

Old Dominion University

ODU Digital Commons

Undergraduate Research Symposium

2018 Undergraduate Research Symposium

2018 Undergraduate Research Symposium: Full Program

Honors College, Old Dominion University

Follow this and additional works at: <https://digitalcommons.odu.edu/undergradsymposium>

Honors College, Old Dominion University, "2018 Undergraduate Research Symposium: Full Program" (2020). *Undergraduate Research Symposium*. 1.

<https://digitalcommons.odu.edu/undergradsymposium/2018/program/1>

This Event is brought to you for free and open access by the Student Works at ODU Digital Commons. It has been accepted for inclusion in Undergraduate Research Symposium by an authorized administrator of ODU Digital Commons. For more information, please contact digitalcommons@odu.edu.

Old Dominion University Undergraduate Research Symposium
Saturday, February 3, 2018
Learning Commons, Perry Library

Sessions at a Glance

8:00 – 9:00 AM	Registration and Continental Breakfast (Learning Commons, Northwest Atrium)
8:45 – 8:55 AM	Welcome and Opening Remarks (Learning Commons, Northwest Atrium): David Metzger, Dean of Honors College
8:00 AM – 12:30 PM	Undergraduate Art Exhibit (Learning Commons, Northeast Atrium) Poster Session (Learning Commons, Northwest Atrium) Featuring Biology, Biomechanical Engineering, Chemistry, Computer Science, Education, Electrical and Computer Engineering, Health Sciences, Human Services, LGBTQ Studies, Marketing, Mechanical and Aerospace Engineering, Physics, Psychology, Sports Studies, Social Work, and Women’s Studies.
9:00 – 10:00 AM	Oral concurrent session I <i>Biological Sciences 1</i> (Rm. 1310) Chair: Holly Gaff <i>Art History Session 1: Experience and Site</i> (Rm. 1306) Chair: Agnieszka Whelan
10:15 – 11:15 AM	Oral concurrent session II <i>Biological Sciences 2</i> (Rm. 1310) Chair: Eric Walters <i>Art History Session 2: Creative Freedom? Shaping the “Self” Image</i> (Rm. 1306) Chair: Jared Benton
11:30 AM – 12:30 PM	Oral session III <i>Communications and the Humanities</i> (Rm. 1310) <i>International Studies and Geography</i> Chair: Megan McKittrick
12:30 – 1:30 PM	Lunch in Broderick Dining Commons

8:00 AM-12:30 PM (Learning Commons: Northeast Atrium)

Art Exhibit

Chair: Elliott C. Jones, Art Department

Student	Concentration	Faculty Mentor
Tatiana Cammel	Art Education	Natalia Pilato
Holly Walsh	Art Education	Natalia Pilato
Carlie Kinzey	Art Education	Natalia Pilato
Edward Cutrera	Drawing & Design	Elliott Jones
Rian Robinson	Drawing & Design	Elliott Jones
Emily White	Drawing & Design	Elliott Jones
Holli Turner	Graphic Design	Ivanete Blanco, David Shields
Connor Fad	Metals	Dianne deBeixedon, Jane Ritchie
Cassie Pendleton	Metals	Dianne deBeixedon, Jane Ritchie
Betty Gowans	Metals	Dianne deBeixedon, Jane Ritchie
Calah Jones	Painting	Elliott Jones
Heather Nygaard	Painting	Elliott Jones
Jade Pangilinan	Painting	Elliott Jones & Alison Stinely
Jennifer Armstrong	Print & Photo Media	Greta Pratt
Mollie Schaidt	Print & Photo Media	Greta Pratt
Josh Williams	Print & Photo Media	Greta Pratt
Betty Gowans	Sculpture	John Roth
Mollie Schaidt	Sculpture	John Roth

**8:00 AM-12:30 PM (Learning Commons: Northwest Atrium)
Poster Session**

Assessing the Benefits of College Climbing Programs: Applying the Perceived Health Outcomes of Recreation Scale

Peter Ahl, Eddie Hill, Cienna Gabriele, Edwin Gomez, and Amy Dizenzo
(Mentor: Eddie Hill)
Sports Studies

Rock climbing is a sport that requires a participant to lift the body against gravity to climb on a rock face using the irregularities of the rock. On a highly rated climb, the rock face is “virtually perpendicular and the irregularities are very small” (Li, Margetts, & Fowler, 2001; Slanger & Rudestam, 1997, p. 359). Although some researchers have maintained that rock climbing involves both sensation seeking and risk taking as the key elements to one’s motivation for participation (Palmer, 2002), others have researched the possibility of characteristics that are unique to rock climbers, which set the rock climbing community apart from the other extreme sports (Kiewa, 2001; Slanger & Rudestam, 1997). Although rock climbing was seen as an outdoor sport for few who chose to live life outside high on the mountainside, more recent years the sport of climbing has become more mainstream. It is now in the Olympics, many YMCAs, middle schools, and colleges. College climbing programs have become increasingly popular. Yet, we have very little evidence of the benefits of rock climbing of “indoor settings” especially on college campuses. The current study seeks to examine the health benefits among college rock climbers. In the spring of 2017, approximately 300 college student rock climbers will complete the Perceived Health Outcomes of Recreation Scale (PHORS) using the online survey software Qualtrics.

Range Expansion of *Ixodes affinis* on the Coastal Plain of Virginia

Michelle Bershers, Hannah Cummins, Kevin Gately, Sara Simmons, and Holly Gaff
(Mentor: Holly Gaff)
Biological Sciences

State Sweep, a collaborative study between the University of Richmond and Old Dominion University, tracked an invading tick species, *Ixodes affinis*. While *I. affinis* is a vector of *Borrelia burgdorferi*, the causative agent of Lyme disease, it does not bite humans. Cities and counties were sampled annually from 2012 to 2017 throughout Virginia, and bordering counties in Maryland and North Carolina. In early summer of each year, ticks were collected by flagging at each location in targeted habitat types. *Ixodes affinis* have expanded north and west across Virginia. Though westward progression has stopped at the Fall Line, the separation of Coastal Plain and Piedmont areas, *I. affinis* is now considered established throughout the Coastal Plain of Virginia. No such limit was found with the northward movement with *I. affinis*, which were collected in Maryland in 2017. The *I. affinis* movement northward and coexistence with the known human-biting tick *Ixodes scapularis*, will result in the amplification of *B. burgdorferi* in shared reservoir hosts and increase the chances of human infection by way of *I. scapularis*.

Social Support and Mental Wellness: Evaluating a Peer Support Group for Transgender People

Tobias Bohn

(Mentor: Narketta Sparkman-Key)

Human Services

This qualitative study evaluates a local support group program and whether it is beneficial to the mental health of its participants. The population of this study is underrepresented in research, and one vulnerable to a number of risk factors. By understanding the role support groups play in the lives of transgender persons, human service and mental health professionals can build more effective helping relationships with their clients.

Catalytic Oxidation of Lignin Model Compounds using a Cobalt(III) Cubane Complex

Joshua Bush, Raj K. Gurung, Elizabeth Lynch, Michael J. Celestine, Sandeep Kumar, and Alvin Holder

(Mentor: Sandeep Kumar)

Civil & Environmental Engineering

Lignocellulosic biomass is produced by nature as structural support in a variety of plants. The cellulose of lignocellulosic biomass is extracted and used industrially, yielding an abundance of lignins as a byproduct. Lignin provides a promising source of renewable energy given its abundance and relatively high specific energy. Lignin also provides an efficient source of aromatic carbon chemicals, which, are otherwise challenging to synthesize. The lignin's structure is composed of a variety of subunits including coniferyl alcohol, p-coumaryl alcohol, and sinapyl alcohol. The degradation of lignin into its subunits and the modification of these units present an interesting challenge. A variety of paths have been pursued towards optimization of lignin degradation; including enzymatic, catalytic, mechanical, electrical, photocatalytic and sonochemistry. We chose the catalytic approach. Catalyzed oxidation of lignin, is commonly greeted by the challenge of catalyst degradation. The catalyst degradation is often due to the volatile reaction conditions required. To ease the oxidation, we have synthesized a cobalt(III) cubane complex to be used as a catalyst. A lignin model compound, coniferyl alcohol, and Polymer A, a multi-unit compound, were oxidized using the catalyst. TLC, ESI mass spectrometry, and ^1H NMR and ^{13}C NMR spectroscopy were used to characterize the products of these reaction.

Average Diurnal and Nocturnal Flight Patterns of Common Terns (*Sterna hirundo*) During the 2017 Breeding Season

Rachel Case, Emily Davis, Michael Marley, Alex Whatley, Jeri Wisman, and Sara Maxwell

(Mentor: Sara Maxwell)

Biological Sciences

Common terns (*Sterna hirundo*) are a migratory seabird species with a summer breeding season and nesting colonies along the US Atlantic coast. They nest along shorelines and forage at sea both diurnally and nocturnally. They play an important ecological role because other species often nest with them, and they can be used as early indicators for environmental disruption. However, not much research has been done on colonies along the Eastern Shore of Virginia, Maryland, and Delaware (Delmarva). We captured 15 birds and geotagged them during the month of June to establish a baseline level of knowledge of the flight patterns of common terns on the Eastern Shore. We processed the data with ArcMap and determined flight times and distances relative to the time of day. We show that there is a difference in distances traveled

nocturnally and diurnally, as well as a variation in flight times. On average, nocturnal flights were longer in duration and distance than daytime flights. With this initial information, a clearer understanding of migratory bird patterns in the Delmarva region can be established to further conservation efforts and prevent unnecessary habitat disruptions.

Implementation of a Tick-Killing Robot to Protect Children in Hampton, Virginia

Amanda DeVleeschower, Alexis White, Armin Bahrani, and Holly Gaff

(Mentor: Holly Gaff)

Biological Sciences

In southeastern Virginia, tick-borne diseases are on the rise. In previous studies, the tick-killing robot, TickBot, has been shown to provide immediate short-term control of tick populations with minimal environmental impact. The goal of our study was to test an integrated tick management system in order to decrease the tick population at NASA Langley's Child Development Center's playground in Hampton, Virginia. The TickBot treated the perimeter of the playground twice a week throughout the summer of 2017. To determine the potential tick encounter risk on the playground ticks were collected from the playground and nearby areas. This information provided us with the efficacy of the TickBot and local tick phenology. Our study results indicate that this integrated tick management system reduced risk of tick encounters on the playground.

Understanding Customer Satisfaction with the Port of Virginia: An Investigation of Different Port user groups

Sydney Geib

(Mentor: Chuanyi Tang)

Marketing

Since the industry that the Port of Virginia (POV) operates in is highly competitive, it is critical for POV to constantly enhance service quality and obtain high customer satisfaction. The objective of this project is to investigate different POV user groups (including beneficial cargo owners (BCOs), freight forwarders, brokers, ship lines, and truck lines) regarding to their perceptions of the services provided the POV and to explore the factors that influence their satisfaction with the POV. The data were gathered by both quantitative and qualitative methods. For the qualitative data, 22 in-depth interviews were conducted with both the port employees and customers. In regards to the quantitative data, a survey was launched that resulted in 288 responses from the POV's customers. The qualitative interviews identified some major service problems of POV and show that although all POV user groups demand effective and productive operations and quick turnaround time, their basic needs of POV's services are slightly different. The qualitative survey results demonstrate that the customer satisfaction ratings provided by different POV user groups vary greatly. As for the importance of the port service attributes, all types of POV users rated reliability and turnaround time as the most important service attribute, followed by tangibles and responsiveness. However, these self-report results are different from the regression results, which show that empathy and turn time contributed the most to customer satisfaction, followed by reliability, tangibles, responsiveness, and assurance. The findings of this study will help the POV identify its strength and weakness and craft strategies to improve POV's services and customer satisfaction, thus enhancing its competitiveness in the market.

A Numerical Study of the Influence of Different Factors on Tumor Diagnosis via a Tactile Sensor

Cristina Genoese-Zerbi, Charles Tison, Timothy Watjen, James Jobe, Kylee Kohl, and Nathan Abshier
(Mentor: Julie Hao)

Biomechanical Engineering

In the medical field, a tactile sensor would be used to find tumors that are just below the surface of the skin. The sensor is made of Pyrex and Polydimethylsiloxane (PDMS) with transducers within the PDMS. By pressing the sensor into the tissue, a resistance profile is mapped out and computed as a force distribution. The task is to simulate the sensor detecting a tumor in a model created in COMSOL Multiphysics 5.1 (The COMSOL Group, Stockholm, Sweden) with certain variables changed. Those variables are curved surface, substrate interference, and viscoelasticity. These will be tested independently on separate models to see how each affects the sensor readings. The goal from these simulations is to produce a suggested modification for the actual sensor. Each model was modified from a reference model, which only had a flat surface, a flat substrate, a tumor within the tissue, and without any associated viscosity. The reference and modified models were all tested with a two millimeter displacement applied superiorly. The simulation will show how these changes affect the readings when compared to the readings of the reference model.

Comparison of Multiple Methods for Quantifying β -Strand Twist in a Protein Structure

Brittany Hasty, Michael Poteat, and Jing He

(Mentor: Jing He)

Computer Sciences

Although proteins have a variety of atomic structures, they are often composed of secondary structures of helices, β -sheets, turns, and loops. β -sheet is a major type of secondary structures and was discovered in the 70's that all β -sheets are twisted in nature. When images of proteins are produced at low resolutions, it is difficult to distinguish β -strands that are components of a β -sheet. Twist of a β -sheet was previously utilized to predict the position of β -strands in the image of a β -sheet. However, it is challenging to quantify the overall twist precisely. We studied multiple methods in quantifying the twist of a β -sheet. In a test consisting ten beta sheets, comparison shows that the best method varied with the size of the beta sheet. For sheets with three or less strands, overall twist calculated with the average twist angles of the two longest beta strands best fit the true protein structure. In sheets with four or five strands, the average of all angles provided the best fit, and in sheets with six or more strands, the average of all the angles except those on the edges of the beta sheet was the most accurate.

Norfolk's Hidden Queer Histories: Police and the LGBTQ Community

Kayla Marie-Mae Hess

(Mentor: Cathleen Rhodes)

LGBTQ Studies

Using archival research that draws primarily on *Our Own*, Norfolk's gay newspaper from 1976 - 1998, and a series of oral history interviews, this project uncovers pieces of Norfolk's queer past. This research began as part of a class-based research project that culminated in the first student-led and designed queer walking tour of Norfolk. It is hard to understand our present without a clear understanding of our past, and this project seeks to give us a lens through which to examine queer Norfolk today. A powerful component of the work was the experience of

physically standing in spaces previously occupied by local LGBTQ citizens, past and present. To stand where Norfolk's Queer foreparents once stood and discuss their lives is to draw a connection from then to now, to understand our own lived experiences. The Norfolk Hidden Queer Histories poster series illustrates those connections in three specific areas: Norfolk's gay bar scene, arts spaces, and Norfolk Police Department's LGBT liaison officers. Historically, police departments have had problematic relationships with LGBTQ communities. Norfolk residents experienced bar raids, targeted harassment, and surveillance. Despite this history, Hampton Roads LGBT liaison officers have taken several steps towards strengthening communication between the LGBTQ community and Hampton Roads police departments. This poster examines those new connections and the unsettling past that precipitated them.

Program Evaluation of Virginia Beach Court Appointed Special Advocates (CASA)

Laura Jackson

(Mentor: Narketta M. Sparkman-Key)

Human Services

For this program evaluation project CASA was being evaluated on how efficient their advocacy efforts are towards the abused and neglected children they serve. An impact model was used to evaluate CASA. To gather results and findings the data collections utilized was an interview, survey, and two program impact reports. Over the course of the evaluation it was revealed that CASA is efficient in their advocacy efforts although the agency needed more volunteers, access to training workshops, and possibly the employment of another full-time advocate case manager.

Exploring the Influence of the Peer Educator Role on Physical Activity, Exercise Patterns, Physical Fitness, Daily Functioning, and Health Harming Habits in People Living with HIV

Stephanie Jen, Jacob Waits, Amanda Pedrazoli, and Kenneisha Edmonds

(Mentors: Jamela Martin & Kimberly Adams Tufts)

Nursing

With the progression of standardized HIV treatment and antiretroviral drugs, the outcomes for people living with HIV (PLHIV) have improved from a death sentence to a manageable chronic disease. Although PLHIV are living longer than before, they experience multi-morbidities more frequently and earlier than persons without HIV. These morbidities, such as type-2 diabetes, cardiovascular diseases, and obesity, are associated with sedentary lifestyles. It is well-established in the research of the general population that regular physical activity is a health promotion behavior that can prevent and/or mitigate the onset and severity of chronic diseases. Also recent meta-analyses have linked exercise to improved cardio-respiratory fitness in PLHIV. However, evidence has shown that PLHIV exercise on average 1.4 hours per week, which is 0.7 hours less than in the general U.S. population, indicating that PLHIV may have increased risk factors for morbidities associated with a sedentary lifestyle. Peer educators play a significant role in HIV care and treatment settings to facilitate health promotion by encouraging positive changes in attitudes and behavior. We aim to investigate the differences in physical activity, exercise patterns, and physical fitness between PLHIV who are peer educators and PLHIV who are non-peer educators. In addition, we will explore measures of physical and mental health as well as tobacco and substance use, which will assess the daily functioning and health harming habits of PLHIV who are peer educators as compared to PLHIV who are non-peer educators.

Norfolk's Hidden Queer Histories: ABC Laws and the Gay Bar Scene

Kira Kindley

(Mentor: Cathleen Rhodes)

LGBTQ Studies

Using archival research that draws primarily from Our Own, Norfolk's gay newspaper from 1976-1998, and a series of oral history interviews, this project uncovers pieces of Norfolk's queer past. This research began as part of a class-based research project that culminated in the first student-led and designed queer walking tour of Norfolk. It is hard to understand our present without a clear understanding of our past, and this project seeks to give us a lens through which to examine queer Norfolk today. A powerful component of the work was the experience of physically standing in spaces previously occupied by local LGBTQ citizens, past and present. To stand where Norfolk's Queer foreparents once stood and discuss their lives is to draw a connection from then to now, to understand our own lived experiences. The Norfolk Hidden Queer Histories poster series illustrates those connections in three specific areas: Norfolk's gay bar scene, arts spaces, and Norfolk Police Department's LGBT liaison officers. This section of Norfolk's Hidden Queer Histories focuses on how homophobic Alcoholic Beverage Control (ABC) laws affected and altered the gay bar landscape in Norfolk, even after those laws were overturned in 1991. Bars to be included in this analysis include the Oar House, The Nutcracker, and HerShee Bar. This research explores how these ABC laws made it more difficult for gay owned, operated, and oriented bars to keep their doors open, disrupting the community that those bars were able to build.

Evaluating the Process of VIEW and TANF Case Managers in Prince William County's Department of Social Services

Morgan Lawson

(Mentor: Dr. Narketta Sparkman-Key)

Human Services

This project goes through the process of conducting an evaluation on the VIEW and TANF caseworkers for Prince William County's Department of Social Services. This process goes from developing an evaluation question to designing an evaluation protocol, and then using that protocol to do the evaluation. The evaluation was centered around the question, "How effectively are PWC's TANF caseworkers being prepared to handle their cases in a way that helps the Department of Social Services fulfill their mission of enabling their clients to live self-reliant lives?." Based on the nature of this question, the evaluation conducted was a process evaluation, designed to evaluate the agency's processes of handling their caseloads. The evaluation gathered qualitative data from stakeholders that was then analyzed and prepared into a report.

Norfolk's Hidden Queer Histories: Art Spaces as Community

Samantha Autumn Mundt

(Mentor: Cathleen Rhodes)

LGBTQ Studies

Using archival research that draws primarily on Our Own, Norfolk's gay newspaper from 1976 - 1998, and a series of oral history interviews, this project uncovers pieces of Norfolk's queer past. This research began as part of a class-based research project that culminated in the first

student-led and designed queer walking tour of Norfolk. It is hard to understand our present without a clear understanding of our past, and this project seeks to give us a lens through which to examine queer Norfolk today. A powerful component of the work was the experience of physically standing in spaces previously occupied by local LGBTQ citizens, past and present. To stand where Norfolk's Queer foreparents once stood and discuss their lives is to draw a connection from then to now, to understand our own lived experiences. The Norfolk Hidden Queer Histories poster series illustrates those connections in three specific areas: Norfolk's gay bar scene, arts spaces, and Norfolk Police Department's LGBT liaison officers. In general, bars historically functioned as the primary community and meeting spaces for LGBTQ individuals. This poster explores how various Norfolk art spaces offered an alternative to the bar scene by providing opportunities for connection around art, film, and literature. Locations to be highlighted include Jaffe Arts Center, the Naro Theater and Expanded Video Store, the Todd Rosenlieb Dance Center, and Lambda Rising.

Prevalence of *Borrelia burgdorferi* in *Ixodes scapularis* and *Ixodes affinis* in Southeastern Virginia

Anna Phan, Zach Bement, Holly Gaff, and Wayne Hynes

(Mentor: Wayne Hynes)

Biological Sciences

Lyme disease, the result of infection by the tick-borne pathogen *Borrelia burgdorferi*, affects thousands of people per year in the United States. The pathogen is primarily transmitted by the blacklegged tick, *Ixodes scapularis*. *Ixodes scapularis*, along with another vector, *Ixodes affinis*, are known to be established in southeastern Virginia. This study determines prevalence of *B. burgdorferi* within these ticks. Presence of the pathogen in these ticks could be an indicator of the risk of human *B. burgdorferi* infections in southeastern Virginia. Questing *I. scapularis* and *I. affinis* were collected by flagging at various field sites between 2010 and 2012. The presence of *Borrelia* spp. was determined by screening extracted DNA from the collected ticks using real-time PCR. Identification of *Borrelia* spp. positive by real time was determined by the sequencing the ospC gene. A real-time PCR assay was used to differentiate *I. scapularis* and *I. affinis*, with sequencing was done to confirm results. This study shows a notable percentage of *Borrelia* infections in both tick species, with a much higher percentage in *I. affinis*. *Ixodes affinis* acts as a reservoir for the pathogen and contributes to the increased prevalence of *Borrelia* within southeastern Virginia. Further research and surveillance is needed on these disease vectors and the pathogens they carry.

A High-Efficiency Approach to Simulation of Inverse Compton Scattering in the Linear-Field Regime and Its Implications on Scattered Linewidth

Nalin Ranjan, Balša Terzić, and Geoffrey A. Krafft

(Mentor: Balša Terzić)

Physics

Compton scattering, though first described some one hundred years ago, has recently experienced a surge of interest due to the search for energy sources that are capable of yielding low emission bandwidths. In particular, the desire for hard x-rays with energies greater than 10 keV has led to increased study of inverse Compton sources. The rise in interest concerning inverse Compton sources has increased the need for efficient models that properly quantify the behavior of scattered radiation given a set of interaction parameters. The current, state-of-the-art, simulations rely on Monte Carlo-based methods, which may fail to properly model collisions

of bunches in low-probability regions of the spectrum. Furthermore, the random sampling of the simulations may lead to inordinately high runtimes. Our methods can properly model behaviors exhibited by the collisions by integrating over the emissions of the electrons in the bunch in a lessened amount of time. Analytical simulations of Gaussian laser beams closely verify the behavior predicted by an analytically derived scaling law describing bandwidth of scattered radiation.

Visualizing the Effects of *Clostridium difficile* Toxins A and B on Mammalian Epithelial Cells

Cody Scott, Melissa Madril, Erin B. Purcell, and David S. Courson

(Mentor: David Courson)

Chemistry

Clostridium difficile is a spore-forming, obligate anaerobe, Gram-positive bacterium that causes *Clostridium difficile* infection (CDI), responsible for ~30,000 deaths annually. *C. difficile* secretes Toxin A and Toxin B, closely related proteins which target host small GTPases and have been associated with severe symptoms of CDI. We studied the effects of these toxins on epithelial cell junctions and actin cytoskeletons via live-cell fluorescent microscopy. Epithelial cells form a protective barrier by generating tight, strong junctions on all sides. The actin cytoskeleton allows cells to bind to the substrate and to interact with their neighboring cells. Using real-time, high-resolution fluorescent microscopy we show how *C. difficile* affects host cell junctions and cytoskeleton. Additionally, we tested the effects of purified toxins at various concentrations on these fluorescently labeled cells to clarify the role of each toxin separately during CDI. Toxins A and B appear to work on different timescales and have different effects on epithelial cell physiology. Cells introduced to Toxin A retracted significantly yet maintained cell junctions relatively well. Cells treated with Toxin B rounded more gradually. Treatment with Toxin A+B caused dramatic rounding and degradation of cells junctions compared to healthy controls. In addition, the tight junctions showed distress slightly sooner than the actin cytoskeleton. Toxin concentration determined how quickly the epithelial cells showed damage, but all concentrations tested were eventually fatal, illustrating how potent these toxins are against mammalian cells. These findings improve our mechanistic understanding of infection bringing us one step closer to effective treatment.

Developing a Scale for Internalized Homophobia

Stacey Thompson, Arushi Deshpande, Lorrie Runion, Shanon Sabo, and Jessica Burgess

(Mentor: Miguel Padilla)

Psychology

Current research indicates that internalized homophobia is detrimental in sexual minorities (i.e., homo- and bisexuals). This phenomenon occurs when a sexual minority is uncomfortable with their sexual orientation. This discomfort has an impact on physical and mental health. Unfortunately, research has been hindered because of the use of inadequately validated measures of internalized homophobia. The purpose of this research is to develop a measure of internalized homophobia for sexual minorities. A content analysis of the literature and focus groups revealed themes pointing to the development of new items for measuring internalized homophobia. In particular, items needed to adhere more to sexual minority experiences, behaviors, and attitudes. Based on this information, a measure of internalize homophobia was developed with the new items. The measure was pilot tested and content validity was established.

Microalgae Cultivation in Aquaculture Wastewater

Matea Tindal, Keyur Patel, Ashani Samaratunga, and Sandeep Kumar

(Mentor: Sandeep Kumar)

Civil & Environmental Engineering

Microalgae is a promising feedstock for production of biofuels and bio-products due to factors such as the ability to harness solar energy, treat wastewater, and capture carbon to reduce the amount of CO₂ emitted to the atmosphere. Utilizing wastewater for microalgae cultivation is economical for the production of algal biomass. Therefore, aquaculture wastewater from a shrimp and freshwater fish farm was used to cultivate *Scenedesmus sp.* The objectives of this study were to test whether the aquaculture wastewater could be used to culture *Scenedesmus sp.*, to compare the algal growth of wastewater with the control medium AM-14, and to harvest the wastewater microalgae to use as a feed source for fish, shrimp, or other aquatic animals. We observed significant algae growth in the aquaculture wastewater compared to the control medium.

Optimization of Microalgae Growth by Testing Different Media

Matea Tindal, Ashani Samaratunga, and Sandeep Kumar

(Mentor: Sandeep Kumar)

Civil & Environmental Engineering

Environmental concerns and declining resources have led to a global interest in renewable and carbon neutral transportation fuels. Microalgae is an outstanding source of biomass for production of biofuels and bio-products due to its efficiency in producing lipids, being a non-food feedstock, the flexibility to be cultivated indoors or outdoors and in various types of photobioreactors, and land conservation. To cultivate microalgae, nutrients must be provided by media which contain chemicals that help contribute to the growth of the algae along with a light source, air supply and suitable temperature. The objective of this study is to test and compare different media that would help grow *Scenedesmus sp.*, to observe the microalgae growth rates and production yields, and to determine the ideal medium for *Scenedesmus sp.* The chosen medium will be used to better cultivate *Scenedesmus sp.* for future research.

Visualization of the Process Interaction Worldview in Discrete Event Simulation

Thomas J. Tracey, Brian D. Dilinila, Jim Leathrum, and Roland Mielke

(Mentors: Jim Leathrum, Roland Mielke)

Modeling, Simulation & Visualization Engineering

A process interaction model is a modeling paradigm representing the interactions involved in entities moving through a process flow. While there exist many ways of viewing and implementing process interaction models and diagrams, there does not exist a visualization method to denote scheduling and execution of events defining the process interactions during runtime of a simulation. During runtime, the scheduling of events, execution of events, and interactions between processes are all hidden and unobservable throughout the course of the simulation. This lack of knowledge about the underlying processes in action, as well as the events that affect the system state, often hinders the understanding of the model. This creates problems in teaching and introducing discrete event simulation to students because there is no visual component of the program that represents the dynamic nature of the underlying

processes occurring during runtime. The authors propose a visualization approach to displaying the scheduling and execution of events in process interaction models. This visualization approach highlights event scheduling and execution, as well as interactions between processes. The authors' methodology for this approach focused on building upon examples of process interaction models by highlighting triggers, event scheduling, and event execution during process interaction simulations. The authors found that the development of this visualization method is very useful for highlighting key factors in process interaction simulations during runtime.

Facial Landmark-based Approach for Classification of Children's Facial Expressions and Facial Action Codes

Megan Witherow

(Mentor: Khan Iftekharuddin)

Electrical & Computer Engineering

Classification of facial expressions from children is a relatively unexplored area in the literature as few facial expression datasets taken of children exist. To explore and understand the classification of children's facial expressions, images from the Child Affective Face Set (CAFE) are classified by facial expression using features based on facial landmark points. One limitation of CAFE is that it is not encoded with the Facial Action Coding System (FACS), which describes facial movements based on anatomical analysis. To address this limitation, we also propose a method for FACS classification of the CAFE dataset. The Discriminative Response Map Fitting (DRMF) toolbox is used to extract 66 landmark points on the face. Interpoint distance features are computed as the Euclidean distance between facial landmark point pairs. Interpoint distance features are then scaled between $[-1.0, 1.0]$. Multi-class Support Vector Machine (SVM) is used to classify two subsets of images from the CAFE dataset: the full dataset and a reduced dataset removing images where the child posed with mouth open or tongue protrusion. Grid search is used to identify appropriate parameters for the SVM classifier. The FACS-encoded the Extended Cohn-Kanade Facial Expression Set (CK+) is used to train a FACS classifier using a combination of interpoint distance and texture features.

ODU Aeternitas CubeSat Project

Kimberly Wright, James Flynn, and Susannah Miller

(Mentor: Dimitrie Popescu)

Mechanical & Aerospace Engineering; Electrical & Computer Engineering

The ODU CubeSat is part of a multi-university collaborative project that aims to build a constellation of three small satellites that are shaped in the form of a cube with dimensions of 10 x 10 x 10 cm and will be deployed into Low Earth Orbit (LEO) to study phenomena that influence the varying thermosphere density. Variations in the density of the thermosphere fluctuate due to seasonal differences, changes in solar activity, solar radiation, and geomagnetic variations, along with temperature and altitude. These factors lead to uncertainties in current atmospheric drag models, which are a major source of error in orbit prediction for most LEO satellites and contribute to flaws in atmospheric density models of the thermosphere. Sponsored through the Virginia Space Grant Consortium (VCSG) the project brings together students from Old Dominion University (ODU), the University of Virginia (UVA), Virginia Tech (VT), and Hampton University (HU) to form the Virginia CubeSat Constellation (VCC), a first of its kind for undergraduate small satellite research projects in Virginia. The VCC mission has been

manifested and given a delivery date of July 2018 for an anticipated deployment during the fourth quarter of 2018/first quarter of 2019. ODU, UVA, and VT are building three satellites that will be simultaneously deployed from the International Space Station (ISS). Each satellite will collect and transmit GPS coordinates, Inertial Measurement Unit (IMU) and attitude data, which will be compiled and analyzed by HU. Among the constellation CubeSats, the one built by ODU has a unique design and will implement a deployable drag brake to accelerate its orbital decay. Currently, the ODU team is making progress with the design and fabrication of their CubeSat chassis, drag brake, and antenna deployment system, as well as with the onboard electronic microcontroller and radio systems.

9:00-10:00 PM (Learning Commons: Room 1310)

Biological Sciences 1

Chair: Holly Gaff, Biological Sciences

Differential Expression of Developmental and Signaling Genes Between Normal Chondrocytes and Chondrosarcoma Cells

Arooba Ayaz, Michael Stacey, Chris Osgood

(Mentor: Chris Osgood)

Resistant to both radiation and chemotherapy, chondrosarcomas can be difficult to treat. Expression levels of two developmental genes, SOX5 and SOX6 were studied in chondrosarcoma cells and compared to normal chondrocytes. The expression levels of GPR68 which is involved in mediation of growth inhibition and the expression of KCNN-2 which plays a role in cellular proliferation were also studied. Chondrosarcomas are thought to arise from mesenchymal stem cells, thus it is important to study the expression levels of genes that may be involved in the process of normal chondrogenesis and proliferation. Both chondrosarcoma cells and normal chondrocytes were cultured in monolayer and pellet (3D) cultures, followed by RNA isolations and conversion to cDNA. RT-qPCR was used to characterize the expression levels of the genes and the $\Delta\Delta C_t$ method to quantify fold change. SOX5, SOX6, GPR68, and KCNN-2 were found to be expressed at lower levels (-11.04, -67.04, -294.41 respectively) in the chondrosarcoma cells when compared to normal chondrocytes. Lower expression of SOX6 likely influences the expression of aggrecan in chondrosarcomas. Lower levels of GPR68 implies a lack of mediation of growth inhibition in these cancer cells as well as lower levels of intracellular calcium. Less expression of KCNN-2 probably alters the membrane potential of the chondrocytes which affects the proliferation of the cells. Overall, the data suggests that when compared to normal chondrocytes there is lower expression of SOX5, SOX6, GPR68 and KCNN-2 in chondrosarcoma cells which likely has effects on their growth and proliferation.

Prevalence of *Borrelia* spp. in *Ixodes* ticks in Southeastern Virginia

Zachary Bement, Anna Phan, Wayne Hynes, Holly Gaff

(Mentor: Wayne Hynes)

Lyme disease is the most common vector-borne disease in the United States. The pathogen, *Borrelia burgdorferi*, is primarily transmitted by the blacklegged tick: *Ixodes scapularis* in the East and Midwest and *Ixodes pacificus* in the West. *Ixodes scapularis* along with another vector, *Ixodes affinis*, are known to be established in southeastern Virginia. This study determines prevalence of *B. burgdorferi* specifically within these ticks which could be an indicator of the risk of human *B. burgdorferi* infections in the area. Other *Borrelia* species carried by these ticks include *B. miyamotoi* and *B. carolinensis*. These species of *Borrelia* are known to cause symptoms similar to Lyme disease as a result of infection. Questing *I. scapularis* and *I. affinis* were collected by flagging at various field sites between 2010 and 2012. The presence of *Borrelia* spp. was determined by screening extracted DNA from the collected ticks using real-time PCR. Identification of *B. burgdorferi* was determined by sequencing the *ospC* gene. A real-time PCR assay differentiated *I. scapularis* and *I. affinis* with sequencing used to confirm results. This study shows a 14.7% prevalence of infection in *I. scapularis* and a 41.8% prevalence in *I. affinis*. *Ixodes affinis* acts as a reservoir for the pathogen and contributes to the increased

prevalence of *Borrelia* spp. within southeastern Virginia. Further research and surveillance is needed on these disease vectors and the pathogens they carry.

Salinity and Temperature Effects on the Reproductive Success of the Leech *Myzobdella lugubris*

Jonathan Blubaugh

(Mentor: David Gauthier)

Largemouth Bass in Back Bay, Virginia have been observed to be infested with leeches in their oral cavity since 2012. The leeches cause severe ulceration and bleeding with unknown health effects. In 2016, the leeches infesting the bass were identified as *Myzobdella lugubris* and health effects of the leeches were examined. While the leeches were not observed to have major effects on the health of the bass, there is still very little known about how the leeches are transported into the bay and spread amongst hosts. We have observed leech cocoons deposited on the carapace of blue crabs, *Callinectes sapidus*, and believe this is how the leeches are transported and disseminated in Back Bay. Blue crabs migrate into the deeper water of the bay during the summer months. For the leeches to have been brought into the bay this way, the leeches and cocoons must be able to survive in a wide range of salinities when being brought from the Atlantic Ocean through the Currituck Sound into Back Bay. The water temperature in Back Bay also varies with season and could influence reproductive success of *M. lugubris*. This study aims to determine the effects of three temperatures (15, 23, 30 °C) and four salinities (0, 3, 5, 10 ppt) on the reproductive abilities of the leeches to understand the seasonality and distribution of leech infestation in Back Bay, Virginia.

Digging Out the Devils: Molecular Examination of Amoeba-like Cells from Cranial Tissue of the Endangered Rio Grande Silvery Minnow

Brandon Hamel

(Mentor: David Gauthier)

The Rio Grande Silvery Minnow (*Hybognathus amarus*) is a critically endangered species native to the southwestern United States. Since the 1990s its population has declined dramatically due to extensive human alteration of the Rio Grande for agriculture and civil development. This has resulted in habitat degradation and impedance to proper migration, resulting in the minnow now occupying only 5% of its historical range. An active restocking and recovery program is underway through the US Fish and Wildlife Service involving breeding programs at three New Mexico sites. In the summer of 2012, aquaculture specimens began exhibiting an unusual spinning behavior and chronic, low level mortalities. An initial investigation of water and habitat quality revealed no abnormalities. Screening tests for pathogenic microbes and viruses yielded only negative results and necropsies of affected fish showed no obvious infectious agents or pathology. As the mysterious symptoms persisted, worries grew about the viability of these fish for restocking purposes. A second investigation performed in 2013 revealed a histozoic (tissue-dwelling) amoebic infection restricted to connective tissues, particularly in the cranial floor. As brain dwelling organisms are known to cause disease in both fish and humans, identification of this possible pathogen became a priority. This project sought to identify this organism using deep DNA sequencing with the Illumina MiSeq platform and bioinformatics techniques.

9:00-10:00 PM (Learning Commons: Room 1306)

Art History 1

Chair: Agnieszka Whelan, Art

Form, Feeling, Ephemerality: Eva Hesse

Betty Gowans

(Mentor: Vittorio Colaizzi)

Eva Hesse created works in latex in the latter half of her career that will continue to deteriorate over time. She strove to insert herself into her work and preferred the ephemerality of the latex. Due to Hesse's awareness of the medium and her efforts to equate herself with her work, links can be established between her life and the decay of her latex sculptures. By analyzing Hesse's life, statements, practice, and statements about the artist, the parallel between Hesse and her work will be established, as well as an argument made for the future handling of Hesse's ephemeral sculptures.

A Reflection for A New End (2016)

Nancy Nguyen

(Mentor: Vittorio Colaizzi)

Public Art has grown and transformed within the last decade. Often, a committee will work with an artist to make a piece for a specific community. Jeppe Hein is a Berlin-based, Danish installation artist, whose work responds to the basic human need for social interaction. Hein's piece at the historic site of World's End in Hingham, Massachusetts, entitled *A New End* (2016), adds personal value to visitors while preserving the site's identity. It does this through its minimalist but elaborate structure that integrates the spectator and reflects the site.

Samurai Swagger and Their Sensational Suits

Dominick Rosnato

(Mentor: Agnieszka B. Whelan)

The presentation explores the ceremonial samurai armor on display in the Chrysler Museum in Norfolk, Virginia. Much has been written on the samurai period and its players; a mythology has been established. The samurai's prominence in Japanese society began to dwindle during the Edo era 1618-1863. The country was relatively peaceful in its international isolation, but major political and societal changes took place then, shifting traditional Japanese principles and creating a sword into plowshare mindset. The presentation argues that these changes ultimately led to the making of the new type of ceremonial armor at the time when the opening of Japan set the stage for a massive cultural exchange and made Japanese historical practices accessible to the world.

Salvation in Silk

Holli Turner

(Mentor: Agnieszka B. Whelan)

Many artists and viewers find sanctuary in their ability to transport themselves into the expressive Chinese landscape handscrolls. The painted scrolls never truly concern themselves

with the realistic depictions but rather focus on mental escape through nature. The paper will examine the long tradition of blue and green landscape paintings and the desire of the artists to engage with landscape as symbolic of cosmic order and permanence. The primary focus is the early Qing Dynasty handscroll in the collection of the Chrysler Museum titled "Mountainous Landscape". In this presentation I will explore why the artist chose a distinctly traditional style for his creation and discuss the importance of continuity in Chinese aesthetic.

10:15-11:15 PM (Learning Commons: Room 1310)

Biological Sciences 2

Chair: Eric Walters, Biological Sciences

Factors Affecting Migratory Bird-Window Collisions: The Role of Canopy Cover and Scavenger Bias

Kayla Berger, Natasha Hagemeyer, Spencer Schubert

(Mentor: Eric Walters)

Window collisions are a major anthropogenic threat to birds, with up to 1 billion mortalities estimated annually in the United States. In addition, migrating birds are more likely to strike windows than residents. Because Norfolk, Virginia is situated within a major migratory flyway, I measured avian window-strike mortality on the Old Dominion University campus. Window strike susceptibility increases with a combination of tall buildings, high glass surface area, and near-building vegetation, all components found on the campus. From 18 September to 01 November 2017, only five individual birds (Mourning Dove [*Zenaida macroura*], Ovenbird [*Seiurus aurocapilla*], Northern Parula [*Setophaga Americana*], Yellow-Rumped Warbler [*Setophaga coronata*], and Northern Cardinal [*Cardinalis cardinalis*]) were found dead because of striking windows. Scavengers and other sources of carcass removal, however, likely cause underestimation of window-strike mortality. To assess this potential bias, I used previously frozen specimens of birds that had been salvaged through various means outside of this study. From 23 November to 5 December 2017, I placed large (>30 g) and small (g) bird carcasses outside of the same buildings where I had surveyed for window kills to assess carcass removal rates. All larger carcasses were removed within 48 hours, while smaller carcasses were present after 7 days. Thus, low numbers of carcasses detected at this and other sites could indicate scavenger activity rather than lower window-strike mortality. In addition, many studies report higher window-strike susceptibility in warblers, which may be due to scavenger bias towards larger carcasses rather than innate susceptibility of smaller warblers.

Improving Detection of Secondary Structures within Medium Resolution Cryo-EM Density Maps

Michael Poteat, Jing He

(Mentor: Jing He)

Cryo-electron microscopy is a biophysical technique in production of electron density maps that are 3-dimensional images. Although atomic structures can be derived from such images at high-resolution, it is still challenging to predict structures when the resolution of the image is at medium resolutions (5-10Å). Although computational methods are available to extract protein secondary structures from a medium-resolution image, they lack sufficient accuracy for structure prediction. This work aims to improve detection of secondary structures such as helices and β -sheets as compared to previous work SSETracer. Detection of these secondary structures is an important prior step for methods that perform further analysis, such as protein sequencing.

Pattern Detection in Three-Dimensional Cryo-EM Images of Filament Bundles

Peter Scheible, Salim Sazzed

(Mentor: Jing He)

Cryo-electron microscopy is a fast-developing technology with many applications in structural biology analysis. Since most biological specimens are radiosensitive, they must be imaged using low doses of radiation. More radiation produces higher resolution images but risks causing radiation damage to the specimen. Low dose imaging produces noisier images that are often difficult to analyze. The purpose of this project is to develop an effective image processing tool using the nature of filaments in a bundle. By using cross-correlation and convolution on cross sections of the filament images, we are able to detect the overall direction of the bundle that can be utilized in downstream detection of individual filaments.

Differential Gene Expression of Chondrocytes in PLGA Scaffolds

Martina Zamponi

(Mentor: Chris Osgood)

Biological Sciences

The field of bone regeneration is constantly growing and has the potential to have a significant impact in the way in which bone fractures are approached. Many projects developed in the past decade envision the use of scaffolds of various materials to promote and aid bone deposition, with the goal of speeding up the healing process. However, the natural course of bone regeneration entails the formation of a cartilaginous callus followed then by new bone tissue, rather than direct osteocyte deposition. The purpose of this project was to use a polylactic acid-co-glycolic acid-calcium phosphates (PLGA/CaP) scaffold to promote the formation of a hyaline cartilage precursor, onto which new bone can eventually form. The material was demonstrated to be biocompatible and suitable for this purpose. Tissue growth was observed in mature chondrocytes cultured with PLGA/CaP scaffolds. Gene expression analysis of chondrocyte growth on the scaffolds was conducted using RT-qPCR, targeting genes expressed in hyaline cartilage. The characterization revealed that mature chondrocytes co-cultured with PLGA/CaP scaffolding expressed an upregulation of biomarkers indicating hyaline cartilage formation. This research provides evidence for the potential clinical applications of PLGA/CaP to induce the development of a cartilaginous callus and can be used for further research in the field of enhanced bone formation.

10:15-11:15 PM (Learning Commons: Room 1310)

Art History 2

Chair: Jared Benton, Art

The Problem of Originality in the Work of Sarah Lucas

Chelsey Burch

(Mentor: Vittorio Colaizzi)

Sarah Lucas is a contemporary British artist known for satirical and often crudely sexual assemblages and photographs. Although she is often celebrated for this brazen imagery, this essay investigates the stark contradictions found between her statements and her work, particularly in contrasting her claims of originality with her similarities to the work of such artists as Louise Bourgeois and Marcel Duchamp. Through analyzing interviews and comparing her work with that of other famous artists throughout modern history, it posits that her strategy entails the purposeful imitation of a variety of inconsistent styles. Her work questions the idea of originality itself in the contemporary art world; in turn, the viewer may ask if her act of imitation becomes a work of art in itself.

Lavinia Fontana: A Life Reflected in Nude Minervas

Heather Nygaard

(Mentor: Anne Muraoka)

This paper argues that the Renaissance painter Lavinia Fontana painted her final work, *Minerva Dressing*, as a tribute to her ending life by making a connection to the goddess of war, wisdom, love, and art. Support for the argument will be found in Fontana's approach to the nude figure in the realm of sacred and profane art, making comparisons between *Minerva Dressing* and other paintings, the symbolism represented in the painting, the meaning of the goddess, the life of the artist, exploration of gerontophobia in the Renaissance, and the patron of the work.

Body Concepts and the Lack of Female Nudity in Classical Greek Sculpture

Dominick Rosnato

(Mentor: Jared Benton)

There is an absence of the female nude among the statuary of ancient Greece in the classical period. Previous scholars have focused mostly on philosophical and moralistic explanations for the absence of idealized female nudity, failing to address the sexual mores and proclivities of the patrons of this art. This paper argues that the prevailing homo-erotic desires of the patronage of this period commissioned highly erotic statuary for the aggrandizement of their personal erotic tastes and desires.

11:30 AM – 12:30 PM (Learning Commons: Room 1310)
Communications and the Humanities
International Studies and Geography
Chair: Megan McKittrick

An Analysis of the Efficacy of Climate Challenge

Nicholas Barnes, Brandon Sharpton, Leslie Cook
(Mentor: Megan McKittrick)

The temperature in our atmosphere is steadily rising; therefore, we need a method of communicating climate risk that educates and motivates people faster than the rising sea level. Our presentation analyzes the communicative effectiveness of *Climate Challenge*, a game created for this purpose. We will also analyze and utilize prior research of climate change games and serious games. We gathered participants for our research using convenience and snowball sampling. We conducted a pre-test survey and post-test interview, along with a screencast-recorded playthrough of *Climate Challenge*. After the research session we used grounded theory and inductive thematic analysis to categorize and find trends in the data. Our analysis suggests that *Climate Challenge* relies on text to relay its message on climate change, which falls under the category of narratological teaching. Such an approach “deals with the structures and function of narrative storylines/backgrounds” (Ouariachi, T., Olvera-Lobo, M. D., & Gutiérrez-Pérez, J., 2017). This could make an effective climate change game, but too much text can lead the player to become bored with the game before it impacts the player. This will lead into a discussion of narratological and ludological methods of teaching through games. We will discuss the results of our study and suggest ways that researchers can continue exploring the possibilities of risk communication games.

American Opinion on Full Military Intervention in the Democratic People's Republic of Korea

Christopher Benoit
(Mentor: Timothy Kidd)

This paper attempts to update the current model on opinion of military intervention with the current situation between the United States of America and the Democratic People's Republic of Korea. It gives historical and current background and would present it to the American populace within a measured research study on whether Americans believe that full military intervention at this point with North Korea is the best option, including the thermonuclear option, and the resulting backlash.

Identifying Potential Areas of Human Zika Infection in the City of Los Angeles, California By Use of Remote Sensing Imagery

Jason Lee
(Mentor: Hua Liu)

Zika is a disease which poses a significant risk to humans and due to strong links of microcephaly during pregnancy. This emerging disease highly contagious due to its spread of infection primarily by *Aedes aegypti* mosquitos. *Aedes* mosquitos are able to breed in small rain collecting containers which allow the species to persevere in urban and semi urban environments. This study attempts to identify potential areas with risk of human infection within Los Angeles and its

surrounding areas. The integration of remote sensing, GIS, geostatistical, and environmental techniques is utilized to study favorable habitats for this particular species of mosquitos and their larvae. Los Angeles was chosen due to its diverse landscape and human population factors. These factors are compared to the geographic and landscape factors which promote the larvae development allow for the disease spread to be analyzed and modeled. There are several goals in the development of this study. These include the coordination of statistical data from population risk modeling methods which can be utilized for disease prevention, identification of geographic risk factors, and human behavior for the spread of Zika.

Refugee Crisis in Greece: Has International Law Failed?

Kleopatra Moditsi

(Mentor: Aaron Karp)

In 2015, Europe experienced one of the most severe migration crisis in its time. Migrants and refugees fleeing conflict and instability in their home countries in the Middle East and Africa. The influx has mostly affected countries of entry, such as Greece. This paper explores the intersection of legal mechanisms on three different levels: the international, European and domestic law and exposes their shortcomings.