbacks of Video Game Usage for Learning and Instruction	Michael A. Evans	School of Education	50
Colleen R	McIntyre	Animal and Poultry Sciences	Changes in Hypothalamic EZH2 Activity Associated with Fasting in Broiler Chicks	D. Michael Denbow	Animal and Poultry Sciences	41
Angelica S.	Melvin	Psychology	Emotion Lability and Improvements in Child Outcomes Following Treatments for Oppositional Defiant Disorder	Julie Dunsmore	Psychology	64
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Courtney J.	Murphy	Apparel, Housing, Resource Management	The Modern Nomad Breaking Barriers	Jihyun "J" Kim	Apparel Housing and Resource Management	55
Rebecca M.	Naramore	Animal and Poultry Sciences	The Effect of Corn Gluten in Lambs	Mark McCann	Animal and Poultry Sciences	41
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Matthew K.	Nguyen	Biochemistry	Development of an environmentally friendly method for making silicon-carbon bonds in water	Webster Santos	Chemistry	58
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Joel G.	Oser	Biochemistry	Silver Nanoparticles: Sulfidation and Toxicity	Peter Vikesland	Civil and Environmental Engineering	50
Nicole E.	Paris	Animal and Poultry Science	Expression of digestive enzymes and nutrient transporters in the intestine of Eimeria maxima infected chickens.	Eric Wong	Animal and Poultry Sciences	42
Christine A.	Pankow	Environmental Science: Water Resources	Microbiology of Simulated Glass Hot Water Heaters	Amy Pruden	Civil and Environmental Engineering	48
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Jaime K.	Rutter	Animal and Poultry Sciences	Using n-alkanes to estimate herbage composition of a diet	Ronald Lewis	Animal and Poultry Sciences	42
L. R.	Scott	Animal and Poultry Sciences	Postmortem effects of ractopamine supplementation in swine	David Gerrard	Animal and Poultry Sciences	43
Morgan L.	Sellers	Human Development	Multi-Intervention Approach for International Graduate Students	Mark Benson	Human Development	56
Corinne	Sharp	Human Development	Multi-Intervention Approach for International Graduate Students	Mark Benson	Human Development	56
Kaitlin S.	Shealy	Landscape Architecture	Growing Together: a study of participatory design	Cermetrius Bohannon	Landscape Architecture	69
Lauren M.	Sheehan	Animal and Poultry Sciences	Effect of Supplementation of Dietary Nutrients on Chicken Peptide Transporter 1 In Vitro	Eric Wong	Animal and Poultry Sciences	43

Carolyn M.	Shirey	Biochemistry	Role of S257 in the sliding mechanism of NADP(H) in <i>Aspergillus fumigatus</i> SidA	Pablo Sobrado	Biochemistry	72
Mia A.	Simms	Sociology	#WhatIWore: Fashion Decisions Of Undergraduate Females	Anthony Kwame Harrison	Sociology, Africana Studies	29
Bishwamoy	Sinha Roy	Electrical Engineering	Optoperoration through Femtosecond Laser to facilitate Exogenous Material Uptake	Giti Khodaparast	Physics	51
Joshua T.	Smith	Political Science	Intellectual Property As Applied to the Changing Role of the Internet	Brandy Faulkner	Political Science	27
Mary C.	Swanton	Human Development	Measuring Temperament in Middle Childhood	Cynthia L. Smith	Human Development	56
Meredith C.	Swartwout	Biology	Diversity and protective function of bacteria on the skin of spring peepers ( <i>Pseudacris crucifer</i> )	Lisa Belden	Biological Sciences	72
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Aimee M.	Tolbert	Psychology	Exploring the Differences Between Children with the Comorbid Diagnosis of Oppositional Defiant Disorder and Fear of the Dark Compared to Children with Oppositional Defiant Disorder	Thomas Ollendick	Psychology	65

Ryan L	Tomas	Chemical Engineering	Protein-Directed Synthesis of Au Nanoparticles	Tijana Grove	Chemistry	68
Daniel M	Torre	Environmental Science	Variability of Net Ecosystem Metabolism Due to Surrounding Environment	Durelle T Scott IV	Biological Systems Engineering	49
Luis A	Torres	Biological Sciences	Rotavirus Co-infection Reassortants and its effect on Strain Viability & Fitness	Sarah McDonald	VTCRI/ Biomedical Sciences & Pathobiology	61
Michelle D	Tran	Biological Sciences	Development of Controlled Electromagnetic Stimulation System to Aid Patients Suffering from Vocal Fold Paralysis	Alexander Leonessa	Mechanical Engineering	45
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Holland M	Vasquez	Psychology	Factors Influencing Attitudes Towards Homosexuality	Gregory S. Longo	Psychology	30
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## The Student Success Center!

The Student Success Center offers free academic support, such as tutoring and study skills seminars to undergraduate students at Virginia Tech. We also have programs and activities for students who are already succeeding academically, and simply want to enrich their educational experiences at Virginia Tech.

Our main office is located on the first floor of Femoyer Hall where we also have a classroom, conference room, tutoring space and staff offices. Additional staff offices are located on other floors in Femoyer.

The Student Success Center supports Virginia Tech's mission to expand personal growth and opportunity, advance social and community development, provide outreach and support services to under-served populations, and improve the quality of life by providing holistic support to our undergraduate students through a network of programs and services to help freshman and transfer students make a successful transition from high school to college as well as facilitate academic and social adjustment to Virginia Tech and to students who want to improve their academic and non-academic skills such as time management, study skills, and networking skills.

The Student Success Center strives to empower students to become life-long learners and contributing members of society, and to facilitate Virginia Tech's successful achievement of an institutional climate that is supportive of student success.

### **Academic Success Programs Include:**

- Academic Recovery Programs
- Exam Preparation: The Final Challenge
- Hokies 101
- Mid-Semester Check: Taking Back the Semester
- Making the Grade
- Reading Assessment and Assistance
- Seminar Series on Academic Success
- Technology Series
- Tutoring Program
- UNIV 1004
- U-Turn

### **Academic Excellence Programs Include:**

The Student Success Center supports Virginia Tech's mission to expand personal growth and opportunity, advance social and community development, provide outreach and support services to under-served populations, and improve the quality of life by providing holistic support to our undergraduate students through a network of programs. The Student Success Center strives to empower students to become life-long learners and contributing members of society, and to facilitate Virginia Tech's successful achievement of an institutional climate that is supportive of student success.

- Student Support Grant Program
- Tau Sigma National Honor Society
- Undergraduate Diversity Research Grant Program

Research

is formalized curiosity.

It is poking

and prying

with a purpose. \*

# poke around

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Undergraduate Research Institute

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Research opportunity databases  
Student grants, awards, and recognitions  
Research classes and workshops  
Research conference database  
Scholars certificate program

\*Quote by Zora Neale Hurston, American folklorist and Writer

