

## 2016 Summer Undergraduate Research with Faculty (SURF)

1. **Student: James Barton-Souza** Major: Biology  
**Mentor: Amy Rogers** Department: Chemistry and Biochemistry  
**Title:** *Growth and Purification of Endothelial Nitric Oxide Synthase Heme Domain for Crystallographic Studies with Novel Pterins Bound*

Time and again you hear about harmful molecules that should be avoided. But have you ever heard of a dangerous molecule that you actually need? Nitric oxide (NO), a toxic gas similar to carbon monoxide, is just that molecule. In fact, it was awarded Molecule of the Year in 1992 for its surprising role as a neurotransmitter, vasodilator, and anti-cancer agent. So how is this toxic molecule that is made in the body with such precision provide Dr. Jekyll's effect and not evil Mr. Hyde's? The enzyme nitric oxide synthase (NOS) produces NO *in vivo* by converting the molecule L-Arginine into L-citrulline and NO but exactly how this is done is not well understood. There are several cofactors that are needed by NOS in order for the reaction to produce product; one of them is called tetrahydrobiopterin (BH<sub>4</sub>). Without BH<sub>4</sub>, the reaction does not proceed and toxic products are formed. But the exact role of the BH<sub>4</sub> is unknown. We believe that one key factor in understanding how NOS produces NO lies in understanding what BH<sub>4</sub> is doing during catalysis. Our studies focus on probing the role of BH<sub>4</sub> by spectroscopic catalytic assays, X-ray crystallography, and Isothermal Calorimetry. Uncovering the role of BH<sub>4</sub> could provide insights into how NOS produces a toxic gas in a perfect orchestration as to provide essential biological functions like neurotransmission or cardiac blood flow.

2. **Student: Theodore Carrigan-Broda** Majors: Chemistry and Biochemistry  
**Mentor: Gamil Guirgis** Department: Chemistry and Biochemistry  
**Title:** *Preparation, Characterization, and Ciculations of Silacyclheptane and its Chloro- and Fluoro-Derivatived*

Carbon atoms can bond with other atoms to form linear and cyclic structures. Our laboratory at the College of Charleston has been involved in a longstanding research program investigating the structural preferences of cyclic organic (i.e., carbon-containing) compounds incorporating silicon and germanium atoms. From these studies, we have published 85 papers in international journals, demonstrating the capability of College of Charleston to produce world-class research on silicon- and germanium-containing organic compounds.

Our previous studies examined cyclic compounds composed of three to six members (i.e., the atoms constituting the ring "skeleton"). Our attention is presently directed towards novel research on seven-membered rings incorporating silicon or germanium atoms within the ring structure. For seven-membered rings composed only of carbon, nitrogen, and oxygen, their biological activity and structure is fully elucidated in chemical literature. However, seven- membered rings incorporating silicon or germanium have never been experimentally investigated—possibly due to difficulties inherent in their synthesis. Our technical knowledge of the synthetic routes to these compounds, as well as our experience with the routine instrumental analyses and theoretical calculations, will help us to successfully explore the synthesis and characterization of these compounds. Our longstanding collaborations with laboratories at the University of Virginia at Charlottesville, the University of Missouri Kansas-City, and the University of Eastern Illinois at Charleston for highly specialized instrumentation will help in interpreting the structure of these molecules.

Finally, the newly prepared compounds may lead to collaborations with biology faculty at the College of Charleston to investigate the bioactivity of these unique compounds.

**3. Student: Elyana Crowder**

**Major: Astrophysics**

**Mentor: Joe Carson**

**Department: Physics and Astronomy**

**Title:** *3D Medical Imaging for Resource Limited Settings*

The research group led by Dr. Carson recently designed and partially fabricated a 3D-imaging device meant for minimally invasive screening and therapeutic monitoring of cervical cancers in a resource limited setting. Unlike conventional devices for the imaging of cervical cancers, which typically require significant medical infrastructure and a specialized physician, this newly developed device enables one-click, all-focus, 3D snapshots to be easily taken by a minimally trained user. The resulting compact images may then be inspected in-situ or uploaded to a server for examination by an expert at a remote location. The technology approach represents an extension of a previous device developed by Carson's team for the screening and therapeutic monitoring of Kaposi's sarcoma tumors of the skin, which was successfully demonstrated during a pilot program at Maputo Central Hospital in Mozambique, and published in the Journal of Translational Medicine (Baghdadchi et al. 2014).

While the hardware prototype for the cervical cancer diagnoses has been recently fabricated, SURF funding is requested to support Elyana Crowder for work implementing and advancing the required homegrown software components, which would include efforts to optimize 3D depth resolution, allow for full quantification of target color, and enable a "movie mode" capability for aiding clinicians in effective diagnoses.

**4. Student: Rachel Dors**

**Major: Hospitality and Tourism Management**

**Mentor: Stephen Litvin**

**Department: Hospitality and Tourism**

**Management**

**Title:** *"Tourists' Use of Restaurant Webpages" Revisited: The Evolution of Web-Based Marketing*

This project is revisiting a 2005 paper by Litvin, Blöse, and Laird, that studied the frequency of viewings to restaurant webpages prior to dining and journeying on a trip and as to whether it affected purchase behavior. Within the last 11 years there has been substantial technological advances allowing greater ease of access to the internet. This convenience has been instrumental in providing an exponential jump in the creation of web based applications, such as Yelp and Tripadvisor. In my research, I will replicate and expand the topic to re-examine, with substantial and new data to provide a platform for future research.

**5. Student: Katherine Duchinski**

**Major: Data Science**

**Mentors: Paul Anderson**

**Departments: Computer Science**

**Dennis Watson (MUSC)**

**Biochemistry and Molecular Biology**

**Title:** *Pipeline for Analysis and Visualization of Gene and Pathway Expression in Breast Cancer*

Breast cancer is the second most common cancer-related death among women in the United States. In 2015, the American Cancer Society estimates that 231,840 women will be diagnosed with and 40,290 will die from breast cancer. One of the most promising and rapidly developing areas of breast cancer research is genomics. The discipline of genomics applies DNA sequencing and computational methods to analyze the structure and function of genomes. Recording the genetic differences between normal and cancerous cells will facilitate the development of new diagnostic, prognostic, and therapeutic tools. Recent developments in experimental methods for genomics, referred to as next-generation sequencing (NGS), have increased the reliance on computational methods and algorithms for successful scientific discovery. The goal of this project is to develop further the computational tools

necessary to study breast cancer. Recent collaboration in genomics with the Medical University of South Carolina has yielded original experimental results that will be used to extend and improve state-of-the-art methods of data analysis. The resulting processing tool will help cancer researchers make connections and perform comparative analysis among genomic studies. Such comparisons represent a new window into a set of genes may influence cancer development.

**6. Student: Courtney Eker**

**Major: Political Science**

**Mentors: Jen Cole Wright**

**Departments: Psychology**

**Christopher Day**

**Political Science**

**Title:** *Cambodia & Vietnam: Regime Hybridity and Developmental Outcomes*

Since the Khmer Rouge genocide in the 1970's in Cambodia, Prime Minister Hun Sen has maintained his position in office through massive power regime shifts and much political and economic unrest. During my study abroad trip last summer, I noticed there was widespread popular support for Cambodia's Prime Minister, even when his arguably dictatorial rule has contributed to, if not directly resulted in, massive country-wide poverty, abysmal education and health care, and political suppression of freedoms in a fledgling (UN created) democratic system. However, based on interviews in Cambodia and an examination of Vietnam, I observed that authoritarian political systems do not necessarily contribute to or result in poor developmental outcomes. In fact, while both Cambodia and Vietnam rank very similarly on such indices as the Human-Development Index and Human Rights Watch Index, they nevertheless diverge in their levels of economic and social development and access to vital resources and civil liberties. This raises an interesting question. Under what circumstances do citizens socio-economically thrive versus fail within an authoritarian political regime?

For this project, I will compare and contrast the relationship between Cambodia's and Vietnam's authoritarian political regimes and the development of their socio-economic infrastructure (e.g., education, health care, etc.) and the existence of basic civil liberties for their citizens.

**7. Student: Sarina Etheridge**

**Major: Astrophysics**

**Mentor: Chris Fragile**

**Department: Physics and Astronomy**

**Title:** *Contrasting Magnetohydrodynamic Turbulence with Alpha-Viscosity in Black Hole Accretion*

A black hole accretion disk is an accumulation of materials, such as gas and dust, which orbits a black hole. The goal of this project is to create two separate computer simulations of black hole accretion disks. The two computer simulations will use different methods of producing the turbulence that is required for accretion disks to operate.

One of the simulations will use an artificial viscosity put in "by hand." This implies that this method is not a representation of true viscosity, but merely acts like viscosity. No physical mechanism is truly represented. This is how accretion disks have been modeled for decades. The other simulation will incorporate the physical process now known to be responsible for accretion, called the magneto-rotational instability.

The purpose of the project is to compare the two simulations to understand in what ways the real physical process differs from the artificial viscosity treatment. Ours will be the first such simulations done using general relativistic gravity, as is appropriate near a black hole.

**8. Student: Anthony Garruzzo**

**Majors: English and Philosophy**

**Mentor: Scott Peebles**

**Department: English**

**Title:** *Emerson and the Formal Implications of Pragmatism*

Pragmatism and neopragmatism are unique in the discipline of philosophy for framing questions of truth in terms of practice. When what is true is relative to practice, the conception of practice becomes vital. This is especially the case with regard to questions of the extent to which practice is arbitrary and malleable, since truth must be correspondently unstable. The more so that practice is conceived in this light, the more that the approaches to addressing questions of truth lose the appearance of scientific rigor and start to adopt styles and forms that engage with subjects of inquiry in idiosyncratic ways.

This anomaly of form is exemplified by the essays of Ralph Waldo Emerson (1803-1882), which themselves explore philosophical questions. Essays such as “Experience” and “Circles” blend poetic imagery, epigrams, allusions, and metaphors, along with argumentation into a multidimensional approach to a topic. In this project, such formal properties of Emerson’s essays will be analyzed in light of the premises of pragmatism and neopragmatism.

This project will enhance the understanding of Emerson by analyzing his work without dividing the content of his propositions from the form of his arguments. Furthermore, it will clarify his relation, as well as that of transcendentalism more generally, with American pragmatism. Perhaps most importantly, it will demonstrate the degree to which philosophical positions not only inform but also are influenced by the formal decisions that inevitably constitute their presentations.

**9. Student: Caroline Gilmer**

**Major: Biology**

**Mentor: Marcello Forconi**

**Department: Chemistry and Biochemistry**

**Title:** *Investigation of Bds1 Reactivity*

In previous research, the enzyme SdsA1 present in the pathogenic bacterium *Pseudomonas aeruginosa* has been determined to possess the capability to degrade sodium dodecyl sulfate (SDS), a common component of detergents and soap. SdsA1 and similar enzymes represent a possible method for bioremediation of SDS contaminations. Surprisingly, we found enzymes almost identical to SdsA1 in all the kingdoms of life. These enzymes are present in organisms that are not predicted to utilize SDS, raising the possibility that SDS hydrolysis might not be the biological function of the SdsA1-related enzymes. One of these enzymes, called Bds1, is present in eukaryote *Saccharomyces cerevisiae*. The aim of this project is determine if Bds1 degrades SDS as SdsA1 does, or if there are difference in the reactivities of the two enzymes.

**10. Student: Shannon Haas**

**Major: English**

**Mentor: Tim Carens**

**Department: English**

**Title:** *“Playing” Women: How Video Game Culture Exploits the Female Form*

Feminist scholars have examined much of the current media landscape and its representation of the female sex, but few have extended this analysis to video games. While Anita Sarkeesian’s video series *Tropes vs. Women in Video Games* has gained widespread attention for “deconstructing the stereotypes and tropes associated with women in popular culture” and “exploring the targeted harassment of women in online and gaming spaces,” she is effectively a solitary voice in the wilderness.

It is my argument that no aspect of contemporary popular culture deserves more attention from feminist critics than the video gaming world. The depiction of women in video games and associated media is demeaning, violent, and pornographic. It would be impossible to count the number of virtual abuses the video game community perpetrates against female characters each year. In digital brothels,

strip clubs, and murder scenes decorated with eroticized female corpses, modern video games invite male players to corner, brutalize, and “play” with pixelated female bodies.

I aim to carry forward analysis of the way that video games perpetuate misogyny through the representation of women. During the grant period I will, first, deepen my understanding of feminist theory and criticism, moving beyond Sarkeesian’s work to expand my understanding of theoretical premises and analytical techniques. Second, I will conduct primary research on video games and associated media. Finally, I will write a conference-length essay and research professional conferences at which I might present it.

**11. Student: Kacey Hirshfeld**

**Major: Marine Biology**

**Mentor: Craig Plante**

**Department: Biology**

**Title:** *Effects of the Invasive Seaweed, Gracilariia vermiculophylla, on Native Benthic Microalgal Communities*

Soft-bottom habitats are important in the health of estuarine ecosystems. Within these sand- and mudflats are diverse forms of photosynthetic algae. Macroalgae are the more familiar “seaweeds” whereas benthic microalgae are photosynthetic microbes associated with the seabed. The microalgae are important to shallow ecosystems because they provide food for animal consumers and secrete biological “glues” that can prevent sediment erosion.

A species of macroalgae, *Gracilariia vermiculophylla*, has been introduced along the East Coast of the United States and is spreading quickly. This invasive alga has formed a relationship with a species of tubeworm, *Diopatra cuprea*, which allows it to attach and grow in the soft-sediment habitats of Charleston Harbor. Both species benefit, *G. vermiculophylla* from its new ability to grow in this area and the tubeworm from nutrients obtained from the algae. However, communities of native microalgae in the sediment may be detrimentally affected.

The nature of the relationship between *G. vermiculophylla* and microalgae is undescribed, however it is believed negative because *G. vermiculophylla* may create resource competition (for sunlight, nutrients, or space). More directly, the large fronds of *G. vermiculophylla* sweep the sandy substratum as the tides ebb and flood, causing a “whiplash” effect that could be displacing microalgal communities and/or altering community composition.

There is little research available on the effects of *G. vermiculophylla* in soft-sediment areas due to the recent formation of the relationship between the alga and tubeworms. Our study will examine the interaction between macroalgae and microalgae to understand ecological effects of this invasive species.

**12. Student: Jozita Konczal**

**Major: English**

**Mentor: Emily Rosko**

**Department: English**

**Title:** *White Space: A Lyric Essay*

When setting out the seminal definition of the genre of the lyric essay in 1997, Deborah Tall and John D’Agata, wrote:

The recent burgeoning of creative nonfiction and the personal essay has yielded a fascinating sub-genre that straddles the essay and the lyric poem. These “poetic essays” or “essayistic poems” give primacy to artfulness over the conveying of information. They forsake narrative line, discursive logic, and the art of persuasion in favor of idiosyncratic meditation. The lyric essay partakes of the poem in its density and shapeliness, its distillation of ideas and musicality of language. It partakes of the essay in its weight, in its overt desire to engage with facts, melding its allegiance to the actual with its passion for imaginative form.

Nearly twenty years later, the lyric essay is here to stay. The genre as a whole has grown, placing a once-on-the-margins form into the center of the American literary scene. Some of the most profound and provocative books in the past decade have been penned via the liberating form of the lyric essay (in particular, the works of award-winning writer and poet Claudia Rankine).

The lyric essay also can enfold techniques from fiction, journalism, song, film, digital media, and the visual arts. Thus, its malleability and hybridity lends form to subject matters that might not be easily categorized; “messier” subjects that are more difficult to talk about. This proposed lyric essay project will explore how highly subjective experiences—pain, questions of faith—can be communicated better through the art of a cross-genre approach.

**13. Student: Anna Kooper**

**Major: Public Health**

**Mentors: Christy Kollath-Cattano**

**Departments: Health and Human Performance**

**Andrea DeMaria**

**Women’s and Gender Studies**

**Title:** *Formative Research to Develop a Collegiate Recovery Program (CRP) at the College of Charleston*

Students who identify as in recovery from drug and/or alcohol addiction face an increased potential for relapse on college campuses. This is due to their surrounding environment in which their peers may engage in illicit drug and/or alcohol use. Regardless of whether or not their peers are aware of the individual’s situation, it creates a threat to their mental health and wellbeing as a recovering addict. In order to meet the needs of these students in recovery, many college campuses have established collegiate recovery programs which hold meetings, host sober events, and provide themselves as a network of support for those that need it. In pursuance of a program on the College of Charleston campus that is empirically grounded and a best fit for the needs of those in recovery, we will interview students and stakeholders within the community. In doing so, we can address needs and encompass assets specific to the Charleston area. This project will contribute to the limited research available on the effectiveness of collegiate recovery programs in accordance with systematic research. In addition, this research will also help to reduce mental health stigma, promote awareness and respect on campus, and provide inspiration to those not yet in recovery.

**14. Student: Savannah Langley**

**Major: Psychology**

**Mentor: Gabrielle Principe**

**Department: Psychology**

**Title:** *Effects of Memory Sharing Style and Goal Orientation on Children’s Memory and Suggestibility for a Past Event*

Memory sharing conversations about past events with parents play a significant role in the development of children’s ability to remember and talk about experienced events. Through these conversations children learn how to search their memory for the details of experiences and relay these recollections in a narrative form to others. One of the most robust patterns in this literature centers on naturally-occurring variations in the elaborateness of mothers’ memory sharing style. Mothers who are characterized as high-elaborative ask open-ended *wh*- questions, introduce new descriptive detail, confirm children’s contributions, and follow children’s perspectives in remembering. Children whose mothers use a high-elaborative memory sharing style provide more detailed, coherent, and accurate accounts of past events than children with low-elaborative mothers when remembering with their mothers as well as with others. Despite the usual association between maternal elaborateness and children’s more skilled remembering, Principe and colleagues found that a high-elaborative maternal style is linked with increases in errors in children’s memory reports when mothers have been exposed to misleading information about their children’s experiences. The purpose of the present research is to

examine in a fine-grained manner how the content of elaborative statements and questions during memory sharing conversations can influence children's later remembering, and to determine which features of a high-elaborative style put children most at risk for subsequent memory errors. This work has relevance not only to a basic understanding of memory but also to discussions of factors that can affect the accuracy and completeness of children's testimony in legal settings.

**15. Student: Tea Thanh Luu**

**Major: Mathematics**

**Mentor: Mukesh Kumar**

**Department: Mathematics**

**Title:** *Numerical Techniques for Q-tensor Model of Nematic Liquid Crystals*

Liquid crystals are commonly considered as the fourth state of matter, different to gases, liquids, and solids. This is due to the fact that liquid crystals exhibit phases between a liquid and a crystalline solid which are known as mesophases. There are mainly two types of liquid crystals *nematic* and *smectic*, according to the degree of positional or orientational ordering shown by the molecules that compose them, cf. Figure 1. Different degrees of ordering can be achieved, depending on the temperature (thermotropic) and/or the concentration of a solute in a solvent (lyotropic). The simplest liquid crystal phase is the nematic one, which is made of elongated rod-like molecules with similar size, whose centers of mass have no positional order (as in an isotropic liquid), but tending to align along certain locally preferred directions, conferring the anisotropic structure.

In recent years, the use of liquid crystal displays (LCDs) in consumer goods such as TVs, laptop computers, mobile phones and monitors has grown rapidly. As a result, there is increasing interest in the development of efficient simulation tools for accurately calculating the molecular orientation (and hence the optical properties) of LCDs. This project would involve modeling, simulation, and analysis of singularly perturbed differential equation which arises in Q-tensor model of liquid crystals. This would also involve learning and developing the necessary numerical tools (such as spline based finite element/collocation methods) as part of the project.

**16. Student: Hannah Manzi**

**Major: Public Health**

**Mentors: Andrea DeMaria**

**Department: Health and Human Performance**

**Christy Kollath-Cattano**

**Title:** *Formative Research to Develop a Collegiate Recovery Program (CRP) at the College of Charleston*

Students who identify as in recovery from drug and/or alcohol addiction face an increased potential for relapse on college campuses. This is due to their surrounding environment in which their peers may engage in illicit drug and/or alcohol use. Regardless of whether or not their peers are aware of the individual's situation, it creates a threat to their mental health and wellbeing as a recovering addict. In order to meet the needs of these students in recovery, many college campuses have established collegiate recovery programs which hold meetings, host sober events, and provide themselves as a network of support for those that need it. In pursuance of a program on the College of Charleston campus that is empirically grounded and a best fit for the needs of those in recovery, we will interview students and stakeholders within the community. In doing so, we can address needs and encompass assets specific to the Charleston area. This project will contribute to the limited research available on the effectiveness of collegiate recovery programs in accordance with systematic research. In addition, this research will also help to reduce mental health stigma, promote awareness and respect on campus, and provide inspiration to those not yet in recovery.

**17. Student: David Melnick****Majors: Astrophysics and Physics****Mentor: Joe Carson****Department: Physics and Astronomy****Title:** *Exoplanet Imaging with the Hubble Space Telescope*

Studies of extrasolar planets (exoplanets) have changed our perception of the universe by proving that our own planet is by no means unique. At the same time, such studies have shown a vast diversity of planet system characteristics, covering a wide range of orbital separations and parent star masses. These studies have taught us that, in order to gain a meaningful perspective of our solar system's place in the universe, including an understanding of the frequency of conditions amenable to life, a complete census of the exoplanet population across a wide range of parameter space is required. The proposed investigation directly advances this effort by confirming, or rejecting, newly discovered, non-public exoplanet candidates, recently identified by the newly commissioned exoplanet-imaging instrument on the 8-meter Very Large Telescope (VLT) (Europe's flagship ground-based telescope). By confirming or rejecting these newly discovered exoplanet candidates, the investigation will improve our census of gas giant planets with orbital separations akin to that of our own solar system's gas giant planets.

**18. Student: Jenesha Nance****Major: Public Health****Mentors: Cara Delay****Departments: History/Women's & Gender Studies****Beth Sundstrom****Communication****Title:** *Reproductive Health Histories: A South Carolina Women's Health Oral History Project*

"When women speak for themselves," writes Kathryn Andersen, "they reveal hidden realities." (Anderson, Armitage, Jack, & Wittner, 1987) Attempting to shed light on South Carolina women's experiences of pregnancy and childbirth from the late twentieth century to the present day, this College of Charleston Women's Health Research Team project involves the collecting, recording, organizing, cataloging, storing, and analysis of women's reproductive health histories in South Carolina. We will focus our interviewing on several particular communities, including rural African-American women and Latina women.

This project will consider race, ethnicity, class, and region as central factors of analysis, asking how South Carolina women's experiences were marked by commonality as well as differences. Topics that we hope to explore and publish on through this research include communicating about reproduction, the African-American and Latina experiences, pregnancy and childbirth experiences, beliefs and rituals, attitudes toward parturition, and the material culture of birth.

**19. Student: Rebekah Rast****Major: Art History****Mentor: Charlie Calvert****Department: Theatre and Dance****Title:** *Developing the Scene Design Process*

Development as a theatre artist cannot be fully achieved in a strictly classroom setting. The nature of this collaborative art form requires immersion in realized production work that takes ideas learned in the coursework and puts them into practice - resulting in a far more in-depth understanding.

"Developing the Scene Design Process" allows for an intensive look into the day-to-day work and research involved for the Scenic Designer on a professional theatrical production. Using the creation of a pair of original set designs for two professional theatre companies as the framework, this project will allow for the student to gain an understanding of the processes of theatrical design and to be exposed to professional theatre with high production values.

The project requires in-depth analysis of the script, the time period and location of the play, and the logistical challenges unique to each performance space. The student will develop communication and

problem-solving skills in a collaborative atmosphere while interacting with the faculty mentor and the members of the production's creative team - hired by the respective theatre companies.

While the faculty mentor will serve as the lead designer on the production, the student participant will collaborate and participate in every aspect of the design process and execution of the design, ultimately leading to a portfolio of professional work produced on the stages of these two critically acclaimed theatre companies.

**20. Student: Victoria Rego**

**Major: English**

**Mentor: Terence Bowers**

**Department: English**

**Title:** *Sherlockian Sites: The Place of Holmes in the 21<sup>st</sup> Century*

To explain Sherlock's extraordinary appeal, Edgar W. Smith in "The Implicit Holmes" states that we love Holmes because he is "all that we are not, but ever would be." Scholars, such as Peter Haining, have proposed arguments that center on the idea that Holmes fills a need for a rationalizing and ordering force in a modern world of instability. Still others, such as Anthony Giffone, note the combination of intrigue, personality, place, and time that draws people to Holmes. However, the scholarship does not explain the transcendence of Sherlock from literature into the physical spaces of modern London and Great Britain.

The aim of this project is to explore the places that were inspired by, and inspired, Arthur Conan Doyle's popular Sherlock Holmes series. This study will investigate questions such as: who visits these places and what do they discover there? What are the relations between the physical sites and the fictional world of the literature? What is it about Sherlock that inspires people not just to read, but also to physically experience his world? And most importantly, how and to what extent does literature impact modern society? Answers to these questions will deepen our understanding of Sherlock's broad - indeed worldwide - appeal and allow me to bolster or offer alternative explanations to the arguments put forth by the scholars mentioned above. Further, as this study examines the physical sites and infrastructure built to serve travelers to Sherlockian places, it will explore and help open up a relatively unexplored topic in the scholarship on Sherlock Holmes: literary tourism.

**21. Student: Lea Richter**

**Major: Geology**

**Mentor: Scott Harris**

**Department: Geology and Environmental  
Geoscience**

**Title:** *Comparison between Modern Shorelines and the Submerged 1894 Shoreline in the Central Euboean Gulf (Greece)*

The coastal area stretching from Arkitsa to Theologos in the Euboean Gulf of Greece is a tectonically active shoreline that serves as a case study for the response of a wide array of beach types to accelerated sea level rise and preservation potential of submerged shorelines. Due to the tectonic situation, during two seismic events in April 1894, the coast between Arkitsa and Theologos dropped almost one meter in one week. That previous shoreline appears to have been well preserved in certain types of coastal areas, but not others. In general, beaches are characterized by an array of measurable parameters such as sediment coarseness, slope, and presence of geologic features such as dunes, cliffs or tidal flats. In this comprehensive study of all beaches and beach types in this coastal area, the preservation potential for both rocky and sandy beaches is considered based on the comparison between the observable characteristics of the current and submerged 1894 shorelines. The immediate submergence of this section of "low-energy" coastal embayment and the coinciding societal migration as well as the modified geomorphology of the area allow for the construction of a conceptual model of societal and geological reactions to differential sea-level rise. This study, and more specifically the

comparison of the preservation potential between sandy and rocky coasts has not been published before and is therefore of great interests as it could serve baseline for similar beaches and ancient coastal populations internationally in the response to accelerated sea level rise.

**22. Student: Wendell Roberson**

**Major: Astrophysics**

**Mentor: Ana Uribe**

**Department: Physics and Astronomy**

**Title:** *Numerical Simulations of the Interaction between Planets and Protoplanetary Disks*

Imagine a spinning CD. Now imagine putting your index finger in the middle of the CD; if we were to find something in space comparable to this scenario, it would be a protoplanetary disk. A protoplanetary disk, as its name suggests, is a disk of gas, dust, and other matter that rotates around a new star, where the star would be in the position of your finger and the gas and dust is the CD itself. Planets form and grow within protoplanetary disks. These planets migrate within the disk; that is they can move toward or away from the star. The focus of this research project is to model and study this effect in cases where the disk, our CD, is not completely smooth, but instead it is warped by other forces. This project will take a deeper look into planet migration within such protoplanetary disks and study what outcomes may come as a result. This is a key element in advancing our understanding about the thousands of observed extrasolar planets and its properties.

**23. Student: Jordan Scott**

**Major: Philosophy**

**Mentor: Jonathan Neufeld**

**Department: Philosophy**

**Title:** *Authority and Interpretation in Musical Performance*

What role does interpretation play in musical performances? For a performer, is an interpretation simply conveying the work of a composer or does the performer add their own interpretation of the music? If it is the latter than what have performers added, and can we now distinguish it from the work of the composer? Furthermore, does the *intent* of the composer need to be taken into account by the performer? Whatever our answers to these questions turn out to be for the performer, similar questions, and more, arise for audience members. To evaluate a performance, do audience members need to take the intent of the composer or the performer into account? Are there different legitimate, but conflicting, perspectives that audience members might take on the same performance. For example, a newspaper critic might have a different perspective than a philosopher of music and both of them might have a different perspective from an ordinary season ticket holder or somebody dropping in to a concert for the first time. How do we determine the legitimacy of a perspective and the norms by which they judge the performance? Do differences indicate a clash of ideas that might be adjudicated by some common standard or are they simply listening to performances differently and in a way that warrants no dispute? All of these questions contribute to the central question of this project: What role does interpretation play in musical performance.

**24. Student: Luke Shirley**

**Major: Religious Studies**

**Mentors: Todd LeVasseur**

**Departments: Religious Studies**

**Zeff Bjerken**

**Religious Studies**

**Title:** *The Capability for Sustainability in Sacred Lands: From Ladakh to the Lowcountry*

The purpose of this project is to gain insight into sustainable learning and working initiatives in the remote Himalayan landscape of India's semi-autonomous region, Ladakh. It is an area of incredible confluence: Tibetan Buddhists, Hindus, Muslims, Christians, and more recent influxes of tourists and Western scholars, all interacting among an even more diverse setting. Having just opened their doors to

foreign visitors in 1974, the once isolated Himalayan culture has already experienced dramatic changes due to an increasing Western presence.

Now, because of the more recently acknowledged impacts of climate change, remote mountain communities such as Ladakh are facing intensifying environmental and consequential social justice issues, regardless of their interaction with the West. However, with the help of the NGO Local Futures/International Society for Ecology and Culture, volunteers and locals are joining hands in projects geared towards preserving Ladakh's cultural and biological diversity.

Given these unique circumstances, this project will take a look specifically at the role of sacred lands in Leh, the capital of Ladakh, where the centrality of sacred place helps structure, at least historically, sustainable lifestyles and traditional ecological knowledge. A key guiding research question of this project is to ask, how have the Ladakhis traditionally interacted with and derived meaning from their surroundings, to what extent has it affected their human nature relations, and now, how are the effects of Western ideas and development helping/harming their long held social and environmental balance?

**25. Student: Yvette Smith**

**Major: Sociology**

**Mentor: Allison Foley**

**Department: Sociology and Anthropology**

**Title:** *“Turning Poison into Medicine” or Creating a Poisonous Medicine? How Buddhist Thought Influences Racial/Ethnic Minorities’ Perceptions of Mental Illness and Attitudes toward Help-Seeking Behavior*

Research on the relationship between Buddhism and mental health yields contradictory findings. Some evidence suggests Buddhist themes of balance and mental well-being are aligned well with the goals of psychiatry (Wallace and Shapiro 2006) and that individuals struggling with psychological problems may be drawn to Buddhism as a way of making sense of and overcoming emotional struggles (Karp 1996). Other literature suggests that Buddhism may have negative consequences for mental health outcomes, especially among racial/ethnic minorities, as it has been suggested as a possible explanation for Asian Americans’ underutilization of formal mental health services (Shea and Yeh 2008; Abe-Kim et al. 2007) and delayed treatment for severe mental disorder (Okazaki 2000). Up to this point, however, studies have only speculated as to how Buddhist thought influences minorities’ perceptions of mental illness, suggesting that Buddhist beliefs may stigmatize mental illness by conceptualizing psychological disturbance as punishment for previous wrongdoing (Lam et al. 2010) or by prescribing balance and mindfulness, as opposed to formal mental health services, as the solution to mental health problems, a trend that has been linked to negative attitudes toward help-seeking behavior (Yamashiro and Matsuoka 1997). In this study, we use qualitative, in-depth interviews to examine *whether* and *how* Buddhist thought actually influences minorities’ perceptions of mental illness and attitudes toward help-seeking behavior. Further, we examine how race, ethnicity, and other cultural influences (e.g., Confucianism, Collectivism, Taoism) intersect with Buddhist beliefs to influence cultural understandings of mental illness within the Buddhist Asian American community.

**26. Student: Ron (Austin) Taylor**

**Major: Computing in the Arts**

**Mentor: William Bares**

**Department: Computer Science**

**Title:** *Visualizing Narrative and Cinematic Choices in Virtual Reality Stories*

In movies, the screenwriter and director completely determine the way the story unfolds and how we see the actions. Everyone sees the same story and cinematic experience. Emerging virtual reality interactive narrative experiences enable users to make choices which determine how the story unfolds and offer freedom to move and look around within the virtual 3D world. Such experiences define a completely new dynamic and relationship between story creators and those who experience

the story which raises several open research questions including: i) How will users interact socially after given the knowledge of how other people experienced the story for themselves with what camera angles they saw, ii) How do choices made by one user's experience influence the way other user's choose to experience the story? iii) What knowledge could storytellers glean from exploring diverse user story paths and cinematic choices to help improve their future stories and possibly improve upon how interactive narratives are made in the future? Existing virtual reality interactive story systems have not yet considered these questions.

This proposal seeks to create a framework to record each user's story path choices and camera views into a searchable database and to develop a graphical interface to visualize and explore the different story choices and camera views. The system will utilize clustering (or grouping) algorithms to automatically group the story paths and camera view choices that are similar so that the visualization is both clear and efficient. We will conduct a study to observe how users interact with this novel exploratory graphical interface to provide answers to the above questions which could affect the types of social interaction involving interactive narratives as well as way future storytellers create these interactive narratives.

**27. Student: Nicholas Van Zandt**

**Major: Psychology**

**Mentor: Adam Doughty**

**Department: Psychology**

**Title:** *Behavioral Mechanisms of Reinforced Behavioral Variability*

Reinforcement is the process by which behavior is strengthened by its consequences such that behavioral repetition is its typical outcome. Importantly, however, variable, or non-repetitive, behavior can be reinforced under particular circumstances. This reinforced behavioral variability, or operant variability, has been observed across many species. For example, hungry pigeons can be trained to emit seemingly random four-peck sequences by delivering food after a sequence only if it has occurred infrequently relative to the other possible sequences. Despite the sizeable literature documenting operant variability and its social significance (e.g., increasing variable behavior in individuals with autism or depression), the mechanisms underlying this variability remain unclear. Our research will compare three approaches to explaining reinforced variability: (1) organisms have endogenous random generators, (2) variation is not learned directly but rather is a byproduct of other factors, and (3) learning to vary is the result of differential reinforcement. We will compare these approaches in two ways. First, we will test whether varying is less likely in situations that promote memory of recent behavior, and second, we will assess the degree of observed variation under conditions that do not involve direct reinforcement. By understanding how organisms vary their own behavior, our findings will inform treatment strategies of increasing variability in people with repetitive behavior (e.g., autism), and improve our understanding of related areas of study in which behavioral variation is integral (e.g., creativity, problem solving).

**28. Student: Kerri Vyge**

**Major: Public Health**

**Mentors: Beth Sundstrom**

**Departments: Communication**

**Cara Delay**

**History/Women's & Gender Studies**

**Title:** *Increasing LARC Access at CofC: A Theory-Based Health Communication Campaign*

Long-acting reversible contraception (LARC), including the intrauterine device (IUD) and the Implant, are highly effective birth control options that are currently under-utilized by women who are at risk for unplanned pregnancy. This study seeks to increase the use of LARC methods among women at the College of Charleston through a theory-based health communication campaign. A multi-channel

communication campaign based on the theory of planned behavior will be implemented and tested to increase the adoption of LARC methods among women at the College of Charleston.

**29. Student: Spencer Wilder**

**Major: Mathematics**

**Mentor: Jason Howell**

**Department: Mathematics**

**Title:** *Numerical Methods for Aeroelastic Flutter*

Fluid-structure interaction encompasses a variety of physical scenarios in which a fluid (such as water, air, or blood) flows within or around an elastic structure (e.g., airplane wing, human tissue). Aeroelastic flutter is a phenomenon that is caused by self-excitation of structural vibrations induced by a surrounding fluid and can result in significant oscillations of the elastic structure, and is found in many applications, including aircraft design and even the human respiratory system (snoring). Unfortunately, the mathematical models that govern the physics of flutter pose many challenges to researchers in engineering and science, and little is currently understood about the onset and underlying mechanisms of flutter.

Over the last half-century, computational simulation has become an important scientific tool, even to the point where it is regarded (along with theory and experimentation) as one of the pillars of discovery. While some algorithms currently exist to simulate flutter, they primarily rely on several simplifying assumptions and/or only compute partial solutions. The objective of this project is to develop new computational tools to simulate flutter. The faculty mentor and student researcher will develop new numerical algorithms for computing approximate solutions to the unsimplified flutter model, and subsequently implement these algorithms in code and conduct several flutter simulations. Hopefully the results of this project will provide a template for better computational tools for those who use simulation as part of the design for aeronautical and medical devices, as well as help elucidate the mechanisms behind flutter, possibly leading to more sophisticated mathematical models.

**30. Student: Kerry Wischusen**

**Major: Biochemistry**

**Mentor: Leslie Hart**

**Department: Health and Human Performance**

**Title:** *Rapid Assessment of Bottlenose Dolphin (*Tursiops truncatus*) Health: There's an App for That*

The health of bottlenose dolphins (*Tursiops truncatus*) can serve as an important indicator of the health of marine environments. A convenient and accurate way to get a “snapshot” of a dolphin’s health is to compare measurements to known reference intervals, which are ranges of values considered normal or healthy. Researchers frequently implement this technique to study dolphin weight, hormone function, and blood abnormalities, but these analyses are almost always applied in a laboratory setting, after the data has been collected, which limits the ability to quickly diagnose problems and immediately perform more telling tests.

The objective of this project is to develop a mobile application (app) that will allow rapid comparison of dolphin measurements to a variety of reference intervals for important aspects of dolphin health. The project team will develop a prototype app incorporating a reference interval for body condition (i.e. body mass index, BMI) in the Spring 2016 semester, which will be pilot tested during data collection with live animals in May 2016. Based on results of the testing phase, the project team will improve the prototype app and expand it to include additional reference intervals in the mid-late summer. The results of this important work will be shared through professional conferences and a publication in a peer-reviewed journal on wildlife health. More importantly, the app resulting from this project will be available for public use, ideally leading to a more comprehensive assessment and understanding of bottlenose dolphin health and consequently environmental health.