2019 HONORS COLLOQUIUM

Saturday, May 4th & Sunday, May 5th

Presentations held in Hahn School of Nursing and Manchester Auditorium

DAILY SCHEDULE AT A GLANCE

8:30  Manchester Auditorium: Opening Remarks
      Susannah Stern, Director of Honors Program
      Keynote Speaker: Olivia Gonzalez (USD Honors ’17)
9:00  Student Presentations (Block A)
10:30 coffee break
11:00 Student Presentations (Block B)
12:30 lunch break
1:30  Student Presentations (Block C)
2:50  coffee break
3:15  Student Presentations (Block D)
4:15  Closing Remarks
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# DAY ONE - SPEAKER SCHEDULE

**Saturday, May 4th**

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# DAY TWO - SPEAKER SCHEDULE

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ARCHITECTURE

Reassessing Urban Fabric: Identifying Opportunities for Architectural Resilience at the Port of Long Beach  
Caitlin Fanning, Thesis Advisor: Dr. Can Bilsel

Industrialized sites largely exist as rigid and immutable spaces, with clearly defined borders. These sites become islands in the middle of vast metropolises, so their processes do not spill over their borders to corrupt the routine of daily life. Architecture plays a crucial role in the development and maintenance of sites such as these by materializing the concept of industrialized islands, whose cities are safe from harm on far off shores. I chose to explore the Port of Long Beach, as it is an exemplar of industrialization that strives to remain separated from its city. Each site — such as the port — maintains a relationship with its surrounding city: one of possession and ultimately, one of disregard. The surrounding urban context dominates and creates choke points for the port that may not otherwise exist. I am exploring implemented strategies for seaport expansion in relation to the city to evaluate and propose a diagrammatic series of architectural suggestions for the Port of Long Beach. By investigating and rearranging the dynamic between ports and cities, the urban fabric could be stitched together entirely anew. The port presents an opportunity to remove the rigid dichotomy in place through the tools which created these boundaries: namely architecture and planning. This thesis project consists of a critical site analysis and architectural diagrams. My graphic diagrams aim to propose several solutions to the problematic sites of these industrialized islands.
(presenting on 5/4, Block A, Manchester Auditorium)

BEHAVIORAL NEUROSCIENCE

Maternal Structuring and Toddler Learning During Didactic Interactions  
Sarah Weeks, Thesis Advisor: Dr. Adriana Molitor

Evolving conceptualizations of effective parenting styles argue that behaviors reflecting parental structure (vs. ambiguity) should be distinguished from those reflecting parental autonomy support (vs. control) as they are often confused with each other. Yet both appear necessary to facilitate children’s motivation and competence. Moreover, while much research has investigated autonomy supportive parenting, far less is known about parental structuring behavior and its benefits to children’s social and cognitive skills, especially in achievement settings. For example, some research indicates that clarity of maternal expectations improves a child’s self-regulated learning. In addition, maternal consistency of consequences improves child compliance. Nonetheless, we do not yet know whether the timing of structure is also important for toddler cooperation and learning. The present study explores whether maternal structuring is beneficial to child performance during two teaching tasks, board lacing and a multidimensional shape puzzle. Specifically, mothers of 30-month-olds were rated on behaviors previously identified as components of parental structuring and presently adapted for interaction with toddlers during teaching situations: clarity of guidance, informative feedback, rationale, opportunity, resourceful leadership, and consistency. The present study additionally coded for maternal coordination as a subcomponent in order to capture each mother’s moment-to-moment ability to cater to the structuring needs of her child. Analyses examine the association between maternal structure and child performance measures such as accuracy and persistence.
(presenting on 5/4, Block A, HSN 106)
Selective Serotonin-Reuptake Inhibitors (SSRIs): Mechanism for Treatment of Depression and Relationship with Suicide Risk

Erin Carollo, Thesis Advisor: Dr. Jena Hales

In 2017, suicide was found to be the second leading cause of death for people aged 10 - 34 in the United States. At least 90% of suicides are found to be comorbid with mental illness, most commonly: depression. Research suggests depression develops due to a combination of environmental, psychological, and biological factors. Imbalances in neurotransmitters, specifically serotonin (5-HT), is one of the leading hypotheses for the biochemical basis of depression. On this basis, selective serotonin reuptake inhibitors (SSRIs) are the most commonly prescribed antidepressant and have been shown to be an effective treatment for moderate to severe depression. However, in 2004, the FDA mandated that SSRIs be given a “black-box” label warning indicating the relationship between the medication and increased risk for suicidal ideation and behaviors. This literature review seeks to investigate the available research on the mechanisms of SSRIs in the treatment of depression, and their highly contested relationship with suicide risk. I aim to make sense of this data and determine where the evidence points in regard to the costs and benefits of prescribing SSRIs, as well as the kind of future investigation needed to fully understand these drugs.

(presenting on 5/4, Block B, HSN 106)

Exploring How Scientists Navigate Community Advocacy

Ali McLagan, Thesis Advisor: Dr. Jesse Mills

Science as an institution has a history of exploitation of communities of color. There has been a lot of valuable literature outlining this history and critiquing the power imbalances that result from western understandings of science. These understandings are eurocentric in nature and have given scientists the power to claim inferiority of some people while being backed by their supposed objectivity. Many community knowledge bases have equally valuable knowledge describing our natural world and providing insight on the wellness of its community members. In this study, I will be exploring how some community advocates navigate being institutionally trained scientists in the fields surrounding community wellness while simultaneously being a part of a community that holds equally valuable knowledge on wellness. I will be conducting interviews with community advocates from San Diego’s East African Immigrant Community to explore how they navigate the power dynamics involved with the scientific institution in which they were trained and the community and which they are a part of and serve. My hope is that these interviews, along with some observation from actively doing work within the community organizations, will allow for some analysis that will give insight into how to engage with both science and community in a way which both recognizes and respects both knowledge sources as valuable to the health of a community.

(presenting on 5/4, Block D, HSN 106)

Reproductive fitness of long and short sleeping Drosophila melanogaster

Pomaikai Murakami, Thesis Advisor: Dr. Divya Sitaraman

Sleep plays an essential role in physical and mental health. Sleep improves memory, increases creativity, and aids in decision making. Physically, sleep is important for maintaining hormonal balance, repairing cells, and ensuring a strong immune system. An insufficient amount of sleep can lead to emotional imbalance, difficulty problem solving, poor decision making, obesity, and increased risk of sickness. Thus, sleep is essential for proper functioning. Sleep researchers have discovered that between species, and even within species, sleep duration is extremely variable. Previous research with Drosophila melanogaster, commonly known as fruit flies, has established a genetic component to sleep duration through engineered mutations. Is there an advantage to having a higher or lower sleep need? This study explores whether differences in sleep duration impacts reproductive fitness in Drosophila melanogaster. Reproductive fitness is an individual’s ability to successfully produce offspring that will survive and pass on its genes. To examine reproductive fitness, male courtship behaviors and female oviposition behaviors were tested in three populations of fruit flies with varying sleep needs: long, short, and normal sleepers. These experiments have identified a specific set of short sleepers named dGRP-38, where the males court significantly more than long and normal sleepers. We will present these ongoing findings and approaches to identify genes critical for the potential link between sleep and reproductive fitness.

(presenting on 5/5, Block B, HSN 106)
The Human Gut Microbiome and Obesity

Mary Clancy, Thesis Advisor: Dr. Andre Der-Avakian

Obesity and the associated comorbidities such as Type 2 diabetes and cancer are a major public health issue. It is generally accepted that the root cause of obesity is a disproportionate amount of caloric intake to energy expenditure. However, recent discoveries have led to an increase in knowledge surrounding the trillions of bacteria living in and on the human body that make up the human microbiome. This has led researchers to shift their focus to examine the obesity epidemic in light of the bacteria that reside in the gut. The gut-brain axis is a plausible mechanism for explaining how the gut microbiome communicates with the brain to impact our physiology and cognition. When certain bacterial populations are too high or low, signals may be sent through the gut-brain axis that affect our feeding behavior. Specifically, skewed levels of the bacteria and phylums *H. pylori, Firmicutes* and *Bacteroidetes* may cause weight gain by influencing neurotransmitter signaling and fat storage. Although these studies need further examining through longitudinal studies, they provide valuable insight into how the gut microbiome impacts obesity, thereby providing possible means of therapeutic gut bacteria treatments.

(presenting on 5/5, Block C, HSN 106)

**BIOCHEMISTRY**

Investigation of Domain Specific Activity Responsible for Calcineurin B Homologous Protein (CHP) Isoform Specific Function in Lung Fibroblasts

Shane Davis, Thesis Advisor: Dr. Joseph Provost

Mammalian cells ubiquitously express the Sodium-Hydrogen Exchanger Isoform 1 (NHE1) a membrane transporter responsible for intracellular pH, motility and proliferation. Calcineurin B Homologous Protein (CHP) in part regulates activation and kinetics of the NHE1. CHP has two isoforms, CHP1 and CHP2, whose physiological function remains unclear but both have a unique role in nascent tumor survival. CHP binds NHE via the N and C terminal domains. There is a considerable tertiary structure between both the N terminal domains (amino acids 1-90) and the C terminal domain (aa 111/110-195/196) with a 72% and 74% conserved homology, an intervening loop domain is unique to each CUR. This signature domain CHP unique region (CUR: CHP1 R91 to S110 and CHP2 R91 to S111) when bound to NHE has a specific and distinct structure indicating its potential role in effecting CHP-NHE1 related functions. The purpose of this study is to investigate how the these CHP unique regions contribute to CHP isoform cell function, specifically cell proliferation and location. Using site directed mutagenesis, we have generated epitope tagged (DDK and MYC) wild type versions of both isoforms of CHP and a variant with the respective CUR domain deleted (CHP1 ΔCUR1 and CHP2ΔCUR2). To distinguish the importance of the CUR domains we have swapped CUR domains between each CHP (CHP2(CUR1) and CHP1(CUR2). These mutations will be expressed in lung fibroblasts expressing NHE1 (CCL39) and PS120 cells (null NHE1 expressing CCL39 derivatives) to determine the impact of each CUR domain on cellular location in the absence and presence of NHE1 and on cell proliferation. We hypothesize that the CUR domain is critical for CHP isoform specific function and NHE1 interactions and present the role of both CHP isoforms on NHE1 related behavior.

(presenting on 5/4, Block B, HSN 106)

Palmitoylation and Phosphorylation – Impact on NHE1 Transport

Clare Bakker, Thesis Advisor: Dr. Joseph Provost

Lung cancer stands as the second most diagnosed, and leading cause of death in the western world. The inherent hypoxic and serum starved environment of metastasizing cancer cells reveals a mechanism for NHE1 to alleviate the low intracellular (pH\textsubscript{i}) strain from the Warburg effect\textsuperscript{2}. If we are able to determine the effects upon the transport due to the regulatory mechanisms of phosphorylation and palmitoylation then a novel way of halting the progression of cancer can be linked to NHE1 modification. Beyond cancer, NHE1 is involved within cell motility, invasion, growth, gene expression, cell anchorage, and proliferation. Connections to multiple diseases, including lung fibrosis have also been linked to NHE1's regulation on cell homeostasis. By researching the post translational modifications of NHE1, it also allows for a better overall understanding of basic protein functioning and modifications upon structure and function.

(presenting on 5/4, Block A, HSN 106)
Understanding the Interactions and Physiological Impacts of the Suppressor of IKKepsilon

Timothy Marshall, Thesis Advisor: Dr. Jessica Bell

The common cold is a viral infection that most people have experienced many times throughout their lives. Once we have obtained this cold, our immune system works endlessly to fight off this virus and recover our health. This natural process occurs without any conscious effort, but it is a very complicated process. A virus infects the body by inserting its genetic code, as double-stranded (ds) RNA, into our cells to hijack the cell's machinery and replicate the virus. While the virus is spreading throughout our body and we begin to feel sick, our body starts to recognize that the virus is present and starts fighting back. Specific receptor proteins in our cells begin to recognize the viral dsRNA, and send off signals throughout the body. These signals lead to the interruption of the viral replication, thus ending the infection. One of these signals leads to the modification of suppressor of IKKepsilon (SIKE). Although it is known that SIKE is involved in the anti-viral response, the specific functions of SIKE are currently unknown. Previous experiments have shown that SIKE forms direct interactions with the cytoskeletal protein alpha-actinin. Analyzing the effects that SIKE has on alpha-actinin may help discover the functions of SIKE. My research aims at determining the functions of SIKE through its interactions with alpha-actinin, and understanding the role SIKE plays within the anti-viral response.

(presenting on 5/4, Block D, HSN 106)

Synthesis and Characterization of Starch-functionalized Dibromomaleimide Conjugates for Delivery Applications

TinTin Luu, Thesis Advisor: Dr. Joan Schellinger

Starch and its derivatives have a myriad of biomedical and industrial applications due to their attractive properties such as biodegradability and biocompatibility. In addition, they are readily available, cheap to acquire, and are chemically modifiable. The chemical versatility of starch allows for the synthesis of hybrid constructs with polymers and other biomolecules, such as protein and peptides, more accessible. Selective modification of the reducing end of starch to an alkyne provides a conjugation strategy through copper-catalyzed azide-alkyne cycloaddition or click chemistry. This research aims to synthesize and characterize a novel hybrid conjugate consisting of a dibromomaleimide linker modified with fluorinated thiol tags and an alkyne-functionalized starch. Attachment of a versatile small molecule linker such as, dibromomaleimide, to the reducing end of starch provides an attractive scaffold for the intracellular delivery of small molecule drugs or biomacromolecules with increased stability. This work shows the optimal synthesis and characterization of starch functionalized with a dibromomaleimide-based linker. The prospective work also includes investigations of optimal click reaction conditions to prepare the starch-linker complex and 19F NMR experiments to further analyze and confirm the synthesis of the macromolecular conjugate. These well-characterized constructs are anticipated to serve as precursor molecules for applications such as drug delivery.

(presenting on 5/4, Block A, Manchester Auditorium)

Synthesis and Evaluation of Peptides as Cofactors for the RNA World Hypothesis

Estefania Martinez Valdivia, Thesis Advisor: Dr. Joan Schellinger

Life is believed to have developed as the descendant from simple organisms that lived during early Earth, in which ribonucleic acid (RNA) carried genetic information and catalyzed its own replication. This is described by the RNA world hypothesis, which also holds that these organisms evolved to incorporate DNA and protein into their biology, eventually leading to modern life. Core components of this hypothesis are ribozymes, or RNA polymers that can catalyze chemical reactions and propagate genetic information. Further investigation of ribozymes may indicate how RNA world organisms could have existed. Conditions that may allow the prebiotic synthesis of nucleotides also generate amino acids, therefore ribozymes were likely surrounded by amino acids and peptides. This study addresses the question whether the presence of peptides could improve the function of ribozymes in a prebiotically plausible scenario. To test this question, we are collaborating with the lab of Uli Müller (UCSD) where the function of triphosphorylation ribozymes is assessed in the absence and presence of peptides. This work focuses on the synthesis and characterization of sets of peptides containing prebiotically plausible and canonical amino acids. The syntheses were completed using Fmoc/ tBu chemistry and solid phase peptide synthesis techniques, the characterization was performed with reverse-phase high performance liquid chromatography and mass spectrometry (LC-MS). The peptides will be co-incubated with ribozymes to determine the structure-activity relationships between the two. The results of this investigation may introduce insights regarding the chemical interactions between macromolecules and processes that ultimately led to the origins of life.

(presenting on 5/4, Block C, Manchester Auditorium)
Polyglutamine Repeat Proteins on Actin Structure in Drosophila Photoreceptors

**Annie Vu**, Thesis Advisor: Dr. Adam Haberman

Huntington’s Disease (HD) and Spinocerebellar ataxia type 3 (SCA3) are fatal inherited neurodegenerative diseases characterized by deteriorating physical and mental abilities, caused by a polyglutamine (polyQ) expansion either in the huntingtin (Htt) gene or the ATXN3 gene. The gene causing Huntington’s Disease and Spinocerebellar ataxia have a region where three of the bases, CAG, is repeated many times. Little is known about which pathways are affected by the Htt and ATXN3 protein expression, so to gain a better understanding about the pathways and regulation involved, the Htt and ATXN3 genes have been studied in the fruitfly Drosophila melanogaster. We have shown that expression of long form HTT and ATXN3 genes disrupt the morphology of neuronal dendrites in various polyglutamine diseases, such as Huntington’s disease and SCA3[AH1]. The defects observed were found to be caused by the disruption of the F-actin cytoskeleton which could be rescued through Rac signaling. Rac is a GTPase known to regulate actin structure by interacting with Formins, like Form3, which are actin nucleating proteins that help promote the development of linear actin filaments. The Drosophila is an excellent model for studying this pathway as we can target expression of the genes to the photoreceptors, which are not important for fly development in a laboratory setting. Overall, this research is important because we were able to model actin regulation in dendrites in Drosophila photoreceptors as the actin regulation pathway is similar.

(presenting on 5/5, Block A, Manchester Auditorium)

Development of Novel Stimuli-Responsive Materials in Organic Chemistry

**Andrew Saiz**, Thesis Advisor: Dr. Peter Iovine

Interfaces between chemistry with other disciplines, such as materials, require the creation of structure-function relationships where cycles of make-and-measure uncover new properties and allow researchers to optimize target physical properties. Our research interests are centered in synthetic organic chemistry and mechanochemistry, which is the sub-field of chemistry that explores the force-induced activation of molecules. Our research has a particular focus on making polymers that respond to mechanical force to undergo chemical transformations. Triazolines are formed by the cycloaddition of an azide and a suitable dipolarophile such as maleimide or norbornene under mild conditions and without catalyst. Herein we present the synthesis of main-chain poly(triazoline) linear polymers using maleimide and azide building blocks. We investigate the poly(triazoline) stimuli-responsive behavior given the propensity of triazolines to ring contract into an aziridine under photochemical and thermal treatment. Various polymer structures and model compounds have been synthesized to study the reactivity of triazoline species. Utilization of the 1,3-dipolar cycloaddition, an example of “click” chemistry, a term which characterizes quick and reliable chemical reactions. Spectroscopic and quantitative data supporting the formation of triazoline units and aziridine units in the backbone of the polymer after photochemical treatment will be presented. The research conducted has the potential to change scientists’ perspectives on materials science and stretches the bounds of conventional chemistry.

(presenting on 5/5, Block C, Manchester Auditorium)

**BIOLOGY**

The Ecology and Foraging Behavior of Semi-Captive Asian Elephants

**Camille Morales**, Thesis Advisor: Dr. Sue Lowry

Asian elephants (Elephas maximus) are an IUCN endangered species. Understanding Asian elephant foraging behavior is critical to mitigating human-elephant conflict, which is intensifying as elephant habitat is degraded and fragmented. There is a large gap in literature regarding their behavior and foraging ecology in Cambodia. This study analyzed the behavior and foraging ecology of semi-captive elephants at the Elephant Valley Project protected forest sanctuary in Mondulkiri, Cambodia. The Interval Sampling method was utilized for two-minute intervals for two hours every morning for a ten day time period in November. The most frequently observed activities of elephants were feeding and preparing food for ingestion. Sixty-six percent of the observed diet was bamboo, which supports pre-existing literature that Asian elephants are predominately grazing herbivores during late wet season. Habitat type and mahout proximity significantly affected elephant activity and elephant activity was statistically correlated to damage to vegetation. There were significant differences between the behaviors of the two focal elephants likely based on their age, personal history, and time spent in the Elephant Valley Project protected forest sanctuary. These results contribute to ongoing research regarding elephant behavior, recovery from captive to natural foraging environments, and implications for mitigating human-elephant conflict.

(presenting on 5/4, Block C, HSN 106)
A Signal Transduction Pathway to Motility in *Rhodospirillum centenum*

**Julia Roccato**, Thesis Advisor: Dr. Terry Bird

Bacteria cover our Earth in abundance, from any environmental niche right to our human body. Of particular importance are bacteria that can form either vegetative cells or hardy, dormant cyst cells depending upon environmental conditions. This study aims to elucidate more on the signal transduction pathway leading to motility in the bacterial species *Rhodospirillum centenum* to better understand the complicated genetic basis of encystment and motility. The current model pathway in *R. centenum* follows a histidine kinase and response regulator pattern, with the phosphorylation of the CtrA protein ultimately promoting motility genes. By studying a related bacterium, *Caulobacter crescentus*, additional homologous proteins involved in this signal transduction pathway are identified. This study characterizes the homologous protein SciP through a series of gene knock-out and phenotype evaluation experiments. It is likely that SciP regulates motility, with further studies focusing on its potential interactions with CtrA and position in the signal transduction pathway.

(presenting on 5/5, Block C, HSN 106)

The effect of sex on the growth rate of *Seriola dorsalis*

**Sasiwan Spahr**, Thesis Advisor: Dr. Sue Lowery

The development of economically and environmentally sustainable aquaculture requires an understanding of the genetic basis of traits that can limit or enhance the growth or health of target species. Genomic resource development is of particular interest for *Seriola dorsalis*, commonly known as the California Yellowtail, as economically valuable traits such as growth rate or response to aquaculture procedures may be linked to sex. Specimens of *S. dorsalis* from an exercise enhanced growth study at the Southwest Fisheries Science Center (SWFSC) were dissected and DNA extracted. Individuals can be identified as male or female using sex-specific genetic markers for *S. dorsalis*. Growth rate data from the SWFSC study will be analyzed for differential response by males and females. This research aims to examine the effect of sex on the growth rate of *S. dorsalis* and may shed light on whether males or females respond differently to specific aquaculture procedures.

(presenting on 5/5, Block D, HSN 106)

Evaluating GFRP as a Potential Negative Feedback Regulator in the Nematode *C. elegans*

**Tatiana Moreno**, Thesis Advisor: Dr. Curtis Loer

Tetrahydrobiopterin (BH4) is a cofactor found in all tissue types of most eukaryotes. It is required for a variety of biochemical reactions including the synthesis of neurotransmitters serotonin and dopamine, and the conversion of phenylalanine (Phe) into tyrosine (Tyr). Its synthesis has been characterized in mammals as a four-step reaction pathway catalyzed by three enzymes. The first and rate-limiting enzyme in the pathway is GTP-cyclohydrolase I (GTPCH1). The pathway undergoes negative feedback regulation mediated by a complex comprised of BH4 and the regulator protein GTP-cyclohydrolase I feedback regulatory protein (GFRP). This complex binds to an allosteric site of GTPCH1 to inhibit enzyme function. Phe can also form a complex with GFRP that allosterically stimulates GTPCH1. Proteins required for BH4 synthesis have been identified in the nematode and model organism *C. elegans*, including likely GTPCH1 and GFRP homologs encoded by the genes *cat-4* and *gfrp-1*, respectively. Our study aims to evaluate the potential feedback regulatory function of GFRP in *C. elegans*. We have observed an increase in serotonin (a proxy for BH4 levels) in *gfrp-1* mutants, which suggests regulation of GTPCH1 is impaired when GFRP is damaged. We have also treated worms with 2,4-diamino-6-hydroxypyrimidine (DAHP), a BH4-mimicking drug. We observed a decrease in serotonin, suggesting that DAHP forms a complex with GFRP to inhibit GTPCH1. Preliminary tests have also shown an increase in serotonin following exposure to Phe. We are working towards documenting the effects of DAHP and Phe on a *gfrp-1* knockout mutant to further evaluate GFRP function in worms.

(presenting on 5/5, Block B, Manchester Auditorium)
Sexual Dimorphism in the Feeding Mechanism of Jackson’s Chameleons

**Michael Gloriani**, Thesis Advisor: Dr. Nicole Danos

Sexual dimorphism is a measurable difference in the one or more characteristics between males and females. The Jackson’s chameleon (*Trioceros jacksonii*) is an example of an organism that exhibits sexual dimorphism. Males display three horns on the head while the females do not. This type of sexual dimorphism is usually a result of sexual selection, where females would choose their mate based on which male displays the best horns. There are also traits that are not ornamental that show sexual dimorphism. These traits might be selected due to a competitive advantage in another non-mating related function, such as feeding. From preliminary data we noted that in another species *Chamaeleo calyptratus*, females have a larger feeding mechanism proportional to body size than males. Sexual dimorphism has not been studied in the feeding mechanism in Jackson’s chameleons before. I hypothesize that females will have larger hyoid compared to body size than males because it gives them a competitive advantage. I will test this by taking a large sample of specimens and measuring proportions of hyoid to body length. I will also be analyzing kinematic data such as velocity and acceleration to see if there is a correlation. Results supporting these hypotheses would indicate that there is an underlying reason that chameleons would demonstrate sexual dimorphism in something not sexually selected for.

(presenting on 5/5, Block D, Manchester Auditorium)

**BIOPHYSICS**

The Effects of Pregnancy on the Elasticity of Rat Tendons

**Megan Lee**, Thesis Advisor: Dr. Nicole Danos

Tendons and aponeuroses are elastic collagenous structures that translate muscle fiber contractions into large-scale movements of limbs. Under the right conditions, these elastic tissues can store elastic potential energy that can be used to move the body. This can have significant advantages for an organism because it means that movements can be produced with a smaller input of metabolic energy. However, for the conditions to be right, the stiffness of the elastic tissues need to be tuned to the capacity of muscles to produce force. Too stiff and it becomes difficult for the tendon to extend and store potential energy, increasing the risk for rupture. Too compliant and it becomes difficult for the tendon to return to shorten. We will use tensile tests to study the changes in stiffness of the Achilles tendons and gastrocnemius aponeuroses of pregnant rats in comparison to those of non-pregnant and post-partum rats. This investigation is an attempt to understand why female athletes, such as tennis player Serena Williams, are able to return to their sports after giving birth. One possible contributing factor is the effect of relaxin, a hormone released during pregnancy to allow the pubic symphysis to stretch during childbirth. The gastrocnemius, or calf muscle, was chosen due to the fact that it is an important muscle in rat locomotion and movement. This project will be paired with another that studies the changes in the animals’ gait during different stages of its pregnancy. After synthesizing all of the data, this project may help to understand why female athletes are able to perform at the same level of competition, or even better, after giving birth.

(presenting on 5/5, Block A, HSN 106)

**BUSINESS ADMINISTRATION**

The Role of Empathy in Leadership

**Michaela Ellis**, Thesis Advisor: Dr. Johanna Hunsaker

Leadership can take on many different roles depending on the context. One thing however that leadership always has at its core is an effort to move a group or organization toward a collective goal. In this paper, I intend to look at qualities beyond traditional characteristics of a leader and see how they affect an organization’s success. I intend to look into qualities such as empathy and vulnerability and where they fit in in leadership, and corporate management roles specifically. I predict that these, along with other elements of emotional intelligence will have a positive impact on one’s ability to manage a group of people. This is an important topic, as these personal qualities are not often viewed as necessary in a business setting and changing that perception can greatly improve the success of an organization. I anticipate that this will be true for leaders and organizations regardless of which field or level they may be in.

(presenting on 5/4, Block C, Manchester Auditorium)
CHEMISTRY

Synthesis of Biorenewable Starch–Farnesene Amphiphilic Conjugates via Transesterification of Terpene-Derived Diels–Alder Adducts
Brandon Orzolek, Thesis Advisor: Dr. Peter Iovine

As society moves away from a petroleocentric economic model, there is an increased demand for materials predominantly or entirely derived from renewable resources. Herein I describe a new class of terpene-starch esters synthesized from biorenewable building blocks. Although my work is specific to starch, I believe the synthetic methodology can be extended to a wide range of polysaccharide substrates. In the approach, an ester functionality is first introduced to the farnesene backbone via high yielding, solvent-free Diels–Alder chemistry. The farnesene esters are subsequently transesterified with starch to produce a range of starch–farnesene amphiphilic biopolymers. The key transesterification reaction between farnesene and starch employs 1,5,6-triazabicyclo[4.4.0]dec-5-ene (TBD) as a guanidine base organocatalyst and is capable of producing materials with a high degree of substitution (DS). The DS can be modulated by altering the starch/farnesene feed ratio. Low DS starch–farnesene esters show surfactant-like properties while the higher DS materials were successfully solvent-cast into standalone films. Thermal and mechanical tests reveal starch–farnesene esters to be robust under both solution and thermal processing conditions. Given the versatility of the synthetic method, the biorenewability of the components, and the biodegradability of the ester linkage joining the subunits, the newly produced polymer amphiphiles appear to be a promising class of new green materials.
(presenting on 5/4, Block A, Manchester Auditorium)

Mechanistic Studies of the Iridium-Catalyzed ortho C–H Borylation of Benzylic Amines
Natalie Chuang, Thesis Advisor: Dr. Timothy Clark

The diverse synthetic processes afforded by reactive carbon-boron bonds make C–H borylation reactions valuable for a number of applications. It is known that borylation of benzene or its derivatives can be achieved using an iridium catalyst. A mechanistic study of directed C–H borylation reactions such as that developed by the Clark group has not previously been reported; doing so is important to improve synthetic design methods and reaction efficiency and to generalize the reaction for its application in other reaction conditions. This study determines the rate law of the ortho C–H borylation reaction as rate=k[substrate][Bpin2][Ir(COD)OMe]3, with the iridium catalyst and substrate showing saturation kinetics. In conjunction with a Hammett study and kinetic isotope effect study, a detailed mechanistic pathway for this chemical transformation will be discussed.
(presenting on 5/4, Block B, Manchester Auditorium)

A More Environmentally Friendly Polymerization of Positively Charged Monomers Using a Microwave
Jonathan Tran, Thesis Advisor: Dr. Joan Schellinger

Polymers are an integral part of modern life. It is a part of electronics, living beings, clothes, floors, etc. Both natural and artificial polymers have been created and utilized by modern society. Natural polymers come from nature and are safer for the environment but can also have limited uses. Artificial polymers are more versatile but may last years without decomposing. The goal of this project is to create a semi-artificial polymer that would decompose more readily while still having a wide array of uses. Amino acids, a component of proteins, are one monomer of interest. This project focuses on optimizing the reaction conditions by using monomers that mimic the side chain of the amino acid lysine, N-(3-Aminopropyl) methacrylamide (APMA) and N-[3-(Dimethylamino) propyl] methacrylamide (DMAPMA). The polymerization is a Reversible Addition-Fragmentation Chain Transfer (RAFT) polymerization that is carried out in an aqueous environment under microwave irradiation. Microwaving the reaction allows for more environmentally friendly conditions. After polymerization, some tests are carried out to make sure the polymer still have the key features of a RAFT polymer. The results of this project will allow us to create more environmentally friendly polymers and will allow us to combine our project with another project in our lab. This polymer may have potential uses in medicine, and oil recovery.
(presenting on 5/4, Block D, Manchester Auditorium)
Iodinated Native and Modified Starch Granules as Reservoirs for Antimicrobial Agents: Release Kinetics and Antimicrobial Properties

Melissa Tran, Thesis Advisor: Dr. Peter Iovine

The objective of our research is to study the sustained release of antimicrobial iodinated species from both starch granules and a hydrogel matrix. Starch granules are naturally found in seeds and roots of plants, and play an important role in storing energy over long periods of time. We have incorporated iodine within the starch granule and have assessed the release kinetics of iodine from the granule over time. In order to deliver and slow the release of iodine from the starch granule, we have also prepared an alginate hydrogel containing the micron-sized iodine-stained starch granules within its matrix. Hydrogels are an important class of biodegradable and biocompatible soft materials that are used widely for various biomedical applications, such as tissue engineering and wound healing. Our polysaccharide-based hydrogel was synthesized by ionically cross-linking alginate with a calcium and D-glucono-δ-lactone (GDL) system, which allows a uniform hydrogel to form. The slow gelation rate of the ionically cross-linked alginate hydrogel has potential for greater control for use as an injectable hydrogel. The release kinetics of iodine from the hydrogel matrix has also been evaluated.

The antimicrobial properties of iodine has been assessed via various microbiological studies. These studies include determining the biocidal properties in liquid cultures of bacteria, such as Staphylococcus aureus, and in biofilms.

(presenting on 5/5, Block B, Manchester Auditorium)

Development of Antimicrobial Films: Amphiphilic Starch Graft Polymers for Iodine Delivery and Tissue Engineering

James Young, Thesis Advisor: Dr. Peter Iovine

Recent advances in disease prevention have brought a plethora of new products to the biomedical market. However, the majority of this research has been surrounding the use and improvement of antibiotics in clinical settings. Research regarding the natural antimicrobial properties of elemental iodine has been scarce as the same marketable products have been in use for over twenty years. One main goal of our research is to improve the efficacy and duration of antimicrobial films to aid wound care by focusing on elemental iodine as a naturally occurring antimicrobial agent. We are seeking to synthesize a starch graft polymer film capable of delivering iodine in a dose-dependent manner with a sustained release for antiseptic biomedical applications. This is done using Triazabicyclodecene (TBD) to catalyze a novel, single step, transesterification of starch with polycaprolactone to produce a homogenous biodegradable film. Herein we present the optimization of reaction conditions and characterization of our films in addition to the initial release studies of the films when soaked in iodine solution. Furthermore, using the novel starch-TBD reaction conditions, we explore other applications for this transesterification chemistry with starch and poly(methyl acrylate) for tissue engineering purposes.

(presenting on 5/5, Block D, Manchester Auditorium)

COMMUNICATION STUDIES

The Shift in Marketing from Traditional to Digital, and the Importance of Successful Social Media Marketing

Monica Cooper, Thesis Advisor: Dr. Jonathan Bowman

With the creation of the world wide web less than 30 years ago, the internet and its use has grown immensely. With this growth, we have seen a shift towards the digital world, as well as the rise of social media and online communities. One industry that has been largely affected by this is the marketing industry. It has resulted in a shift from more traditional means of marketing, such as billboards and magazine ads, to digital marketing, such as internet ads and social media marketing. Social media marketing in particular is still a recent trend that businesses and companies are adapting to, as many of today’s successful social media platforms have only been around for 15 years or less. While many people simply view social media as a leisure activity to pass time, it is a large investment for companies and businesses to market their brand and products or services. Although social media marketing can be an extremely beneficial tool when done right, it can also negatively impact a company, business, or brand if done wrong. It is important to develop certain strategies and successful practices when going about social media marketing, as well as looking at the consumers and curating content that will attract and please them. If we can better understand consumers’ actions and behaviors on social media, we can better adapt real world practices, such as marketing, and maximize the benefits we gain from this popularity of social media and online communities.

(presenting on 5/5, Block B, Manchester Auditorium)
Beyond the Brain: Communication Strategies for Alzheimer’s Disease and Dementia

Tiffany Zhang, Thesis Advisor: Dr. Jillian Tullis

Alzheimer’s disease is the third leading cause of death in San Diego County and by 2030, 38% of the population will be 55 and older and at least 10% of those people will have Alzheimer’s disease or dementia. With the Internet being the first source that the public uses for health information, it is imperative to have accessible and inclusive language for addressing brain health. To understand if the current communication strategies are supporting both the patients and caregivers, I conducted a thematic analysis of the quality and quantity of the online brain health materials available on the top five organizations serving San Diego. Each site was coded for content of information being presented, types of imagery used, quantity of programming, and overall thematic quality. Barriers like health literacy and cultural competence will also be addressed. Based on the interdisciplinary approach of neuroscience and communication studies, this analysis will identify components of effective health communication and offer practical and equitable strategies for Alzheimer’s disease and dementia communication.

(presenting on 5/5, Block D, Manchester Auditorium)

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ECONOMICS

Basic Income and Consumption in the U.S. Economy

Vijayraj Patel, Thesis Advisor: Dr. Alyson Ma

As millions struggle to make ends meet, the provision of a Basic Income can not only be critical to survival but can also empower individuals and eventually strengthen the economy. This project studies the practicality, plausibility, and specific impact of a Basic Income scheme on Consumption in the U.S. economy. The project will be using times series data on U.S. Consumption and would be manipulating the income figures in order to arrive at a predicted level of Consumption post the implementation of Basic Income scheme. This is done with the expectation that a Basic Income scheme will positively increase Consumption, aid consumer sentiment and potentially help the overall financial strength of the economy. Essentially, this research will provide crucial insight into understanding the full-scale economic impact of Basic Income schemes in developed economies.

(presenting on 5/5, Block A, Manchester Auditorium)

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ELECTRICAL ENGINEERING

The Future of Smart Home Technology: How a Robot Can Mow a Lawn

Mariella Saviola, Thesis Advisor: Dr. Venkat Shastri

The presence of technology in everyday tasks is ever increasing, and consumer electronics are spreading into the area of household devices. Similar to an iRobot or Roomba, the Picket is an autonomous lawnmower that can operate without the supervision of a human operator. However, a major difference and improvement is the Picket’s capability to follow a path and avoid obstacles without the presence of a physical barrier such as a wall or fence. The design for the navigational system includes three main technical parts; a Wheel Encoder, an Inertial Measuring Unit (IMU), and an Arduino Uno microprocessor. The Encoder measures the distance a wheel travels, and then the IMU relates the Picket’s position to time that allows for measurements of acceleration and velocity. These systems then feed information to the Arduino that uses an algorithm to drive the robot in the desired direction towards the desired position. As technology becomes more common in the lives of the general population, more consumer electronic products are entering the realm of household items. There are cameras in refrigerators that display its contents to a home owner’s phone, security systems that can unlock a front door with the tap of a screen, and sound systems that play different music in different rooms from the same control panel. We will consider how the increased applications of technology services will help to form new standards of living for the public looking into the future.

(presenting on 5/5, Block A, HSN 106)
A Literary Inquiry into Class Inequalities and the British Legal System

Kathryn Querner, Thesis Advisor: Dr. Jeanie Grant Moore

Literary, legal, and historical texts from the fourteenth to nineteenth centuries have provided a broad basis for me to explore the role of the British legal system in structuring and reinforcing social class inequalities. In my project, I focus particularly on literary presentations of the implications of specific laws and legal proceedings, and how these laws are shaped by, and in turn shape society. From the fourteenth century through the beginning of the Victorian era, I examine pieces of literature from each period in order to determine how these literary works present the social and legal elements of class-related laws. Many authors represent the legal system’s ineffectiveness by satirizing laws and legal proceedings, demonstrating appalling conditions and treatment of the poor, present alternative legal solutions to poverty and crime, and challenge common perceptions of the lower classes. After this general, comprehensive analysis of the British legal system’s reciprocal exchange with societal norms and perceptions, I focus in more narrowly on the Victorian-era legal system and related literature. An in-depth analysis of works of Dickens, Gaskell, and others has provided me with an understanding of the detrimental effects of the class-related laws of the time. Tracing the development of laws and social perceptions through a literary frame of reference has illuminated the function, effectiveness and development of class-related laws in Britain, and, indirectly, America.

(presenting on 5/4, Block C, HSN 106)

Family and Femininity: an Exploration of the Creative Nonfiction Genre

Mackenzie Mendez, Thesis Advisor: Professor Brad Melekian

Creative nonfiction is a relatively young genre. Unlike other literary genres, the edges of creative nonfiction are not clearly delineated; Lee Gutkind, the founder of the Creative Nonfiction Magazine, defines creative nonfiction as simply “true stories well told.” My purpose in undertaking this project is to firm up this definition — what do we mean when we talk about “creative nonfiction”? What are the best practices within the genre? What tensions result from combining the words “creative” and “nonfiction” in a single phrase, and how do we navigate them? My project addresses these questions in two parts: one analytical, and one creative. The analytical piece first considers the origins and development of the genre. It then evaluates the aesthetic and ethical challenges that creative nonfiction writers face, and finally considers how a variety of successful creative nonfiction pieces address these challenges. The conclusions I draw in this essay are ultimately used to generate a working definition of ‘creative nonfiction,’ which I use to inform my approach to the creative component of the project. In the creative component, I apply what I learned in the analytical piece to my own writing. Through the subgenres of profile writing and memoir, I explore the changing ideas and ideals of femininity within one family over the course of three generations. I draw on the aesthetic techniques ethical guidelines identified in the analytical piece to guide my writing, seeing what this newly formed definition looks like when put into practice.

(presenting on 5/5, Block A, HSN 106)

The Restrictiveness of Space in Wong Kar-wai’s In the Mood for Love

Yin Chin Casey Huang, Thesis Advisor: Dr. Koonyung Kim

This project argues that the restrictiveness of space in the cinematography of Wong Kar-wai’s In the Mood for Love reflects the limited existences of its main characters, Mr. Chan and Mrs. Chow. By examining cinematic elements such as the limitations of space, camera angle, sound, dialogue, music, repetition, and framing amongst others, this project seeks to understand how these components parallel the suffocation that the protagonists feel in their individual lives. Trapped between closed walls and cramped spaces, Wong’s cinematography reflects how their already limited worlds narrow further as they begin to fall in love after they discover that their spouses have been having an affair together. Through this limited style of filmic framing, Wong uses the physical filmic space to reflect the emotional state of the protagonists. Wong evokes the sensation of nostalgia and memory to emphasize the characters’ constant desire to return to the past, as they are stuck between their desires and what they are able to do in reality. This project also seeks to connect this desire and their personal relationship to parallel that of the historical relationship between Hong Kong, Britain, and China. It argues that the relationship between Chan and Chow can be read as a metaphor for the complicated colonial relationship for the three countries, in which China and Britain both seek to possess Hong Kong. The restrictiveness of space in the film then function both as a physical reflection of the emotional state of the characters and a possible metaphor for a larger historical relationship.

(presenting on 5/5, Block C, Manchester Auditorium)
Mary Wollstonecraft’s Advocacy for Women’s Education: Joining of Reason and Sentimentality in Fiction

Leilee Ghassemi, Thesis Advisor: Dr. Mary Hotz

My research project engages with 18th century author Mary Wollstonecraft’s work, specifically *Maria, or The Wrongs of Woman*, through a legal lens. Using an interdisciplinary approach, my project discusses the way in which Wollstonecraft draws together the law, which was unavailable to women, and the novel, which was at women's disposal, to create a space for women in legal discourse. My project connects her writings to Caroline Norton, a writer whose work influenced the legal system nearly forty years after Wollstonecraft’s death, to analyze and understand how literature enabled women to engage with the law.
(presenting on 5/5, Block A, Manchester Auditorium)

ENVIRONMENTAL & OCEAN SCIENCES

Observing aggregate formation of phytoplankton cultures at different growth phases using stereoscopic imaging

Riley Henning, Thesis Advisor: Dr. Jennifer Prairie

The sinking of marine snow aggregates is one of the primary mechanisms behind the transport of particulate organic carbon from surface waters to the deep ocean. Since aggregation of phytoplankton causes them to sink more quickly, allowing a higher rate of vertical carbon flux, it is important to understand how phytoplankton physiology may affect aggregate formation rate. In particular, previous work has shown that the concentration of transparent exopolymeric particles (TEP), which acts as the glue in aggregate formation, may differ depending on the growth phase of the phytoplankton.

We conducted experiments to investigate how aggregation of cultures of the diatom *Thalassiosira weissflogii* varied at different growth phases. Phytoplankton cultures at four different growth phases were rolled in cylindrical tanks and imaged by two cameras illuminated by a laser sheet. This imaging setup allowed for direct 3D observation of the first 8 hours of aggregate formation. Here we will present results of these experiments showing the differences in aggregate formation between growth phases of phytoplankton by tracking particle concentration and size over time. In addition, by tracking individual particles in 3D, we are able to quantify particle collision and adhesion rates and demonstrate how they vary over time and for different particle sizes. Observing aggregate formation on the individual-scale for the first time will further our understanding of how different biological and physical factors affect the carbon cycle on much larger scales.
(presenting on 5/5, Block B, HSN 106)

Human-wildlife Conflict in Tanzania: Environmental Justice Impacts of East African Colonialism

Kiana Lindsay, Thesis Advisor: Dr. Brito-Millan

In recent decades, global climate change and rapid human population growth have threatened East African wildlife populations, prompting a need to mitigate human-wildlife conflict and reestablish coexistence. Local biodiversity functions as an important revenue source for East African nations, with wildlife tourism and trophy hunting driving many regional economies. Following nearly a century of colonial rule, analyzing these environmental issues in a postcolonial framework is crucial in assessing local responses. Furthermore, understanding public perceptions of wildlife is key to implementing effective wildlife management and conservation techniques. An analysis of suggested wildlife management based on the damages and benefits associated with 26 local mammal species was conducted in three districts in Northern Tanzania using structured interviews (n = 385). The three study areas differ in ethnic composition, local economies, land-use practices, and contain a variety of Protected Areas with different wildlife management techniques. When suggesting management, most participants desired the implementation of damage prevention or compensation rather than a reduction in population size. Therefore, taking preventive measures to ensure that wildlife does not damage the livelihoods of local people would be beneficial in improving local attitudes towards wildlife, and formulating a more just system of management. The highest levels of tolerance were found in the study area that actively participates in a Wildlife Management Area, a conservation program specifically emphasizing local engagement, suggesting this methodology as a potential solution. This suggests that future wildlife management ought to focus on indigenous voices and other forms of co-management reflective of a decolonial approach.
(presenting on 5/5, Block C, HSN 106)
Border Diplomacy: How Water Unites Cities

**Michael Bennett**, Thesis Advisor: Dr. Suzanné Walther

The San Diego-Tijuana border region has undergone transformative political, economic, and social integration in the age of globalization. These changes have given rise to regional institutions, governmental partnerships, and other cross-border apparatuses that capitalize on the economic might and political significance of the border while acknowledging its unique challenges. The existence of transboundary issues surrounding water management and protection across this international watershed, particularly within the Tijuana River Estuary, has provided a similar cooperative arena for local and regional actors to establish and maintain mutualistic partnerships. The impetus for regional actors to tackle pragmatic issues that remain a lesser concern for far-off central governments raises key questions about the future of transboundary cooperation. As cities have risen in prominence in their shares of global population, economic power, and social clout, local actors may be uniquely poised to tackle transnational challenges with specialized practical approaches to diplomacy. The opinions and perspectives offered by actors at multiple levels of government suggest that such cooperation has represented an increasingly valuable tool for tackling environmental issues. Much deliberation has occurred in recent years on the viability of “city diplomacy” or paradiplomatic engagement that exists among municipal-level entities. Despite naysayers, the formal and informal institutional integration that has occurred among public and private entities in the San Diego-Tijuana border region lends both credence to and guidelines for the viability of such political partnerships.

(presenting on 5/4, Block C, Manchester Auditorium)

Grain size and organic matter as indicators for benthic community composition and distribution in Mission Bay, San Diego

**Leslie Gobel**, Thesis Advisor: Dr. Michel Boudrias

As a prime source of revenue for the tourist industry in San Diego, Mission Bay is a crucial part of the city’s economy. Therefore, it is important to understand how certain factors, both natural and anthropogenic, could alter the ecological health of the bay for both marine organisms and humans. As an extension of an ongoing project studying the benthic composition of Mission Bay, my project focused on how benthic meiofaunal communities vary in abundance and diversity spatially throughout the bay in response to abiotic factors such as organic matter and grain size. Using sediment samples dyed with Rose Bengal, I quantified and identified taxa of meiofauna from 14 sites. I used the Shannon-Weiner and Simpson’s indices to quantify species richness and evenness for each site. Results indicate that grain size is a greater driving force than organic matter for species richness. Sites composed of 75% or more sand showed richness values less than 0.3, while sites composed of 30% or less sand had values greater than 0.9. Furthermore, any change in abiotic factors affecting grain size, like water flow and dredging, changes the patterns of distribution and abundance. Therefore, contrary to the broader scientific perspective, geography of Mission Bay does not seem to be the driving factor of the benthic composition. Instead, grain size seems to have the greatest effect on the diversity of these estuarine communities, although further analysis is necessary to fully understand the natural and anthropogenic factors that contribute to varying grain size across Mission Bay.

(presenting on 5/4, Block D, Manchester Auditorium)

**FINANCE**

The Grand Plan for the UFC. How to turn a short-term focused company into a sustainable enterprise

**Eric Moshcatel**, Thesis Advisor: Dr. Tara Salinas

With every small business that experiences explosive growth, there comes a time when the executives need to adjust their operations to compensate for their increasing size. Changes that need to take place can be with regards to operational efficiency, financials, public relations (if a company is growing, they’re going to have a larger spotlight), and marketing. The UFC (Ultimate Fighting Championship) is one such company that has experienced growth at a high rate (valuation jumped from $2 million in 2001 to $4.025 billion in 2016). However, many aspects of how the UFC handles their day-to-day operations, opportunities, and crises are subject to improvement as the company continues to grow. The purpose of this paper is to illustrate a roadmap that the UFC, other MMA (mixed martial arts) promotions, and growing companies can use to make sure that they’re correctly adjusting their companies to accompany the growth they’ve experienced, and to maximize their potential. In order to write this paper, I will be utilizing research and history on the UFC, and MMA as a whole, and combining that with business practices used in areas like marketing, corporate finance, and public relations.

(presenting on 5/5, Block B, HSN 106)
Cash as a Determine of Intrinsic Value in Enterprise Securities: An Investigation into the Components of Value Investing

Christopher Conte, Thesis Advisor: Dr. Stephen Conroy

This paper aims to modernize certain aspects of Dr. Benjamin Graham’s theory of intrinsic value and its pivotal role in stock appraisals. Originally published in the year 1934, Dr. Graham’s time-tested concepts continue to serve as the foundation of value investing philosophy. Yet, due to the dynamic nature of modern financial markets it seems now is the time for economists and financial scholars alike to begin the process of updating Graham’s work to better suit the needs of contemporary investors. In this report, I attempt to take a step in this direction by introducing cash – as annually reported on the balance sheet – into Graham’s equation for intrinsic value pricing. The data used in my analysis is comprised of annual earnings reports for roughly five-hundred S&P 500 companies over a twenty-year time period. By way of this data, market capitalization (an equivalent for intrinsic value) is estimated as a function of cash, alongside net income and dividend payments, using standard regression techniques with time fixed-effects. The results of this report demonstrate that cash is a significant contributor to a business’ intrinsic value, especially in circumstances where the firm’s cash holdings exceed their short-term debt. These results stand to reason, as more cash translates to more liquidity, giving an enterprise a certain financial agility that they would otherwise lack. Therefore, in the pursuit of educated and intelligent investment, it would be wise for all investors to include cash in their appraisal techniques.

(presenting on 5/4, Block C, HSN 106)

HISTORY

An Airplane is Only as Good as its Ace: How Pilots Redefined Combat Through Air Power in the World Wars

Emmalea McNay, Thesis Advisor: Dr. Kathryn Statler

When it comes to warfare in the 20th century, there is a consensus that the introduction of aerial combat was one example of how belligerents measured success or failure in a campaign, established superiority, and in general understood how modern combat has evolved. Especially in the case of the World Wars, historians tend to argue that the reasons for these outcomes have to do primarily with technological developments and advancements, and that these factors ultimately determined results on the battlefield. These sources are limited however in that they tell of the significance of technology, but they rarely tell why it became significant in the first place. In analyzing primary sources, it becomes clear that there is another factor that determined this success or failure in aerial combat and therefore contributed to how war has developed in the modern era. This is called the “human factor.” From this perspective, technology, no matter how superior or inferior it was compared to its adversaries, may not have been the only factor that determined how conflicts were resolved. Instead, these sources assert that the human factor played a truly vital role in aerial warfare and ultimately earned the aircraft’s fame recognized by historians today. In this classic case of man versus machine, the evidence points to the assertion that it was not simply the airplane, but also the person behind the airplane, that determined success or failure in aerial combat, and therefore contributed to changes in modern warfare for the next century.

(presenting on 5/4, Block C, Manchester Auditorium)
**INTERDISCIPLINARY HUMANITIES**

‘Christ: Life, Death, and Resurrection’: A Fall 2019 exhibition on loan from the British Museum  
**Molly Lindsey**, Thesis Advisor: Dr. Derrick Cartwright  
This project considers previous utilizations of the Hoehn Family (Founders) Galleries space and will provide curation plans and research for a future exhibition: “Christ: Life, Death and Resurrection” on loan from the British Museum. As a liaison between the British Museum and the University of San Diego, I plan to conduct interviews and research addressing the topics of lending, curating, and transporting pieces internationally. Additionally, I will craft a floor plan, write labels, investigate security features for and research on the featured artwork. The exhibition itself includes forty-two Italian prints and drawings and focuses on three stages of the life of Christ beginning with his incarnation at the Nativity scene, his death via crucifixion and lastly, his resurrection. “Birth” has a celebratory tone and recalls episodes from the Nativity story. Within this section the viewer will observe and study the ways in which Renaissance artists attempted to convey Christ through sketches and finished works alike. “Death”, in contrast to “Birth”, embodies suffering. Through drawings and prints scenes of Christ’s incarnation are portrayed. Finally, “Resurrection” is shown and Easter is examined through pieces ranging from the 15th to late 16th centuries. Scenes of a biblical nature were popularly depicted by Renaissance artists. While motivations varied, some artists producing works to make the bible more accessible and others crafting works for places of worship, artists shared a common goal: evoking emotion and making a connection to and with the viewer.  
(presenting on 5/5, Block D, HSN 106)

**INTERNATIONAL BUSINESS**

The Evolution and Analysis of the 20 Year Anniversary of the UN Global Compact  
**Taylor Hamer**, Thesis Advisor: Dr. Eileen Daspro  
Since 1950, the expansion of multinational corporations (MNC’s) has caused a discussion about the role these corporations should have in society. The previous mentality was that only the government and nongovernmental organizations could serve the people. This has changed as MNC’s grew across borders and were confronted with humanitarian, environmental, and political. These issues arose from the lack of having a single entity of international law that regulates the practices of MNC’s overseas. Different legal principles were put in place, but none of them were binding. As companies faced extreme scrutiny for their practices in a host country, arguably one of the most important documents was created, the UN Global Compact of 1999. With principles set forth that aligned with the Sustainable Development Goals, it required annual reporting and would be monitored to ensure the signatory companies met the requirements. I will assess the UN Global Compact over the past 20 years and focus on how well the compact has achieved the goals set forth at promoting greater business responsibility and achieving social impact aligned with the Sustainable Development Goals. I will then draw my own conclusions and analysis in regards to how successful it has been, where it falls drastically short, and where the compact could improve.  
(presenting on 5/4, Block A, Manchester Auditorium)

The Easternization of the West in Product Labelling of Food and Drink  
**Jinjing Wei**, Thesis Advisor: Dr. Maria Kniazeva  
The objective is to explore how packaging stories educate western consumers and convey wellness values, norms and ideas born in the East such as Yin and Yang, Zen and the eastern purity. The project shows the increasing interests of eastern ideas among the western world using the U.S. as the primary example. The Westerners were more curious about eastern spirituality than material goods. The accessibility to the general public expanded dramatically since the 1950s, predominantly because of World War II. It enabled a considerable group of Westerners to have direct contact with the East and learn from their observation. In a capitalistic marketplace, products reflect the demand from customers and customers’ need can be found in the variety of products already existing in the market. Some products were sold with remedies found in the eastern spirituals for western evils such as chemicals or anxiety. Understanding how the trend of Easternization appears, evolves and applies in the market enables businesspeople to make the next decision more successfully. It is also beneficial for scholars in the liberal arts studies such as philosophy, religious studies and sociology to read and further their research in their respective fields.  
(presenting on 5/4, Block D, Manchester Auditorium)
**INTERNATIONAL RELATIONS**

Children are Children: Applying the Rights Given to Defendants in Juvenile Court to Minors in Deportation Proceedings

_Caroline McLeod_, Thesis Advisor: Dr. Del Dickson

Under Donald Trump’s presidency, immigration policies involving children have become more restrictive and publicized. Without the rights given in juvenile court, particularly the right to free counsel for indigent defendants, minors are unlikely to remain in the country. Upon returning to their native country, many immigrant children face severe economic, social, and physical hardships, all of which could be avoided if they remained in the United States. This paper examines the ways in which rights given to defendants in juvenile court can be applied to minors in deportation hearings. It does so by tracing the philosophical history of immigration court, which parallels the philosophical history of juvenile court. In both cases, court philosophies transferred their emphasis from the rights of the state to the rights of the individual, leading to the increased advocacy for or application of due process rights for juveniles. The paper ends by acknowledging the challenges to providing these rights to minors, the most poignant of which is financial cost. Although the cost is high, the moral and societal benefits of providing free counsel to indigent immigrant minors outweigh this financial burden.

(presenting on 5/4, Block B, HSN 106)

**MARKETING**

The Impact of Advertising Social Justice Issues on Consumer’s Brand Perception

_Isabelle Suarez_, Thesis Advisor: Dr. Aarti Ivanic

Recently, prominent brands have made headlines due to advertisements that take a stand on social justice issues, such as race and gender. These advertisements often spark dialogue as well as mixed reactions among the brand’s consumers. This research project explores how these advertisements have affected the consumer’s perception of the brand. Companies have an extremely valuable and influential platform with the ability to quickly reach a great number of individuals. Advertisements about social justice issues often stimulate broader conversations regarding the issues at hand and draw more attention to the topics addressed in the advertisement. In addition to a literature review, I will conduct a content analysis of data found on Facebook and YouTube and I will utilize Word Clouds and Linguistic Inquiry and Word Count to gauge the general reactions to various advertisements. The results of this study will inform companies interested in releasing such advertisements of the risks and rewards involved in doing so. Further, using the analysis, I will provide some recommendations of best practices to release purposeful and effective social justice advertisements. If this project shows that thoughtfully crafted advertisements impact brand perception, companies should be encouraged to provide messages that will motivate the public to recognize and address the social justice issues of today’s world.

(presenting on 5/4, Block B, HSN 106)

The Birth of Korean Beauty: A Look into the Use of Marketing Channels for the Creation of K-Beauty

_Mariah Shotts_, Thesis Advisor: Dr. Maria Kniazeva

K-beauty: myth or reality? My project looks into the modern construction and conceptualization of a culturally specific type (Korean) of beauty ideal. I aim to explore how marketing channels contribute to the creation of the construct of Korean Beauty. Titled K-beauty, the trend encompasses beauty perceptions rooted in the skin-care products developed in Korea and based in traditional Asian beauty techniques. The discovery of made-in-Korea products and the creation of the desirable ideal of beauty in the West have been taking place recently. For this project, I will use the ideals of American beauty as a basis for understanding how culturally specific types of beauty are being constructed. Applying qualitative methodology, I will analyze visual data that will be collected in the form of pictures taken at the marketplace, copies of the print ads, and posts on social media. These images and accompanying text will be analyzed in order to conceptualize the marketing contribution into the construction of the newest beauty ideal. The objective of this research is to contribute to theory development in the area of how to conceptualize a culturally specific type of beauty and how it is designed and manufactured. As well, it will provide insight for marketers on how to manipulate these techniques of manufacturing beauty and apply them to different cultures.

(presenting on 5/4, Block B, Manchester Auditorium)
MATHEMATICS

Tone and Text: A Phonetic Comparison of Shakespeare’s Sonnets

**Timothy Holdsworth**, Thesis Advisor: Dr. Devadoss

What gives a piece of poetry its aesthetic? Poets string together words to tell a story, but also string together phonemes to create a certain aesthetic of sound. Traditional methods of textual clustering use words as the base unit for comparison. In this project, we explore alternative methods of clustering using phonemes as the basis of comparison, including an adaptation of the Word2Vec algorithm. Although methods could possibly give a quantified analysis of the similarity of any two given poems, our focus will be on the 154 Shakespearean sonnets. Using the neighbor-joining algorithm, a phylogenetic tree is created as a tool to compare these poems.

(presenting on 5/4, Block B, Manchester Auditorium)

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Bounds on the Number of Elastic Collisions in D-Dimensional Space

**Kiley Sprigg**, Thesis Advisor: Dr. Lukasz Pruski

This interdisciplinary project focuses on improving the lower bound for the number of collisions of a finite system of n-balls in d-dimensional space. This is an open problem in mathematics whose solution might also be applicable to modeling collisions between particles in liquids and gases. However, our study goes beyond traditional 3-dimensional models known from physics. We developed software that computes all possible collisions between a system of balls with given initial positions and velocities, including collisions in positive and negative time. Building on the computation of collisions, we analyze various configurations of balls and their velocities in order to find configurations that produced more collisions than others. My research yielded a minimum of 8 collisions for a system of 4 balls in 3-dimensional space, a configuration which has never been published before.

(presenting on 5/5, Block A, Manchester Auditorium)

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MECHANICAL ENGINEERING

‘Picket’ Fences and Greener Grass: Patenting an Autonomous Lawnmower Invention Designed Around Reciprocating Cutting Blades and Teachable AI

**Austin Hirsh**, Thesis Advisor: Dr. Frank Jacobitz

According to the California EPA, one gasoline-powered lawn mower run for one hour can produce as much emissions as 40 automobiles (Mow Down Pollution, 1999). Additionally, the average U.S. homeowner with a lawn spends 66 hours on lawn care annually (American Time Use Survey, 2018). Existing robotic lawnmowers that aim to address these two issues have mostly failed to catch on in the United States due to a handful of technical drawbacks. For the past year, I have been working with a team of engineering students to develop a fully-autonomous lawn mower that can produce the same quality and efficiency of work as a human. For this project, I explored the nuanced process of drafting a traditional patent to protect my autonomous lawn mower invention. I first analyzed more than 50 related patents available in the U.S. Patent & Trademark Office (USPTO) database. I evaluated each patent based on criteria such as the status of the patent’s protection, the recent activity of the patent holder, and the similarity of the patent’s claims to my own invention. Additionally, I investigated tactics that inventors and lawyers use to create strong, legally sound patents. This research gave me an idea of where my invention stands in the existing patent landscape and how to best protect it. My end result is a draft of a traditional utility patent which, when reviewed by an attorney and submitted to the USPTO, will legally protect my invention by proving that it is novel, useful, and non-obvious.

(presenting on 5/5, Block B, HSN 106)
The Development of an Analysis Tool for the Comparison of the Microcirculation in Rat Spinotrapezius Muscle and Muscle Fascia

Amanda Kennedy, Thesis Advisor: Dr. Frank Jacobitz

The microcirculation comprises the flow of blood through small vessels that supply nutrients to and remove metabolites from surrounding tissues and cells. It is difficult to analyze the microcirculation based on simulation results without a visualization of a variety of flow variables, including pressure, velocity, flow rate, Reynolds number, or Womersley number. In order to overcome this gap in understanding we must be able to map the simulation results onto the network structure in a way where it can be seen and understood visually. The network includes small arterioles, capillaries, and venules with vessel diameters ranging from 8 to 150 μm. In this study, the network connectivity is obtained from microscopic images of blood vessels and the simulation results are mapped back on the network structure. From the microscopic images, a matrix is created that describes each blood vessel and its location. This matrix is then used to display the solution of flow properties onto the vessel structure, allowing a spatial analysis of the simulation results in addition, for example, to a statistical analysis. When analyzing the color maps of pressure in muscle fascia to skeletal muscle, both show a general trend of high pressure in arterioles, intermediate pressure in capillaries, and low pressure in venules. However, it can be seen from these pressure maps that the muscle fascia has a lower average pressure. The pressure histogram for the muscle fascia is also more skewed to the left while the skeletal muscle histogram demonstrates a Gaussian distribution.

(presenting on 5/5, Block C, Manchester Auditorium)

POLITICAL SCIENCE

What Can Congress Do: The Second Amendment versus the Commerce and Equal Protection Clauses

Pitrina Gilger, Thesis Advisor: Dr. Del Dickson

This research project explores the Second Amendment debate through the lens of Congress’s power to enact legislation. It evaluates whether or not Congress has power through the Commerce Clause and/or Equal Protection Clause to create gun control legislation, placing these rights and powers in conversation with Second Amendment rights. This paper provides a legal groundwork for gun control, using case briefs, law reviews, and Supreme Court rulings. It analyzes the implications of precedent on the legal response to potential future legislation regarding gun control. With this framework, a response to case history will provide a legal argument for why Congress can, and should, pursue reasonable gun control regulations. My thesis statement is that Congress, by powers enumerated in Article I, Section 8 of the Constitution (the Commerce Clause), and to protect rights laid out to citizens in the Equal Protection Clause of the Fourteenth Amendment, can constitutionally enact federal gun control legislation in America. This project is significant because it provides a specific and actionable legal outline for federal gun control.

(presenting on 5/4, Block A, HSN 106)

The Promise to Make American Great Again: The Power of Political Narrative

Cassandra Cyphers, Thesis Advisor: Dr. Timothy Wyman McCarty

Narrative is essential to human thinking and conceptualization of the world. In a political context, narrative proffers a particular understood pattern of political reality that is socially constructed and reinforced through shared understandings of causality and interrelationship between background, events, and characters. I investigate how “Make America Great Again” (MAGA) functions as a political narrative and has been employed by United States President Donald Trump during his 2016 presidential campaign and his first term in office. In terms of narrative theory, I analyze the meaning of “MAGA” as a socially meaningful story utilized in Trump’s major speeches and featured in his tweets. In terms of counter-narrative theory, I also analyze the use of “MAGA” as an insurgent narrative which holds psychological value for Trump supporters. Through qualitative analysis, I find that Trump uses “MAGA” to refer to an imagined bygone era of American exceptionalism, economic success, and cultural homogeneity by weaponizing images of American military weakness, domestic decay, and societal infiltration by “the other,” creating a counter-narrative of American life that bolsters support for Trump.

(presenting on 5/4, Block B, Manchester Auditorium)
Havelian Presidency: A Study in Theory & Practice

**Chelsea Johnson**, Thesis Advisor: Dr. Timothy McCarty

Despite former dissident and Czech president Václav Havel’s widespread influence, his presidency has not been seriously considered as a framework for how one should head a government. Havel is known for and evaluated most in terms of his sweeping moral principles and philosophical treatises, but I wish to know whether his presidency passes the test that he provides so clearly in his written works and speeches. Specifically, I will examine how Havel’s philosophical ideas translate to his political acts as president. I will select one international, one domestic, and one economic policy that Havel actively advocated for and instituted. These policies were either controversial or *prima facie* appear to contradict his political philosophy. I will then examine these policies through the lens of his prior-written plays and philosophical treatises to determine whether his political theory works in practice, whether his actions can be justified in the terms of his theory, and whether it constitutes a viable method of governing. Essentially, it will be a study in theory and practice. My lens is rather narrow as I will be looking at specific presidential acts of Havel’s and how they relate to his worldview. In doing these things, I hope to ascertain the practical manifestations of and/or inconsistencies in Havel’s conception of a good president. The end result of my thesis will either confirm scholarly suspicions of Havel’s presidential mediocrity, or prove the opposite and thereby serve as an externally applicable framework for morally and politically sound action.

(presenting on 5/4, Block D, HSN 106)

**PSYCHOLOGY**

Overcoming Stereotypes: Perceptions of Single Parents Attending College

**Sarah Petrovich**, Thesis Advisor: Professor Stephen Pearlberg

Stereotypical parenting roles in the workplace have been assessed, yet few studies have considered whether such stereotypes exist in higher education. Research has shown that parenting roles can influence whether a person is hired, their level of success at work, and their perceived job commitment. The purpose of current research is to examine whether certain perceptions exist for single parents attending college, and if this is moderated by gender. Based on prior research that shows mothers are perceived as less successful than fathers in the workplace, I hypothesize that female single parents attending college will be perceived as less successful than male single parents attending college. To test this hypothesis, college students read a description of either a single mother or single father attending college, then rate their level of success in college and afterward. I predict male participants will report that female single parents attending college are less successful than male single parents. Female participants will perceive no significant difference in success as a product of gender. The results of this research could have important implications for single parents attending college.

(presenting on 5/4, Block C, HSN 106)

USD Military-Connected Students’ College Experience

**Alexis Nacht**, Thesis Advisor: Dr. Veronica Galvan

At the University of San Diego (USD), we have a large military-connected student population that consists of over 750 students. A military-connected student at USD could fall into one of these categories; veteran, ROTC, or other commissioning program member, an active duty member, or a family member/spouse using the GI Bill benefits. Military-connected students differ from typical college students and may face challenges that make it more difficult to graduate. The results from a survey comparing the challenges that military-connected students and non-military connected students face will be discussed in three broad categories that may pose challenges: their transition period, academic experience, and social involvement. In addition, non-military students’ perceptions of military students will be collected. I also want to learn which challenges are unique to the USD military population versus which challenges are shared with military-connected students at other universities. After data collection is complete, the survey information will provide crucial information pertaining to the well-being of our military-connected student population which can be used to offer more specific programs to these students and make USD’s campus better suited for the military-connected student community.

(presenting on 5/5, Block A, HSN 106)
How Diet Choices and Weight Changes Person Perception

Nicole Tibbits, Thesis Advisor: Dr. Rebekah Wanic

Previous studies have explored how overweight targets are perceived and the physical and psychological characteristics commonly used to describe them. The current study experimentally investigated the relationship between a target’s weight and his or her diet choices, and the characteristics used to describe him or her. The participants were exposed to one of four situations (overweight/unhealthy diet, overweight/healthy diet, average-weight/unhealthy diet, average-weight/healthy diet) where they were shown a picture and a short description of the target. It is likely that overweight and unhealthy diet targets were rated lower on questions pertaining to physical health. Regardless of weight, healthy diet targets will likely be rated higher than unhealthy diet targets for positive psychological attributes. Overall, overweight/unhealthy diet targets will likely be rated the lowest in all three categories (positive psychological attributes, negative psychological attributes, and physical attributes).

(presenting on 5/5, Block B, Manchester Auditorium)

Understanding Imitation in Parent-Child Interaction Therapy

McKenna Sakamoto, Thesis Advisor: Dr. Kristen McCabe

Parent-Child Interaction therapy (PCIT) is an efficacious intervention for young children with behavior problems that teaches parents relationship-enhancing and disciplinary skills. Imitation is a significant PCIT skill because it allows parents to reinforce their child’s positive behavior, encourage their child to imitate others, and teach children about imitation in social interactions. Additionally, imitation has many cognitive, developmental, and social benefits for young children. Parental skills in PCIT are measured by the Dyadic Parent-Child Interactive Coding System (DPICS); however, the DPICS does not provide guidelines to measure imitation. This makes it difficult for therapists to monitor imitation and impossible for researchers to investigate imitation’s role in PCIT. The current study seeks to develop reliable guidelines to code parental imitation (PIM) and child imitation (CIM) and to analyze the frequencies of and relationships between PIM and CIM. The investigators developed a series of coding guidelines for PIM and CIM then applied these guidelines to 78 pre- and post-treatment DPICS videos using interval coding. Analyses indicated that PIM and CIM frequencies are correlated, that PIM and CIM frequencies did not significantly increase from pre- to post-treatment, and that the experimental measure’s reliability is within the range of other DPICS skills. This inquiry suggests the need for further refinement of the experimental guidelines and study of imitation in PCIT. Additionally, quantifying imitation in PCIT could extend the therapy’s relevance to additional populations, such as interventions for Autism Spectrum Disorder, which often have a strong imitation component.

(presenting on 5/5, Block C, Manchester Auditorium)

THEATRE ARTS

Staging Science: Enhancing Scientific Communication Through Theatrical Performance

Emma Dickson, Thesis Advisor: Dr. Monica Stufft

In contemporary America, scientists struggle to convey both their discoveries and the rationale behind them. Because of the difficulty in conveying scientific ideas to a general audience, scientists must expand their communication strategies. One way to do so is by using creative art forms like theatre to convey ideas. Indeed, Theatre has already begun to engage with science; many prominent playwrights have written works about science which range from biographical dramas to elaborate metaphorical explorations of scientific concepts. This project examines how different ways of engaging with science on stage affects the audience’s understanding and perception of the concepts presented. Instead of surveying a vast quantity of science-themed plays, I focus on an in-depth analysis of several key examples of the genre. As the audience experiences plays as live performances, I focus on an in-depth analysis of several key examples of the genre. As the audience experiences plays as live performances, this project treats them as such, rather than as purely written texts. Therefore, in addition to scripts, this study also incorporates insights gained from critical reviews of key productions. By drawing on these sources, I can determine how the plays have been received both when they were first produced as well as in contemporary society (where applicable). From this, I will extrapolate what dramatic strategies are the most effective for theatrical works to communicate scientific ideas to an audience. These conclusions will form a basis for further collaborative efforts between scientists and theatre artists to help ameliorate the current crisis of communication which modern science faces.

(presenting on 5/4, Block A, HSN 106)
Nothing Heard, But Far from Silent  
**Tessa Wood**, Thesis Advisor: Dr. Monica Stufft  

Broadcasted speeches given by American presidents are a way for the Commander in Chief to reach the public. Through television, not only the words of the president but his physicality is communicated to the people. There is an underlying language that presidents embody with their head, hand, and shoulder positioning. Their gestures tell a story and are a part of their performance as they take on the role of the presidency. This project will explore the gestures of the 43rd, 44th, and 45th presidents of the United States through the lens of theatrical performance. A predicted finding in the examination of presidential speeches is a distinct contrast in types of gestures between the presidents studied. Also, a particular group of gestures per president is anticipated to emerge as a cohesion with the ascension of personality politics. The interpretation of gestures will be guided by the theories of Restored Behavior and Delsarte’s System of Oratory.  
(presenting on 5/5, Block C, HSN 106)

**THEOLOGY & RELIGIOUS STUDIES**

Responding to the Reality: A Call for the Development of Sexual Ethics in Catholic Higher Education  
**Sydney Pidgeon**, Thesis Advisor: Dr. Rebekah Wanic  

There is a stark difference between the Catholic doctrine on sexuality and the experiences of students at Catholic universities. Institutions of Higher Education play a vital role in mentoring students through their transition and equipping them with the knowledge and support. One component of curiosity during the transitional years is a person’s sexuality, and how their embodied sexuality fits within their identity. The Christian tradition has been notably silent on issues of sexuality, and the conversations that do arise often fuel shame and confusion. Due to this, an increasing number of students in Catholic higher education are compartmentalizing their faith and sexuality due to the absence of a relevant sexual ethic within the tradition. The current sexual ethic of the Catholic Church is not responding to the reality of young Catholics, creating a dissonance between a Catholic’s sexual experience and their faith. Institutions of Catholic Higher Education should be held to a higher standard of providing space for wisdom and support in questions of sexuality and sexual ethics. This paper will contrast of the Catholic doctrine on sexuality and the lived experience of students at Catholic Universities, the implications of the current Catholic doctrine, and avenues to move forward in creating a ethic embedded in the Catholic tradition that avoids shame and promotes justice.  
(presenting on 5/5, Block D, HSN 106)