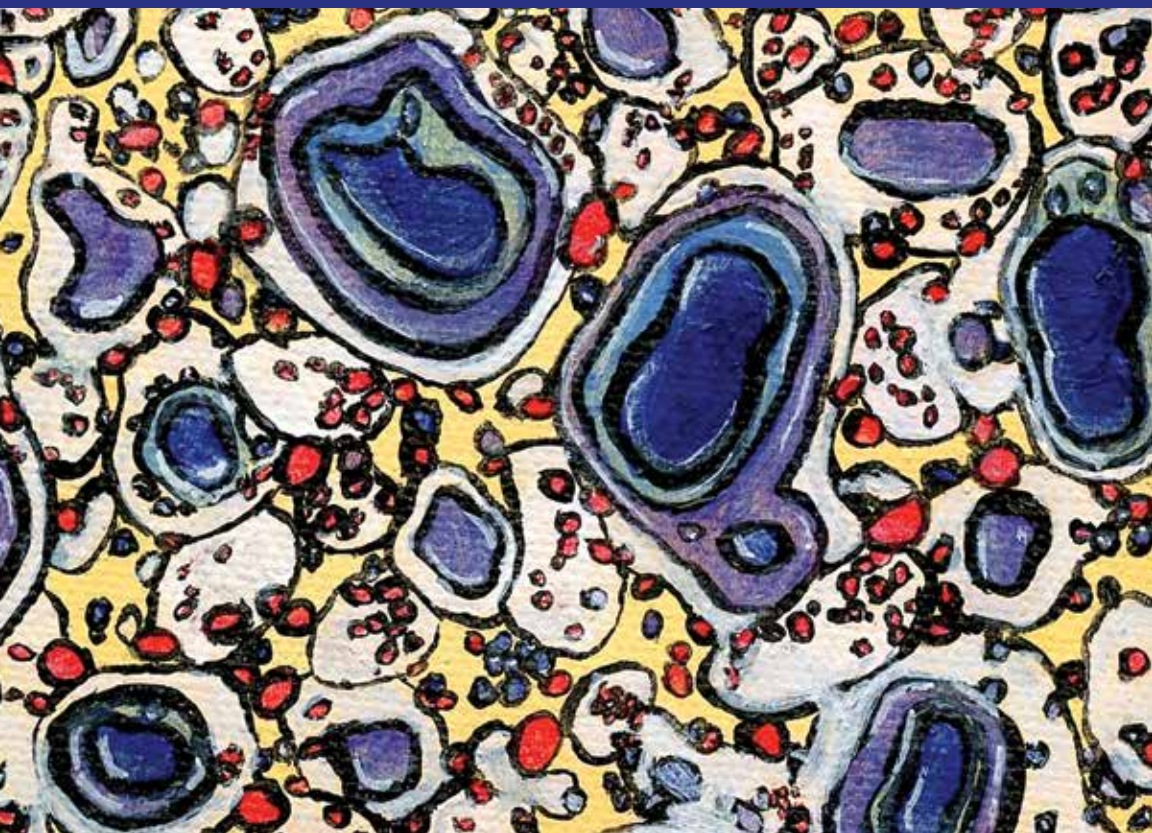


BELLARMINE
UNIVERSITY
IN VERITATIS AMORE

2018 CELEBRATION OF STUDENT RESEARCH + CREATIVITY



2018 CELEBRATION OF STUDENT RESEARCH + CREATIVITY

Tuesday, April 17

5:00 – 6:30 p.m.

Student Research Poster Session and Reception
Frazier Hall

Thursday, April 19

5:00 – 8:45 p.m.

Celebration of Scholarship and Creativity
in the Arts and Humanities
Wyatt Center for the Arts

Sunday, April 22

12:30 - 4:15 p.m.

Honors Student Thesis Presentations
Centro, McGowan Hall Room 075
and Centro, McGowan Hall Room 081



Elizabeth "Clare" Taylor



Brianna Jacobi



Clare Hagan

BECVAR ARTISTS IN RESIDENCE

Elizabeth "Clare" Taylor, Brianna Jacobi and Clare Hagan

About the BecVar Artist in Residence Program

The Lansing School of Nursing and Health Sciences established the Artist-in-Residence program in the 2002-2003 academic year. This program examines the art and science of Nursing and Health Sciences through the eyes of an undergraduate student working in the fine and creative art mediums. Endowed by Mrs. Arthur N. BecVar in 2006 in honor of her husband, this program exemplifies the diverse and many creative and artistic talents of the BecVar family. Having earlier established an endowed nursing scholarship fund during Art's lifetime, with this endowment Jayne BecVar further connects her desire to support and provide to our community caring, ethical graduates. It is our mutual desire that the students' experiences in this program, as viewed through the arts, will give them new ways of thinking to inform their clinical practice, the health care profession, and patient contact and care.

Clare Taylor's Artist Statement

Front Cover

As an artist in residence, I've revolved my project around the stages of healing. My work portrays the body recovering from an injury from two different perspectives: on the surface and under the microscope. Imagery found in paintings are based on year of compiled research and observing in a couple of physical therapy classes at Bellarmine. The large pieces show multiple body parts in the stages of recovery from bodily injury. Each of the large paintings is accompanied by three smaller canvases that show what is happening on a cellular level. My goal is that this body of work reflects my identity as an artist. Multiples, patterns, and small spaces have been reoccurring themes in my body of work. As I've found, our bodies are also composed of multiples, patterns, and small components.

Brianna Jacobi's Artist Statement

Back Cover

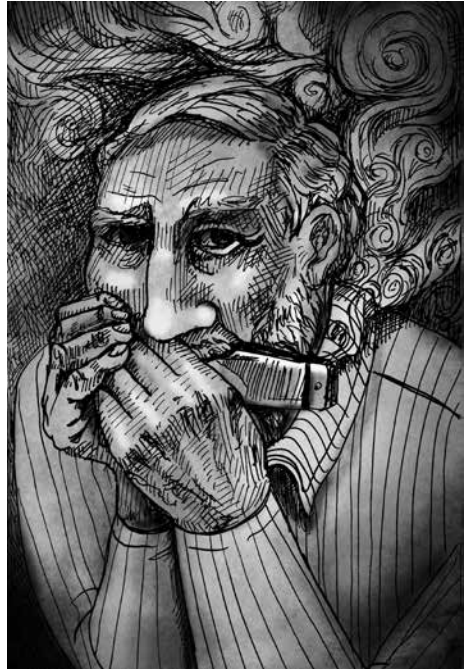
This past year was spent asking the question, "What is the most important aspect of nursing and the health sciences?" After much researching, reflecting, and talking to those involved in the field I found a common thread binding them all: people. Whether those people are nurses, patients, therapists, or students, the healing always begins on a personal level. Cultivating relationships with patients is the foundation of all health sciences.

Connection is a body of work created to highlight the lives and humanity of all those touched by the nursing and health science fields. This includes the patients, the professionals working to heal those patients, and any student dreaming of studying the health sciences with the goal of helping others. Healing starts with people.

Clare Hagan's Artist Statement

Poem and image on next page

"Life Cycles" is an illustrated chapbook of poetry which looks at how nurses are present at every stage of life, as well as the education and life cycle of those who practice nursing. The work incorporates many different voices and speakers within the poems, many of which were inspired or directly taken from interviews with nursing students. The collection of short poems is divided into seven sections, to represent the progression of a life as well as the progress of a week. These seven sections are titled "Birth," "Young Childhood," "Childhood," "Young Adulthood," "Adulthood," "Aging," and "Death." Each section contains two or three poems, as well as an illustration, which brings to life different images from one of the poems in each section, combining the lyrical with the visual.



Hallelujah, By and By

“I know you’re a-comin’ to get me”
The woman always says
At the young nurse’s first smile.
“We’re a-goin off into the Great Blue Wonder”

While Marvin, in his chair
Is floating like a grey balloon
‘Until they stick a harmonica in his hands
And bring his house slippers back onto the carpet

The glinting metal instrument
Spins his tired breath into song
With threads that hold faster than memory or worn out trousers

He laughs
As the music leads him off

into the Great Blue Wonder

2018 CELEBRATION OF STUDENT RESEARCH + CREATIVITY POSTER SESSION

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SPECIAL THANKS TO

Dr. Susan M. Donovan, President

Dr. Carole Pfeffer, Provost

Dr. Mark Wiegand, Vice Provost

Dr. Hunt C. Helm, Vice President for Communication & Public Affairs

Ms. Joan Riggert, Director of Planned Giving & Stewardship

Ms. Connie Smith, Grant & Research Specialist

Ms. Allison Becker, Administrative Assistant to the Dean of Bellarmine College

Ms. Kathleen Kelty, Director of Campus Communications

BIOCHEMISTRY AND MOLECULAR BIOLOGY

POSTER 1

Zinc, Dietary Fat, and Sex have Interacting Influences on BTBR Mice in the Open Field Test

Kandis Arlinghaus / Faculty Sponsor: Dr. Mary Huff

Approximately 1 out of every 68 children in the US are diagnosed with Autism Spectrum Disorder (ASD). ASD is a heterogeneous neurodevelopmental disorder that has widespread activation of brain immune cells that produce inflammation. Data suggest diet can be used to control inflammatory effects in other conditions, such as diabetes, which is regulated by the anti-inflammatory characteristics of zinc. Our aim is to assess whether manipulation of dietary zinc and fat have interacting behavioral and physiological effects on mice. In this study, an inbred polygenic mouse model of autism (BTBR) was used. Mice (54 M, 61 F) were separated into 6 groups, based on dietary zinc (low, normal, high), and fat (normal, high) content. Behavior was analyzed using open field, 3-chamber, and an elevated +/- maze tests, recorded from the side and/or above, and analyzed using in-house machine vision software. Only open-field data are presented here. Data were collated in excel and analyzed via multi-level ANOVA in R.

POSTER 2

Cytotoxicity of Chalcones Against MiaPaCa-2 Cells

Jacob Drescher / Faculty Sponsor: Dr. Amanda Krzysiak

Chalcones are a group of naturally occurring chemicals found in plant species as the precursors to flavonoids. The structure of chalcones, consists of a ketone bridge attached to two aromatic rings. Different substituents on the aromatic rings allows for various characteristics, including the anti-cancer properties chalcones have been shown to possess. These anti-cancer properties can result from the chalcone serving as a Michael acceptor enabling them to interact with a variety of pathways that disrupt the initiation, promotion, and progression of cancer tumors. We have screened 32 compounds for inhibition of growth in pancreatic cells that vary the flexibility and confirmation of the 3 carbon bridge between the two aromatic rings as well as the effects that result from the electronic modifications to the aromatic ring. We have found that constraining the ring has drastic, negative effects on biological activity.

POSTER 3

Determining the Effects of Quercetin on Cadmium Toxicity in Kidney Cells

Elizabeth Dugan / Faculty Sponsor: Dr. Mary Huff

Cadmium is a heavy transition metal that causes kidney disease via prolonged, low-level exposure due to circulating metallothioneins. These proteins transport cadmium ions to the proximal convoluted tubule, where they induce the creation of reactive oxygen species (ROS). Oxidative damage from ROS can lead to kidney dysfunction and, eventually, failure. Previous studies have shown that antioxidants, including

quercetin, which is found in most fruits and vegetables, can lessen cadmium-induced toxicity. In this study, human embryonic kidney cells were pretreated for one hour with varying concentrations of quercetin ranging from 10-200 QM. This was followed by 24-hour treatment with 30 QM cadmium chloride, and growth was measured by a cell proliferation assay. In contrast to previous reports, these studies suggested that quercetin concentrations above 40 QM resulted in an increase in cell death, suggesting that quercetin enhances, rather than inhibits, the toxic effect of cadmium within this concentration range. Since JNK, a stress activated protein kinase, has been shown to be activated in response to cadmium, future studies will address if quercetin may induce cell death in a similar manner.

POSTER 4

A cytotoxic evaluation of a chalcone library on A549 cells

Mary Elaine Kuo / Faculty Sponsor: Dr. Amanda Krzysiak

Chalcones, a precursor to flavonoids, are chemical compounds found naturally in plants. The chalcones' structure consists of a ketone bridge attached to two aromatic rings. Varying substituents on the aromatic rings allow for different affects, including anti-cancer properties. As a Michael acceptor, chalcones interact with pathways that cause inhibition of the initiation, promotion, and progression of cancer tumors. We have screened 32 compounds for growth inhibition in lung cells that vary the flexibility and confirmation of the 3 carbon bridge between the two aromatic rings as well as the effects of electronic modifications to the aromatic ring. We have found that constraining the ring has negative effects on biological activity.

POSTER 5

Elucidating the Relationship Between *sox4a* and *sox4b* in the Zebrafish Eye

Hadley Neal / Faculty Sponsor: Dr. Mary Huff

Abnormal development of the vertebrate eye can result in long-term defects, one of which is ocular coloboma. Ocular coloboma is a congenital malformation that occurs when the choroid fissure fails to close during embryonic development. It can result in visual impairment and is also associated with other morphological defects like microphthalmia and cataracts. SOX4 is a transcription factor that has been shown to be associated with ocular coloboma. SOX4 belongs to the SoxC subfamily of proteins, characterized by the presence of a high mobility group (HMG) domain-containing Sry-box, that allows the proteins to bind to DNA, and a transactivation domain that allows the proteins to function as a transcription activator. In previous studies, morpholinos were used to knock down the expression of Sox4 in zebrafish. This resulted in coloboma, microphthalmia, and fewer rod photoreceptors. These morphant phenotypes were supported by preliminary data observed from individual CRISPR genetic mutants in *sox4a* and *sox4b*. However, the mutants have a less severe phenotype than the morphants and previous attempts to make a double mutant were not successful. To determine whether mutation of one *sox4* co-orthologue sensitizes the zebrafish to loss of the second co-orthologue, we injected a low dose of *sox4b* morpholino into *sox4a* mutant embryos, and compared the penetrance and severity of the resulting ocular phenotypes to control injected and single mutant embryos. The data presented here suggest that a low dose of *sox4b* morpholino does increase the penetrance and severity of some of the microphthalmia phenotype.

POSTER 6

The Associations between Gaming, Heart Rate and Cortisol Production

Katie Neff / Faculty Sponsor: Dr. Christy Wolfe

Behavioral addiction has only recently gained the attention it needs. Until very recently, gambling addiction was the only behavioral addiction listed in the DSM (Diagnostic and Statistical Manual of Mental Disorders) as a disorder. At first glance, this area of addiction appears to be behaviorally based, but upon further inspection, there are complex physiological processes involved in this and other addictions (Deroche-Gamonet et al., 2017; Ko et al., 2016; Zack et al., 2016). For example, research has shown a correlation between gambling addiction and cortisol production (Meyer et al., 2016). Cortisol is known as a stress hormone, as it is released by the sympathetic nervous system in response to a real or imagined stressor. It is also associated with substance addictions with both long-term and short-term effects (Lovallo, 2016). The current study investigated potential associations between cortisol and internet gaming. For this experiment, 8 Bellarmine students took a survey to assess their level of engagement with gaming. They were then asked to play 3 games of varying difficulty and intensity for 15 minutes, with a 15 minute break in between. Every 15 minutes they were asked to provide a saliva sample. After the session, the subjects took another survey on how stressful they found each game to be. Salivary cortisol levels were hypothesized to correlate with the subject's self-rated "addiction to" internet gaming, as well as how stressful they rated the session. Internet Gaming Disorder (IGD) is currently in the DSM as a "Condition for Further Study". It has gained more recognition in recent news, but until the new DSM is released it will not be considered an official disorder. This experiment hopes to contribute to the knowledge of IGD so that there can be more accurate diagnoses and treatments in the future.

BIOLOGY

POSTER 7

New Mechanisms and Targeting of Maladaptive Sensory Growth in the Development of Neuropathic Pain Following Spinal Cord Injury

Hailee Bray, Alysha Wonka, Blaire Conner, Morgan Rowe / Faculty Sponsor: Dr. Sonja Bareiss

The development of neuropathic pain following spinal cord injury (SCI) is common and poses a significant clinical challenge. Recent evidence suggests that this pain may be partially due to the maladaptive growth of afferent fibers. We have previously shown that SCI results in alterations in GSK-3 β signaling as a potential regulator of these sensory growth responses. This project further defines the role of GSK-3 β signaling on δ -catenin, a synaptic adherens protein and potent neuronal morphogen. Previously characterized as brain-specific, the role of δ -catenin on the spinal cord and peripheral nervous system has not been defined. The objectives of this study were (1) to define the expression pattern of δ -catenin in the dorsal horn of the spinal cord and the dorsal root ganglion (DRG) and (2) to correlate δ -catenin expression changes with the presence and severity of at-level pain. Male Long-Evans rats underwent intramedullary injection of quisqualate acid (SCI) or saline (sham control) and were allowed to survive for 1, 14, or 22 days (n=4-12 per group). Animals in the 14- and 22-

day groups were examined daily for onset and severity of at-level dysesthesias termed “overgrooming.” Spinal cord and DRG at the level of injury were analyzed for alterations in δ -catenin signaling. Biochemical and immunohistochemical techniques show early and persistent decreases in δ -catenin expression, which correlated with altered afferent growth and the presence and severity of overgrooming behavior. Blocking GSK-3 β / δ -catenin signaling via intrathecal delivery of GSK-3 β activator LY294002 partially reversed these responses and reduced the development of at-level pain 22 days post SCI. These findings indicate a novel role for δ -catenin signaling in spinal afferent plasticity and provide insight into a new molecular target in SCI-induced neuropathic pain. This work was supported by Bellarmine University SGA, Craig H. Neilsen Foundation #314851, and the Wooten Laboratory for Neurodegenerative Disease Research.

POSTER 8

Cadmium Toxicity on Human Kidney Cells and the Effects of Resveratrol

Mariah Geisen / Faculty Sponsor: Dr. Mary Huff

Cadmium is a toxic metal found in the environment that affects almost all the systems in the human body. Accumulation of cadmium in the kidneys has shown to activate cell death by initiating apoptotic pathways. It is possible that resveratrol, a polyphenol belonging to a group of antioxidants known as phytochemicals, protect cells from cadmium toxicity. To first establish the amount of cadmium needed to induce cellular death in the embryonic kidney cell line, HEK-293, cells were treated with varying concentrations of cadmium ranging from 10 QM to 300 QM for 24 to 48 hours, and growth was measured using a cellular proliferation assay. These results showed that treatment with cadmium for 24 hours had a toxic effect on HEK-293 cells in a concentration dependent manner. Forty-eight hours treatment with cadmium resulted in cell death at all concentrations of cadmium tested. To determine if resveratrol could protect cells against cadmium toxicity, cells were treated with concentrations ranging from 25 QM to 100 QM for 1 hour before treating with 10 QM and 30 QM cadmium for 24 hours. Preliminary results suggest that pretreatment with resveratrol may partially protect against cadmium toxicity. However, resveratrol alone inhibited cellular growth making these results difficult to interpret. Further experimentation is necessary to confirm these results.

POSTER 9

Diversity of Freshwater Invertebrates in Little Indian Creek

Ashton Gentry / Faculty Sponsor: Dr. Anthony Lentz

Located within a property in Floyds Knobs, Indiana is a section of Little Indian Creek that had not been previously studied. In order to better understand the aquatic ecosystem of the creek as well as the diversity of freshwater invertebrates located in it, a variety of samples were collected and examined. Six traps placed along a 1480-foot section of the creek were collected and replaced every two weeks along with measuring temperature, conductivity, pH, and dissolved oxygen levels of the water surrounding each trap. Freshwater invertebrates collected in the traps were counted and identified in the lab. Results indicate that the three most prevalent families were Heptageniidae, Asellidae, and Chironomidae. The remaining families in traps were represented by approximately one individual throughout the entire collection period. The number of organisms found during the study fluctuated in response to changes in

environmental conditions that were seen due to the changing seasons. Through this study it was determined, using a Shannon Diversity Index, that this section of Little Indian Creek has relatively high species diversity, which included a total of fourteen different families of freshwater invertebrates. With knowledge of the different families present and their relationship to changes in certain environmental factors, it provides a further understanding not only of this small creek ecosystem present, but possibly that of surrounding sections as well.

POSTER 10

Affects of Novel Mutation in Transforming Growth Factor Beta One Promotor Region on Asthma Severity

Calley Thompson / Faculty Sponsor: Dr. David Robinson

Asthma is a disease that affects 300 million people worldwide. It has a strong genetic component with estimates of heritability ranging from 36 to 77%. Already several studies have implicated genes in the interleukin pathway and others involved in inflammatory responses. Severe asthma, which affects 5 to 10% of asthmatics, is still poorly controlled despite heavy doses of medication. Less research has been done on the smooth muscle development and airway-remodeling mechanisms that may play a key role in controlling severe asthma. This study examined several of those genes using DNA from 16 donors. A single nucleotide polymorphism (SNP) was found in the promotor region of Transforming Growth Factor Beta One (TGFB1) from a family of severe asthmatics. This SNP did not appear in any of the controls. It may disrupt the regulation of TGFB1 production and cause smooth muscle remodeling abnormalities that are not addressed by current treatments.

POSTER 11

Effect of ferulic acid on cadmium oxidative stress in human embryonic kidney cells

Ramon Batista Torres / Faculty Sponsor: Dr. Mary Huff

Cadmium (Cd) is a heavy metal categorized as a human carcinogen that is present in the soil, water, and even food. It has been related to various medical conditions, such as metal fume fever, pneumonitis, pulmonary edema, and long-term exposure has been associated with death. The present study aims to identify the protective role of ferulic acid (FA), an antioxidant found commonly in the cell wall of plants, to protect against Cd-toxicity in human embryonic kidney cells. To establish the optimal concentration of cadmium needed to induce cell death, HEK-293 cells were treated with concentrations of cadmium ranging from 10 QM to 300 QM for 24 hours. Cellular growth was measured by a cell proliferation assay. The results showed that increasing concentrations of cadmium-induced cell death in a concentration-dependent manner with the lowest concentrations reducing growth by 24% and higher concentrations inhibiting cell growth by 71%. To determine if FA can protect against cadmium toxicity, cells were treated with concentrations of FA from 10 QM to 2 mM one hour before cadmium treatment. The results suggest that pretreatment with FA may protect cells from cadmium-induced toxicity. Further studies are needed to confirm these preliminary results.

CHEMISTRY

POSTER 12

Investigations into the Wavelength Shifting of Fluorescence Spectra Produced by Mixtures of PAH Molecules

Alberta Bosela / Faculty Sponsor: Dr. Joseph Sinski

Oil is composed of many different hydrocarbons with a small fraction that are PAH's (ring shaped aromatic molecules) which have the unique ability to fluoresce. There are many different types of PAH's so to monitor the exact assortment mixed together in a certain sample of oil we utilize fluorescence spectroscopy. Petroleum contamination can be matched with potential sources because the exact ratio of PAH's in any particular petroleum sample will vary widely. The spectrofluorimeter has the ability to send to the sample a large range of colors/energies of light and each PAH molecule absorbs and emits specific wavelengths; resulting in spectra that can be thought of as a fingerprint for each mixture. Our research is centered on exploring how the molecules create these fingerprints. (Fun fact the color each absorbs and the color each emits are different.) Because natural petroleum contains a mix of PAH's, in the lab we need to make mimics of the mixes found in nature. Some of the work presented here deals with the molecules fluoranthene, fluorene, and chrysene; the separate spectra, and all possible combinations of resulting spectra. We note any apparent anomalies and present proposed reasons for the trends. To make an analogy to a person in the art world for example, together the PAH's do some funky things with their "colors" or energies. It's not too crazy like a disco of colors, but it's puzzling. At times you might expect to see multiple different and specific colors in the petroleum mixture because each PAH by itself expressed a certain color but when you shine all those different colors together you may instead see only one color, and not all the colors you put in! This work is very preliminary and supported by a grant from the Clare Boothe Luce Foundation.

POSTER 13

Synthesis of Chalcone Derivatives as Cytotoxic Agents against Cancer Cells

Amber Hill / Faculty Sponsor: Dr. Amanda Krzysiak

In the last 20 years, there has been a strong interest in the research of chalcones and their effect on different types of cancer. Chalcones are a class of natural products which serves a wide variety of biological activities and are made of two aromatic rings linked by an α,β -unsaturated carbonyl system. The anti-cancer properties of chalcones result from the different functional groups on both aromatic rings. These compounds are simple to synthesize by reacting the appropriate benzaldehyde and acetophenone derivatives. A series of chalcone derivatives have been synthesized through the Claisen-Schmidt condensation reaction of 1-indanone and a variety benzaldehydes derivatives including electron donating and withdrawing groups. These synthesized products are purified by recrystallization technique, and their identities are confirmed through Nuclear Magnetic Resonance (NMR), infrared spectroscopy (IR), and Thin Layer Chromatography (TLC). The anti-proliferative activities are going to be evaluated against a series of cancer cells to understand their structure-activity relationship.

POSTER 14

Compact, Portable Construct of a Raman Spectrometer

Tia King / Faculty Sponsor: Dr. Patrick Holt

Spectroscopy allows chemists to determine the structure of molecules for analytical purposes. Raman and Infrared (IR) spectroscopy are closely related to one another in a complementary relationship. Raman spectroscopy is unique in that it has different selection rules. For example, a strong vibration mode in Raman spectroscopy could be a weak one in infrared spectroscopy and vice versa. Some of these include a greater sensitivity to nonpolar functional groups, minimal sample preparation and nondestructive analysis. In this research, an attempt to construct a Raman spectrometer is made. This Raman spectrometer can be portable, compact and modular. It will prove useful as a teaching aid because all the components are open and clearly visible, as well as a useful research tool. This Raman spectrometer is set up using a 75-milliwatt (mW), 532-nm, green laser and a monochromator/detector array. The monochromator is produced by Ocean Optics and is attached to the apparatus by a fiber optic cable. The monochromator is attached to a computer by a USB connection that dually serves as its power supply and the source of information for the Raman spectrum. The computer is also used for the analysis of the Raman Spectrum.

COMMUNICATION

POSTER 15

#ArtSpeaks: How Arts Nonprofits Can Use Social Media to Inspire Action

Rebecca Waskevich and Mollie LaFavers / Faculty Sponsor: Dr. Rain Wuyu Liu

The purpose of this project is to provide an understanding of how arts nonprofit organizations can most effectively gain support through social media communications to increase the impact of the organization on a local level. A review of the literature shows that three arguments to support the need for arts nonprofits: providing economic support, offering creative outlets to community members, and helping address social needs. However, the research is limited in its exploration of arts nonprofits impact through social media. An online survey will be conducted to explore the demographics of stakeholders for arts nonprofits, the strengths of social media platforms for garnering financial support, and the use of different kinds of messages via arts nonprofits on Instagram. This study will be expected to complete by May 2018.

ECONOMICS

POSTER 16

To What Extent Does Health Care Play a Role in a Nation's Development?

Jeffrey Cook / Faculty Sponsor: Dr. Frank Raymond

This paper explores the impact of healthcare and nutrition on economic development. Improving access to basic healthcare services supports entrepreneurship and

innovation, as well as the absorption of new technology. These in turn lead to higher productivity and wages. In particular, I isolate specific factors such the prevalence of communicable and chronic diseases, limits to healthcare infrastructure, and unequal access to healthcare and proper nutrition in order to determine the extent to which healthcare affects economic growth and development in developing nations.

POSTER 17

Educational Attainment and Economic Development

Miranda Maertz / Faculty Sponsor: Dr. Frank Raymond

This paper investigates the impact of impediments to educational attainment on economic development. Improvements in education lead to innovation, higher productivity and wage growth. Limits to educational attainment occur in a variety of ways. Virtually all developing nations face limited resources for all services including education. Some societies choose to offer educational opportunities to only a subset of the population. Weak institutions can lead to chaos and inefficiency, which mitigate incentives for education as well as educational opportunities. Moreover, in many developing nations, obstacles to education are deliberately maintained to prop weak institutions or consolidate political power. Obstacles to educational attainment inhibit entrepreneurship and innovation, as well as the absorption of new technology, all of which deter economic growth and development.

ENGLISH

POSTER 18

The Stories We Tell

Emma Biggs and Sean Ryan / Faculty Sponsor: Dr. Kathryn West

For my project I have created a cookbook of some of my favorite recipes. Each recipe in the book is accompanied by the story behind the recipe. Cooking is so much more than just making food. Recipes are passed down from generation to generation and can be changed and improved by every person who touches them. My project examines the importance of telling stories in the kitchen to help form connections. I've always been drawn to the cookbooks that include personal stories because it makes the recipe mean something. Every time I make that recipe, I am reminded of the story and the meaning behind the ingredients.

POSTER 19

English Capstone - Why We're English Majors

Laiken Breeden / Faculty Sponsor: Dr. Kathryn West

Many students do not have a positive experience with poetry while in high school. Teachers tend to focus more on form, rhyme scheme, and a "hidden message" than the content of the poem itself. If there's one thing I've learned in my time in the English department, it's that there often is not a hidden message nor does the form and rhyme scheme dictate the content of the poem. While form and rhyme scheme are important concepts to be taught in the classroom, they are less important than the content and language itself. This project seeks to examine how poetry is taught

within the secondary classroom and how it can be taught better. This project looks to examine current strategies and standards being taught within the classroom, such as focusing heavy on rhyme scheme rather than content, as well as create new strategies and ideas for how to teach poetry in the classroom. New strategies and ideas would include focusing on language, having students explore writing their own poetry, etc. This project seeks to provide alternative strategies to better engage students in the classroom when teaching poetry.

POSTER 20

The Business Brother: The Literary and Historical Significance of George Keats

Tyler Harris / Faculty Sponsor: Dr. Kathryn West

George Keats, brother of Romantic Poet John Keats, has been subtly looked down upon by many in English academia for years — he is often viewed as the business-oriented prodigal son of the Keats family, and since he took a good portion of the family's inheritance with him when he moved to America, he's long been blamed for leaving John in poverty where he would die from tuberculosis at the young age of 25. However, the relationship between these two brothers is far more complex than recently thought — and George's trek into America from England, specifically into Louisville, Kentucky, presents a portrait of a man who should be, locally at least, heralded as a role model of business prowess and do-it-yourself dexterity. With help from Father Clyde Crews, Dr. John Gatton, the voices of Frederick Smock and Jack Fox, and several locally published books, this project will focus on conveying the literary-based relationship between George and John and local pre-Civil War history via the documentary format — featuring visual information in conjunction with voice-over narration and academic interviews.

POSTER 21

LGBT+ Literature in America

Kristia Ising / Faculty Sponsor: Dr. Kathryn West

My Senior Capstone Project is centered on research that explores the timeline of American LGBT+ Literature, its importance and role in U.S. culture, and its reception. For this project, I will be studying the transformation of how LGBT+ Literature has been received by audiences, by using reviews dating from various points in U.S. history. My sources will include a wide range of historical as well as contemporary authors and their relevant works, as well as focusing on the reviews and public reception of those works. For the creative aspect of my project, I'll be producing a timeline of my research findings.

POSTER 22

"And so we beat on beyond the book"

Haley McCowan, Abigail Adams, Clare Hagan, Ashley Hite, Heidi Kimmich, Rebecca Livingston, Sean Ryan, Jessica Sylvester, and Brittany Welsh / Faculty Sponsor: Dr. Kathryn West

Our project will examine the cultural context surrounding *The Great Gatsby* as well as the cultural media that influenced the writing of the novel. Such context includes details about Fitzgerald's own life, life during the Prohibition Era, and locations in

Louisville featured in the story. Other influences we will examine include the literature that inspired and that is featured in the novel, the popular music of the era, dance, and fashion. We will have examples of these categories for people to see, look through, and listen to (dance to) for a tangible experience of *The Great Gatsby* that is beyond the book.

POSTER 23

Sexism and Homophobia in Crime Fiction

Christina Mudd / Faculty Sponsor: Dr. Kathryn West

This project explores the genre of crime fiction and the sexism and homophobia often present in it. My goal is to analyze these characteristics and how ingrained they are in popular novels such as Raymond Chandler's *The Big Sleep*, as well as using element from the novels to write the first chapter of a potential novel critiquing those tendencies by writing in a different grain.

POSTER 24

Effects of Serialization on Fictional Works

Molly Phelps / Faculty Sponsor: Dr. Kathryn West

This project looks at the effects of serialization on fictional plots. Drawing on works by HP Lovecraft, Charles Dickens, and various contemporary fiction creators, this project will be analyzing how serializing a work influences the finished project. It will be looking at how serializing a work has benefits, like increasing the audience of the work. It will also look at the drawbacks, such as the way the work must accommodate for the increased time it takes for the audience to consume the work. Finally, this will be looking at well as elements that are a mixture of the two, focusing on the way audience response can change a work for better or for worse. The goal of the project is to show these unique pros and cons of choosing to serialize a work of fiction.

POSTER 25

Mental Illness Represented by Women Poets

Julia Zalmanoff / Faculty Sponsor: Dr. Kathryn West

My project hopes to analyze mental illness represented in women's poetry and the use of poetry as a coping mechanism. I draw connections between the response to mental illness in society (particularly how it was treated in women) and the ways in which it has been expressed in poetry throughout the 20th century as well as discussing the use of writing poetry as a coping mechanism. I focus primarily on Sylvia Plath and Anne Sexton, but also research some of their predecessors in the field as well.

ENVIRONMENTAL SCIENCE

POSTER 26

How do low-head dams affect sediment deposition and toxicity in Indian Creek in southern Indiana?

Emily Brown / Faculty Sponsor: Dr. Martha Carlson-Mazur

The removal of obsolete dams has beneficial uses such as restoring clean water, revitalizing fish and wildlife populations, providing public recreation opportunities, and boosting local economies. Removing a dam, however, can cause downstream flooding and can release toxic sediments trapped behind the dam. Research prior to a dam removal is necessary to protect the health of the aquatic life and the stability of the river system. The Nature Conservancy (TNC), a nonprofit organization dedicated to natural resource preservation, has proposed removing three low-head dams on Indian Creek in southern Indiana. The goal of this study is to focus on the sediment deposition and accumulation of toxic sediments to determine how the two will affect a stream once these dams are removed. Before beginning the core sampling field research, preliminary research has been conducted. Using ArcGIS, a geographic information system, two of the three dam's reservoirs were mapped. The area and volume of these reservoirs were calculated to determine the maximum amount of sediment behind each dam. Dam #2, the middle of the three, has an area of 3,387.9 m² and a volume of 215,738.9 m³. Dam #3 has an area of 11,249.8 m² and a volume of 780,680.6 m³. The primary land cover around Indian Creek is pasture and low-intensity residential with deciduous forest, commercial/industrial/transportation, and high-intensity residential following. Due to the significant amount of pastureland use, polychlorinated biphenyls and pesticides will later be examined rather than harmful metals that could potentially be found in areas with a greater industrial land cover. TNC is in support of the removals to improve fish habitats and is seeking funding to remove two of the dams. This research supported TNC efforts by providing prior researched knowledge of the dams to establish a pathway for successful dam removals.

POSTER 27

A Paleoenvironmental Analysis by Comparison of Compass Bearings of fossils at the Falls of the Ohio, Clarksville, Indiana

Aspen Burman / Faculty Sponsor: Dr. Katherine Bulinski

The Falls of the Ohio contains coral assemblages that date from the middle Devonian. The fossils are embedded in the Jeffersonville Limestone of Clarksville Indiana. This area is primarily composed of rugose corals, tabulate corals, and stromatoporoid sponges. Although the beds are rich in fossils, they have not been formally studied since 1967 by D.L. Kissling and J.A. Lineback. Their study focused on specimens over 4cm, observing the size, orientation, and abundance by different taxa. Through their research, they found a preferred East/West orientation for corals.

Since Kissling and Lineback did not examine the fossils smaller than 4cm, there are ecological patterns that have not yet been examined. The purpose of this study is to analyze the compass bearings of coral specimens over and under 4 cm. In the data collection phase, fossil lengths, widths, and bearings were recorded on multiple transects for every specimen over 1 cm, resulting in over 2,300 specimens across 81 meters of data. The data were divided into two size categories to compare fossils under 4 cm and over 4 cm. Each category was then divided into 10-degree increments from

0-180 and the percentage of fossils within each increment was calculated. The two size categories (above and below 4 cm in size) were then compared to observe the difference in preferred orientations. Fossils over 4 cm were most commonly oriented between 81-90 degrees while those below 4 cm were more often oriented between 41-50 degrees. By examining the difference in orientations between fossils of different sizes, it is now possible to gain a better understanding of the paleoenvironmental conditions at the Falls of the Ohio. This would allow for an updated estimation of water energy, such as waves and currents, for the Louisville/Clarksville area during the Devonian period.

POSTER 28

Influence of bedrock geology and land use on habitat and water quality in two Blue River watersheds with differing management plans

Erin Crone / Faculty Sponsor: Dr. Martha Carlson-Mazur

A stream's habitat and water quality are heavily influenced by land use and geology within its watershed. Pollutants and sediment loading from watershed drainage can make streams less habitable for certain species, reducing biodiversity. Watershed management strategies, such as the promotion of best management practices in agriculture, can help to combat stream degradation from watershed inputs. The upper Blue River in southern Indiana is a biodiversity hotspot but is experiencing degradation and biodiversity loss due to watershed inputs. This is exemplified by the disappearance of the eastern hellbender salamander, an indicator species, from this area. Fine sediment loading is particularly harmful to the hellbender because it causes embeddedness, decreasing habitat space within the substrate. Two watersheds of the upper Blue River, the Salem and South watersheds, differ significantly in land use and bedrock geology and have different watershed management strategies. The Salem watershed has higher percentages of urban and agricultural land, has predominantly limestone bedrock, and has a watershed management plan in place. Conversely, the South fork has a higher percentage of forested land and siltstone bedrock and does not have a watershed management plan in place. To determine how these watershed factors impact stream quality, five sites in the Salem fork and five sites in the South fork were tested for water chemistry, macroinvertebrate assemblage, and sediment distribution in the summer of 2017. Results suggested that the South fork had better ecological condition than the Salem fork and that high levels of phosphorus and fine sediment affected macroinvertebrate ecology. Developed land provided significant phosphorus inputs, while agriculture and siltstone bedrock were the main sources of sediment loading. These results will be used by The Nature Conservancy, an organization that protects ecologically valuable areas, for developing watershed management strategies and furthering conservation within the South and Salem fork watersheds.

POSTER 29

Devonian stromatoporoid interactions at the Falls of the Ohio State Park, Clarksville Indiana

Morgan Sierra Hall / Faculty Sponsor: Dr. Katherine Bulinski

Stromatoporoids are calcitic sponges that occurred in the fossil record from the Early Ordovician to Late Devonian period. These sponges show evidence of interaction with other organisms, especially rugose and tabulate corals. Some corals appear to benefit from the rigidity of stromatoporoids in response to turbulent marine condi-

tions. Stromatoporoids and many corals went extinct during the Frasnian-Famennian crisis when paleoenvironmental parameters were shifting. For this reason, studying the relationships between these taxa may provide insight to their vulnerability during the extinction.

This research was performed at the Falls of the Ohio in the Coral Zone of the Jeffersonville Limestone, a biostrome of exposed Devonian-age fossils located in Clarks-ville, Indiana. Even though this is an important paleontological site that contains several hundred species of coral, no peer-reviewed paleoecological studies have been conducted here in more than fifty years. Organisms in the Coral Zone were studied using transect sampling along a portion of the bedding plane. Each fossil along the 81 meters of transect line was identified, measured, and if the fossil was elongate, a compass bearing was recorded. Stromatoporoid-coral interactions were also documented. The data were then analyzed in Excel and tables were created to summarize fossil occurrences and interactions.

Stromatoporoids accounted for 72.9% of the biomass of fossils identified, demonstrating their overwhelming dominance in the biostrome. They most commonly interacted with small rugose corals. A meta-analysis using scientific literature was also performed to compare results from the Falls of the Ohio to other Devonian systems across the world. Tabulate corals were the most common interaction, followed by rugose corals. Delicate corals were likely protected by the rigid stromatoporoid skeleton, but endobionts also competed with their host for food and slowed its growth. For this reason, both commensal and parasitic relationships between stromatoporoids and corals are possible.

POSTER 30

Rugose Corals at the Falls of the Ohio Provide Insight into an Ancient Devonian Marine Ecosystem

Zoe Laughlin / Faculty Sponsor: Dr. Katherine Bulinski

The Falls of the Ohio State Park (Charlestown, Indiana) is among one of the largest continuously exposed Devonian fossil beds in the world. During the months of August to October, the Ohio River level lowers enough that 220 acres of coral-rich limestone is exposed and available for study. The purpose of this study was to examine the body size distribution of rugose corals in the Coral Zone of the Jeffersonville Limestone. To accomplish this goal, all fossils greater than 1 centimeter in size were identified and measured along a total of 81 meters of transect. By examining the distribution of body size of different rugose coral taxa it may be possible to understand the relative longevity represented by the preserved specimens of different coral taxa at the Falls of the Ohio. Additionally, the size of the preserved fossils may reveal patterns related to how the fossils were preserved. Variability in the preservation of rugose corals can describe sedimentary conditions that may have impacted this ancient ecosystem. If smaller size ranges of corals are underrepresented in the Coral Zone, there may be evidence of a taphonomic bias in the preservation of smaller individuals. This will be examined specifically by using the width of rugose coral as a proxy for the age of individuals, as length is more likely to be affected by post-mortem breakage. Understanding the patterns in preservation and body size of these fossilized corals may reveal more about the community structure of the Falls of the Ohio and help us interpret the paleoecological conditions of this marine ecosystem.

POSTER 31

Abundance, orientation, and distribution analysis of coral fossils in a Devonian biostrome at the Falls of the Ohio, Clarksville, Indiana

Tonya Summerlin and Kendra Sadler / Faculty Sponsor: Dr. Katherine Bulinski

The Jeffersonville Limestone at the Falls of the Ohio in Clarksville, Indiana contains one of the most extensively exposed middle Devonian biostromes in the world. This community is primarily composed of solitary, colonial corals and stromatoporoids. Until now, the only in-depth paleoecological study performed here was published in 1967 by D.L. Kissling and J.A. Lineback. In that work, they recorded positions, sizes, and shapes of specimens larger than four centimeters. They also generated azimuth estimates by averaging the bearing measurements of branching Favositid corals axes. Their abundances and distributions were calculated using surface area measurements. This study will present an update on Kissling and Lineback's findings. This research utilized transect sampling to document fossil location, identification, length, width, and bearing. Data were collected for every specimen along the transect that was one centimeter or larger for a total of 2,340 intact specimens over 81 meters of transect. The bearings, and positions among the fossil bed, of each taxon were analyzed. Size distribution trends were examined by calculating surface area for each taxon by transect and in the study area as a whole. Abundances were determined by the number of fossils recorded, as well as the surface area per taxon.

Together, these analyses provide a comprehensive interpretation of the Coral Zone at the Falls of the Ohio. Analyses of all orientations found that most fossils are aligned within the 46 to 90 degree category, a statistically significant trend. When analyzed per meter, it was found that the 46-90 degree direction was favored in 34% of meters that exhibited a pattern of coral orientation. This indicates a paleocurrent once existed in the ENE or WSW direction. This is parallel to the findings of Kissling and Lineback, who asserted evidence of an east-west current.

POSTER 32

Examining Academic Self-Efficacy and Competence in First-Year College Students

Tonya Summerlin, Brittany Ballard, Emmanuel Fasipe, Nigel Ouslan, Anne Torgerson, and Shannon Wilson / Faculty Sponsor: Dr. Kristen Wallitsch

The ETS SuccessNavigator results of the 2017 cohort identified a major area of concern for first-year students: self-management. While most university administration and faculty were not entirely surprised by these results, seeing the dramatic difference in this domain was alarming when compared to the other three domains (social support, academic skills, and commitment). 88% of students scored moderate or low in the self-management domain, but the majority of students (65%) actually scored low. The other three domains did not show such concerning results since only 11-14% of students scored in the low category. After examining the results of the ETS SuccessNavigator, the Student Success Leadership Board chose to use academic self-efficacy and Chickering's competence categories as a framework to understand students' transition from high school to college. An overall sense of competence and self-efficacy is grounded in a student's feelings about their accomplishments and failures and their ability to trust that their abilities will help them attain their goals. By examining students' coping strategies during their first semester and who or what they sought for help, insight can be gained about their levels of competence and self-efficacy. Three

focus groups were conducted to gather information about what resources students have used to manage their stress and college transition. At the completion of the focus groups, the ETS SuccessNavigator results of the participants were examined, as well as their engagement with Student Success Center programs and services.

POSTER 33

Identifying the abundance and distribution of corallite bending in Middle Devonian Rugose Corals

Alma Wilcox, Zoey Laughlin, Aspen Burman, Tonya Summerlin, Kendra Sadler, and Sierra Hall / Faculty Sponsor: Dr. Katherine Bulinski

The Falls of the Ohio State Park, in Clarksville, Indiana, is a well-preserved and exposed fossil biostrome from the middle Devonian. The coral zone layer of Jeffersonville Limestone contains the highest concentration of fossils and is where the data collection for this research took place. Previous work by researchers Lineback and Kissling, was the starting point for this current research effort. Their research focused specifically around the orientations, size, shape and abundance of stromatoporoid, tabulate and rugose corals within the limestone coral beds. However, since the data collected by Lineback and Kissling only examined fossils over 4 centimeters in size and therefore consisted of only 3.7 percent rugose coral, most of their analysis focused around stromatoporoids and tabulates. Therefore, the goal of this research is to understand the environmental conditions that the rugose corals experienced over 400 million years ago. Out of the 2,421 fossils recorded for analysis in this research, 60 percent, among 7 genera, were rugose.

Some of the rugose coral examined in this study are bent at a high angle (i.e., close to 90 degrees), which may indicate presence of strong ocean currents or rough waters. In conditions like these, the coral falls on its side, detaching from the ocean floor and a bend is formed as the coral continues to grow upwards toward sunlight. For this reason, unfavorable environmental conditions, such as water turbulence and unstable sedimentation can be inferred by the presence of many corals with a bend. Rugose corals within a close proximity of each other should display similar reactions to stress. Therefore, by tracking the location and abundance of bends on each transect as well as analyzing patterns in width, this research may contribute to the current understanding of the paleoecology of these extinct fossils.

EXERCISE SCIENCE

POSTER 34

Unilateral Resistance Training's Effect on Muscular Strength and Power and Measures of Core Stability in Trained Individuals

Anthony Duong / Faculty Sponsor: Dr. Andrew Carnes

This study will examine the effects of unilateral resistance training on lower body muscular strength and power, and measures of core stability in team sport athletes. A two condition, between subjects design will be used to compare the effects of bilateral (two legged) versus unilateral (single legged) training following a three week exercise protocol. Twenty (N=20) participants will be recruited from the lacrosse, wrestling,

rugby, soccer teams, and club sports teams (rugby, men and women's volleyball, and men and women's soccer) at Bellarmine University and subsequently randomized into a control or treatment group. The control group will perform three weeks of bilateral resistance exercises, while the treatment group will be prescribed the unilateral counterparts of the control exercises. At baseline and post intervention, lower body strength will be measured with a one repetition maximum (1-RM) leg press and lower body power with a standing vertical leap. Measures of core stability will consist of isometric hip abduction strength, double leg lowering, and isometric back extension (i.e., the "Sorensen" test). Additional measures will include thigh circumference and body composition via air displacement plethysmography and a seven-site skinfold test. Training sessions will be performed on three nonconsecutive days of the week under the supervision of a trained researcher and the supporting faculty member.

POSTER 35

ACL Injury Prevention in Female Dominican Athletes: A Training Intervention Pilot Study

Sara Wilder, Dillon Pruett, and Samantha Zuber / Faculty Sponsor: Ms. Chelsey Franz

Research shows that females are at a higher risk for an anterior cruciate ligament (ACL) tear than males. Several studies have examined the role of rehabilitation programs after operative treatment to repair the torn ligament, however few studies have focused on preventative measures for this injury. A recognized injury prevention method cited throughout the literature is the Prevent injury and Enhance Performance program (PEP). This program was designed to strengthen the hamstrings and the abductors of the legs. With adequate strength in abductor leg muscles the athlete can better avoid forces placed on the knee that can lead to an ACL tear. To explore the feasibility of teaching this program to coaches in a Spanish-speaking, developing country (Santiago, Dominican Republic), and to understand their attitudes and beliefs towards injury prevention programs, researchers utilized a mixed methods approach. Based on preliminary results of the surveys completed by coaches, community members, parents, and athletes in Santiago, coaches from the Dominican Republic understand and can implement the PEP program in both their female and male sports programs. In addition, members of the community in Santiago believed that an injury prevention program would benefit the athletes in reducing their risk of injury. The majority of the athlete's parents perceived the importance of an injury prevention program to be equal for males and females. The athletes themselves also indicated that an injury prevention program was necessary to reduce their risk for injury.

POSTER 36

Polarized vs. High Intensity Multimodal Training in Recreational Runners

Zachary Yates / Faculty Sponsor: Dr. Andrew Carnes

The purpose of this study longitudinally compared changes in running performance (5-kilometer time trial) and fitness (VO₂max, body composition) between polarized training and CrossFit Endurance[®] in recreational runners. Methods included 21 participants that completed 12 weeks of CrossFit Endurance (CFE) or polarized endurance training (POL). Both groups trained 5 days per week. POL ran 5 days per week while CFE ran 3 days per week and performed CrossFit[®] 3 days per week (run and CrossFit 1 day per week). Intensity was classified as low, moderate, or high (Zone 1, 2, or 3) according to ventilatory thresholds. POL was prescribed greater volume

(295367 minutes per week), distributed as 85/5/10% in Z1/Z2/Z3. CFE emphasized a lower volume (110318 minutes per week) distribution of 48/8/44%. Results were that POL ran 283375.9 minutes per week and 47.3311.6 kilometers per week, both exceeding the 117332.2 minutes per week and 19.337.17 kilometers per week in CFE ($p < 0.001$). The POL distribution (74/11/15%) had greater total and percent Z1 ($p < 0.001$) than CFE (46/15/39%), which featured higher percent Z3 ($p < 0.001$). Time trial performance improved -93.8340.4 seconds (-6.2132.16%) in POL ($p < 0.001$) and -84.2365.7 seconds (-5.4933.56%) in CFE ($p = 0.001$). Body composition improved by -2.4532.59 %fat in POL ($p = 0.02$) and -2.6232.53% CFE ($p = 0.04$). The magnitude of improvement was not different between groups for time trial performance ($p = 0.79$) or body composition ($p = 0.88$). Both groups increased VO₂ max ($p \leq 0.01$), but with larger magnitude ($p = 0.04$, $d = 0.85$) in POL (4.333.6 ml•kg•min⁻¹) than CFE (1.7831.9 ml•kg•min⁻¹). Conclusions were that recreational runners achieved similar improvement in 5-km performance and body composition through polarized training or CFE, but POL yielded a greater increase in VO₂ max. Extrapolation to longer distances requires additional research.

MATHEMATICS / ACTUARIAL SCIENCE

POSTER 37

Natural Language Processing and Mathematics

Mason Callender / Faculty Sponsor: Dr. Anne Raymond

Natural language processing by computers is a very difficult concept since a computer does not 'think' or process human languages the same way a person does. This research explores the various ways mathematics is implemented into artificially intelligent programs designed for processing human language. Whether the goal is translation of languages, the generation of a piece of text that makes sense, or the identification of what language a piece of text is in, mathematics can be used in different ways to match the respective situation.'

POSTER 38

Building Mathematics: Examining the Mathematics behind Architecture

Kennethia Chapple / Faculty Sponsor: Dr. Daylene Zielinski

Mathematics surrounds us in so many ways that often go overlooked. One such example of where mathematics plays a major role is architecture. We see the Eiffel Tower and contemplate its great beauty. However, most people probably do not think about the mathematics behind how it was constructed. This paper illustrates the relationship between mathematics and architecture. I demonstrate the geometry behind the Colosseum in Rome and the Great Pyramids in Egypt. I also show how, with the creation of digital computations, one can design complex architectural models containing asymmetric hyperbolic paraboloids and parametric modeling as seen in such structures as the Guggenheim, Phillip's Pavilion, and the Gherkin.

POSTER 39

Busted: The Odds of Blackjack

Ashley Holmes / Faculty Sponsor: Dr. Anne Raymond

Blackjack is one of the most popular casino games in the world. The results of blackjack can be determined somewhat accurately through mathematical analysis. This research looks at the probabilities of winning against the dealer and the probabilities of “busting” and the expected returns. This research also looks at the theory of counting cards and other strategies to beat the dealer in the game of blackjack. Counting cards in blackjack determines the probability of which cards are likely to be drawn next. The most common way to count cards is the high-low method: assign a value to every card and keep a running count. Then use this information to calculate the total count and modify bets as the total count rises. By examining this method, I illustrate how counting cards should increase expected returns.

POSTER 40

Modeling Sustainability: How Mathematical Models Can Shed Light on the Energy Crisis

Michele Pfeifer / Faculty Sponsor: Dr. Anne Raymond

It is no secret that the environment is changing. With the recent technological boom, more energy is being consumed now than ever before. Over 60% of the United States' energy is sourced from coal and natural gas, both non-renewable sources. This means that they will eventually run out. Even if these sources could last forever, there are severe consequences to the environment in depleting these sources, so it would be in our best interest, both environmentally and economically, to seek out and implement more renewable energy sources. In my research, I look at what the best way to go about this could be, as there are many obstacles to renewable energy like cost and dependency on the weather. To go about this, I look at different existing mathematical models of various energy sources and analyze how the United States could be sourcing and using its energy more efficiently.

POSTER 41

Configuration Spaces, Braid Groups, and Contra Dance

Nicholas Rockstroh / Faculty Sponsors: Dr. Jennifer Miller and Dr. Gregory Kelsey

Configuration spaces are a variety of topological space which can be used to track the locations of non-colliding, moving particles as points in a topological space. These structures have been applied to describe the motion of robots in production factories, but can also be applied more generally to any situation in which individuals move around a space without colliding. This, combined with the close connection between configuration spaces and braid groups, suggests an applicability of configuration spaces to the modeling of various kinds of group dance, including American Contra dance. By describing individual dancers as particles it is possible to find a subspace of a configuration space which models the Contra line and the positions of the dancers within it at various points in time of the dance. This ties into existing models of Contra dances with braid groups and generalized existing analysis tools for the state of a dance at a given time and the dynamics which apply to certain forms of progression.

POSTER 42

A Statistical Redefining of Game Shows

Caleb Satterly / Faculty Sponsor: Dr. Susan White

It is no question that game shows often include mathematical principles, particularly expected values, to estimate their projected payouts to their contenders. However, certain game shows offer different varieties of prizes with different criteria for obtaining said prizes which follow other principles of mathematics. These differences between games often tell a lot about the games themselves and how the public values them. This research illustrates and compares how much a game show is worth by certain variables such as expected payout, variance in payout, viewership, and other statistical methods. This research dives into breaking apart the intricacies of a few select game shows such as *Deal or No Deal*, *The Power of Ten*, and *Let's Make a Deal*, to view their internal statistical workings of how they operate. The comparison of these different shows gives evidence that producers often tweak the laws of the games to benefit specific outcomes that may not always agree with the “house always wins” mentality.

POSTER 43

The Probability of Crime

Jasmine Thomas / Faculty Sponsor: Dr. Susan White

Everyday, someone in the United States is convicted of a crime and sentenced to a number of years in prison. In 2015, 149 people in the United States were exonerated, which was an increase from the 139 people that were exonerated in 2014. The number of annual exonerations in the U.S. has been steadily rising since 2005, when only 61 people were cleared of their crime convictions. These exonerations usually come from advances in forensic testing or from new evidence coming to light. But what if we could gauge the probability that someone is innocent given the fact that they are the most likely suspect? This research paper takes a deeper look into an area of probability called Bayes' Theorem, which is a mathematical approach that has been proposed in court systems over the years to find the probability that the suspect in question is not actually guilty even though much of the evidence makes it seem as though she/he is. While this mathematical approach is not the only thing that should be taken into consideration when deciding whether or not to convict a person of a crime, my research shows why it is something that should be presented to a jury and taken into consideration along with the evidence incriminating the suspect.

POSTER 44

Predicting a Population: Probability as a Way of Studying Genetics

Helena Varga / Faculty Sponsor: Dr. Michael Ackerman

It is often believed that an offspring's chances of inheriting traits are simply based on Mendel's Punnett square. However, this is not always the case. As evolution and other factors have skewed this perceived probability, quantitative genetics have stepped in to measure what the odds truly are. Whether it is in the food we grow, the animals we adopt, or our own children, genetic qualities and their possible manipulation are at the forefront of our minds. This paper explores mathematics' role in genetics. Statistical inference, means, correlations, and variances are used as methods to find resemblances genetically. In this paper, I examine theorems and principles related to the mathematical side of genetics, including the Hardy-Weinberg Principle.

MEDICAL LABORATORY SCIENCE

POSTER 45

Amniotic Fluid Embolism: A Case Study

Morgan Bailey / Faculty Sponsor: Dr. Karen Golemboski

An amniotic fluid embolism (AFE) is an often-fatal medical condition that affects pregnant women in which fetal fluid, hair, and/or debris enters the mother's circulatory system. While the pathophysiology of AFE is not well understood, studies conducted conclude that the fetal amniotic fluid causes an immune response in the mother's bloodstream. These situations may occur during or after labor, during planned abortions, or during pre-term labor. There are two stages to AFE; the first is characterized by respiratory distress and cardiac arrest. The second stage of AFE is characterized by disseminated intravascular coagulation, or DIC. AFE's occur in approximately 1 in 8,000-80,000 deliveries; however, the exact incidence is due to inconsistent reporting and inaccurate diagnosis. Even though the occurrence of AFE's are so rare, there are many risk factors that increase a patient's chance of suffering from this condition. Risk factors include; increased maternal age, multiple pregnancies, cesarean sections and eclampsia. Unfortunately, there is no known treatment for AFE, except to treat the symptoms (which does not ensure patient survival). However, understanding the pathophysiology behind this condition can help develop a treatment. In this case, a pregnant female was admitted to the hospital for pre-term labor. At 26 weeks gestation, it was concluded that the baby's placenta had been abrupted, in which the placenta separated from the inner wall of the uterus. The physician decided to deliver the baby. After the delivery, the patient's blood pressure had dropped, and the anesthesiologist became concerned that the patient was suffering from an AFE. Laboratory testing was performed to diagnose AFE including; blood gases, coagulation studies, and a peripheral blood smear. The patient's cause of death was cardiac failure due to an amniotic fluid embolism.

POSTER 46

The Arctic Sun - The Ultimate Cool Down

Christina Benock / Faculty Sponsor: Dr. Karen Golemboski

The Arctic Sun® 5000 Temperature Management System is a non-invasive system used to control and monitor body temperature. The system is used to induce mild hypothermia in patients after a cardiac arrest in order to reduce brain injury and improve neurological outcomes. Mild hypothermia, which is suggested to be between 32°C and 34°C, is to be induced as soon as possible after a cardiac arrest if the patient meets the criteria for the treatment. Cardiac arrest occurs when the heart malfunctions and stops beating unexpectedly. Lack of blood flowing to the brain during cardiac arrest leads to ischemia and possible anoxic brain damage. Following the restoration of circulation, the return of blood flow to the brain occurs and is associated with the production of oxygen free radicals, mitochondrial damage, and cell death. In patients who have a return of spontaneous circulation following a cardiac arrest and are comatose, poor neurological outcomes are high. Mild hypothermia treatment slows the perfusion process as well as metabolic processes that can lead to brain injury. Laboratory data is essential in order to achieve the goal of maintaining the body at its organic state. Blood gases and chemistry panels are done at regular intervals to

watch the patient's metabolic and electrolyte balance. Complete blood counts and coagulation studies are used to monitor cardiovascular effects and platelet function. Liver enzymes are tested to ensure proper liver function, while lactic acid levels and cultures are performed to test for infection and sepsis.

POSTER 47

Fourth-Generation HIV Testing in the Clinical Laboratory

Paige Bullock / Faculty Sponsor: Dr. Karen Golemboski

Human Immunodeficiency Virus (HIV) is a virus that attacks the immune system, weakening the body's defense against infection and making the host highly susceptible. Untreated HIV can develop into Acquired Immune Deficiency Syndrome (AIDS), at which point the infection becomes life-threatening. The current HIV testing algorithm set by the Center for Disease Control and Prevention (CDC) offers several advantages over the previous approach of HIV antibody screening, followed by Western blot confirmation of positive results. New fourth-generation testing provides earlier and more accurate detection of HIV infection and the ability to differentiate between HIV-1 and HIV-2 infection. A major viral protein found in the core of HIV that is ideal for diagnosis of an acute infection is the p24 antigen which is present in the first few weeks — something that older generations lack testing for. This reduces the window between infection and antibody positivity by one week, allowing for earlier detection of acute infection. In this case, a 27-year-old homosexual male entered the hospital and was routinely checked for HIV after testing negative years prior. Initial laboratory results showed he was nonreactive for the Fourth-Generation HIV 1 & 2 Antibody/Antigen combo, then reactive two months later. At that time, he was negative on the HIV 1/2 antibody confirmation test. Two weeks later, the HIV 1 & 2 Antibody/Antigen combo was still reactive, the confirmatory test was positive for the HIV-1 antibody, and HIV-RNA was detected, resulting in the diagnosis of an acute HIV-1 infection. Without advancements in laboratory testing, serious infectious diseases such as HIV itself would be misdiagnosed or even missed. This patient presentation highlights the importance of understanding both the viral components of HIV and testing methodologies to provide better patient care.

POSTER 48

An Unexplained Presence of Mycobacterium in the Blood

Margaret Horihan / Faculty Sponsor: Dr. Karen Golemboski

Sepsis is a complication of infection that can become life threatening. The most common causes of sepsis are *Escherichia coli*. In this case an 80 year old female came to the hospital presenting with upper and lower abdominal pain and was found to have elevated lactic acid levels, which occur when an individual's oxygen level is low and their body begins to break down carbohydrates for energy. Situations when this can occur include: strenuous exercise, heart failure, severe infection (sepsis), or shock. Each of these situations decreases the amount of oxygen traveling throughout the body. An infection was found in the patient's biliary duct using an endoscopic retrograde cholangiopancreatography (ERCP) and blood cultures were drawn and found to be positive in two of two bottles. The organisms were identified as *Escherichia coli*, *Klebsiella pneumoniae*, and *Streptococcus gallolyticus*. After being placed on fluids to bring her lactic acid levels into range and receiving multiple antibiotics for the three organisms found, the patient began to improve. Blood cultures had remained negative for six days and the patient was discharged. Two days following her discharge, her blood cultures became positive in two of two bottles presenting

as beaded gram positive organisms. The organism was identified as *Mycobacterium abscessus*, an environmental, non-tuberculosis mycobacterium (NTM) that is generally found in skin and soft tissue infections. At a follow up 20 days after the positive blood culture for *M. abscessus* the patient had no signs or symptoms and the blood cultures were found to be negative. From these results the *M. abscessus* could be considered a contaminant, could have been present but was overgrown in the original culture bottles, or was eliminated by the antibiotics given to the patient.

POSTER 49

The Laboratory's Role in Diagnosing Immunodeficiencies

Brandon McClanahan / Faculty Sponsor: Dr. Karen Golemboski

Diagnosing primary immunodeficiencies can be a challenging prospect for any practitioner. The laboratory can provide the tools to differentiate between the various immunodeficiencies, but even with all of this information it can still prove difficult to diagnose a patient correctly. In this case, a four-month-old infant was presented to the ER with respiratory failure and general failure to thrive. A respiratory pathogen panel was performed indicating that the child was infected with a virus that was causing her respiratory system to fail. Most individuals infected with this virus do not show symptoms or only get mildly sick, but she was having a severe reaction. Many tests were ordered monitoring the patient's health and eventually the focus turned to her immune system. A quantitative immunoglobulin test was ordered, and the laboratory reported a critical decrease in all antibody isotypes (IgG, A, M, E and D). First line treatment, Intravenous replacement immunoglobulin, was ordered and the patient slowly began to recover. After the immediate crisis was averted the more challenging dilemma began, what exactly was wrong with this patient's immune system? Often, diagnosing immune deficiencies is a case of exclusion. Determining what is not wrong with the patient is often the most direct way to figure out exactly what is wrong. Antibody titers to various childhood vaccinations were ordered to demonstrate her body's response to vaccines and flow cytometry was ordered to assess her population of immune cells. Many tests were ordered to try to identify a genetic cause for her illness, but all results were normal. The laboratory played a critical role at every one of these junctures and therefore is critical to the eventual diagnosis and selection of appropriate treatment for this patient.

POSTER 50

Best Technique and Compliance for Hand Washing

Meera Patel / Faculty Sponsor: Ms. Michelle Pendleton

Effective and compliant hand washing leads to patient safety. It can help reduce nosocomial diseases for patients and help protect healthcare workers from microbes that cause harm if taken home. There is also a continual increase in healthcare-acquired infections that result in increased spending in fighting these resistant microbes. Microbes resistant to antibiotics are not safe to anyone and can potentially threaten public safety. The amount of money is projected to increase yearly to fight off infections (Gould, Moralejo, Drey, Chudleigh, & Talijaard, 2017).

The clinical question posed was, 'In healthcare workers how do various hand washing techniques compare to each other and the influence the compliance of hand washing.' Databases used to find the most current evidence was Cochran Database of Systematic Reviews, Joanna Briggs Institute EBP Database, Micromedex Solutions, CINAHL, and MEDLINE. The articles chosen were a variety of evidence types but some

articles were excluded because the keywords used in the database searches were 'hand washing techniques' and 'compliance with hand washing' this excluded a lot of unnecessary articles. There were eighteen articles that were initially included. After skimming through all the articles the top five that fit the clinical question was chosen.

The recommendations from the various articles cite that soap and water need to be used along with an alcohol-based hand sanitizer with 62% alcohol. In order to increase compliance among healthcare workers, multiple interventions such as posters, automatic dispensers for water, soap, and towels, other innovative ideas like performing routine quality control for hygiene. This information can improve all of the healthcare professionals keep hand hygiene in mind.

Gould, D. J., Moralejo, D., Drey, N., Chudleigh, J. H., & Talijsaard, M. (2017). Interventions to improve hand hygiene compliance in patient care (Review). *Cochrane Library*, (9), 1-109. DOI: 10.1002/14651858.CD005186.pub4.

POSTER 51

Darzalex Interference with Blood Bank Testing

Maggie Vaughn / Faculty Sponsor: Dr. Karen Golemboski

Darzalex, or daratumumab, is a relatively new drug on the market to treat multiple myeloma. It is a monoclonal antibody that targets the CD38 protein on myeloma cells as well as reacting weakly with CD38 on red blood cells. This has become a problem in blood banks across the country. The monoclonal antibody in the patient's serum is binding with the CD38 antigen on reagent red blood cells used for testing. This causes pan-reactivity and results in a positive test result on almost all antibody screens, causing the patient to look as if they have an autoantibody. This occurred in two patients' antibody screens at a hospital, causing further workups and reference testing to be done to solve the issue. This testing takes up time and resources as well as delaying blood transfusions for both of these patients. Transfusions are delayed because of the unknown "antibody" the patient appears to have, and turnaround time is negatively affected as well. This had also been affecting direct antiglobulin tests and indirect antiglobulin tests resulting in false positive results. ABO and Rh typing are not affected. Since this drug has been on the market blood banks have had to become aware of patients on this drug and come up with a new procedure that involves adding Dithiothreitol or DTT to the reaction. DTT degrades the soluble CD38 antigen making daratumumab unable to cross-react and solving the issue. With this drug looking promising for treating other cancers this could become a problem for much more than just multiple myeloma patients.

POSTER 52

Quality Improvement Targeting Missed Urine Culture Specimens

Fei Wang / Faculty Sponsor: Dr. Karen Golemboski

Urinary tract infections (UTIs) are frequent and lead to a variety of complications if untreated. Urine culture aims to detect and identify bacteria and yeast in the urine, which may cause a UTI. More than 8000 urine cultures are performed monthly in a local Micro lab. In September 2017, 104 urine culture specimens were not received on time by this Micro Lab, which accounted for 1.2-1.3% of monthly urine culture volume. It was found that most missed urine culture specimens (MUCS) were shared by urinalysis (UA) and Micro lab, which were either UA/Urine Culture (UA/URC) double orders or

ADD-ON orders for culture based on UA results. In order to reduce MUCS and avoid delayed patient care, a new workflow was implemented in UA lab through oral and printout education. The total number of MUCS decreased from 104 in September to 68 in October and 75 in November. Weekly median missed UA/URC specimens reduced from 15 in September to 8.5 in October, and down to 8 in November. Weekly median missed ADD-ON specimens was 7.5 in September and October respectively, but increased to 14.5 in November. In conclusion, reeducation of UA lab staff significantly reduced the number of missed UA/URC specimens, but was not effective to reduce missed ADD-ON specimens. A follow up study is necessary to target missed ADD-ON specimens through a conversation between physicians/nurses and Lab to clarify test ordering process.

POSTER 53

Influenza B with Secondary Staphylococcus aureus Pneumonia

Rebecca Watson / Faculty Sponsor: Dr. Karen Golemboski

The influenza virus can be categorized into two main subgroups, Influenza A and Influenza B. Both types can cause a wide range of symptoms that can include a fever, body aches, nausea, and congestion. In a typical flu season, the recommended regimen for getting over the flu is rest and staying hydrated. However, what makes each flu season unique is that the influenza virus mutates and changes from year to year, making even partial immunity to the virus challenging. It was evident that this past flu season hosted a strain of the virus that was more severe than in years prior. Since the influenza vaccine was only 36% effective towards this strain, most of the population was put at risk. One consequence of getting the influenza virus that is rarely thought about is secondary pneumonia often caused by Staphylococcus aureus or Haemophilus influenzae. Pneumonia is caused by air sacs in the lungs filling up with fluid, often causing shortness of breath and a sputum-producing cough.

A pediatric patient presented to the Emergency Department with flu like symptoms. Laboratory results revealed a primary diagnosis of Influenza B. One week after being admitted, the patient was placed on Extracorporeal Membrane Oxygenation or ECMO, which is reserved for patients in respiratory and cardiac distress. Laboratory values such as arterial blood gases, lactic acid, and ionized calcium were monitored daily. After going into respiratory failure, an uncommon symptom of influenza, a sputum culture was ordered. A secondary diagnosis of S. aureus pneumonia was confirmed which ultimately caused the patient's death.

NURSING

POSTER 54

Patient Outcomes in the United States and the United Kingdom

Alexis Bode / Faculty Sponsor: Dr. Gabriele Bosley

Introduction: According to the Commonwealth Fund (2014), the United States has the costliest health system in the world with over \$8,500 spent on each individual. However, the United States' healthcare system's performance was the worst among

11 developed countries (p. 7). In contrast, the United Kingdom spends just over \$3400 on individual citizens, and its healthcare system's performance was ranked the best in the study (Commonwealth Fund, 2014, p. 7). The United Kingdom also has a national universal health system that is in sharp contrast with the United States' third-party health system. Purpose: This project aims to describe key differences in healthcare costs and patient outcomes on individual acute care units. Methods: Average hospital stays' costs on a medical-surgical unit were compared between the two countries. Patient outcomes regarding hospital-acquired infections, length of stays, falls, and transfer to intensive care units were then compared. Results: Despite having fewer costs, acute care units in the United Kingdom had fewer negative patient outcomes.

POSTER 55

Reassessment of the Constant Observation Algorithm in an ICU Setting

April Butler / Faculty Sponsor: Mr. Christopher Webb

The overall purpose of this study is to reduce the amount of constant observations hours in an intensive care patient. Constant observation (CO) is a nursing intervention that consists of one on one interaction with a patient to ensure safety. First, an assessment of the current CO algorithm was conducted. A need was identified to create a new, easier to use CO algorithm. The new CO algorithm that was created is more linear, lists specific interventions, and has a reassessment option; all aspects that are lacking from the current CO algorithm. A nurse satisfaction survey was then administered across two ICU floors to evaluate the use of the current CO algorithm and possible use of the new CO algorithm. According to the survey the new CO algorithm was found to be more appropriate for intensive care patients. Ultimately, the use of the new CO algorithm would lead to a possible decrease in CO hours needed for an intensive care patient.

POSTER 56

Throughput Time From Emergency Department to Floor

Lauren First / Faculty Sponsor: Dr. Teena Darnell

Though each hospital strives to provide safe, quality care to patients; there continues to be a need for improvement in the process of transferring patients from the Emergency Department (ED) into their assigned inpatient room. Research shows that there is a direct correlation between patient throughput time and the quality of care that is received by the patient (Baker, 2015).

The purpose of this capstone was to determine patient transit time (throughput) from the ED to the inpatient unit. This project was carried out in participation with Norton Brownsboro Hospital and sought to identify a gap in practice. Both quantitative and qualitative data were collected through the hospital's electronic medical record system and through direct observation. Analysis of the data suggested that communication was a primary hindrance to the emergency department throughput processes. In the implementation of this project, a tool was introduced and adopted by the ED staff to facilitate effective communication. Ultimately, better communication will translate into more efficient care processes for the patient and create an environment that ensures patient safety.

POSTER 57

Improving Outcomes by Fostering Hope in Patients Diagnosed with Substance Use Disorder by Integrating Community Twelve Step Groups with Medical Care

Wendy Holmes / Faculty Sponsor: Ms. Michelle Pendleton

More than 64,000 deaths in 2016 were caused by drug overdoses and more than \$740 billion per year is the cost to our nation in crime, lost work productivity and healthcare due to the abuse of tobacco, alcohol, and illicit drugs (NIDA, 2017). Effective treatment programs are multidimensional including assisting the person to stop using drugs, maintain a drug-free lifestyle and reach productivity within relationships, secular work and society in general (NIDA, 2012). A review of the literature was conducted on CINHHL, Medline and the NIH utilizing the keywords: recovery, substance use disorders, alcoholics anonymous, twelve-step recovery groups, and hope. Scientific research and clinical practice demonstrate the value of continuing care in treating addiction with integrating community settings, including twelve step recovery groups (TSGs) such as Alcoholics Anonymous (AA) and Narcotics Anonymous (NA). Increasing numbers of patients are admitted to hospitals for medical problems such as endocarditis, pulmonary emboli and abscesses that are directly related to substance abuse. Moos and Moos (2004), Lemke and Moos (2003), Kaskutas et al. (2002), and Vederhus (2014) studies show that early participation in, increased attendance with, support from, and early education by trained healthcare staff about community TSGs improves patient outcomes, doubling abstinence rates in some studies. One of the first steps of the TSGs success is related to its philosophy of providing hope that full recovery is possible living a substance-free lifestyle. Therefore, in patients admitted to hospitals for long-term medical treatment related to a diagnosis of substance use disorder, adding two TSG meetings per week to the medically stable patient's care plan along with brief motivational education will increase the patient's level of hope prior to discharge. Increased hope may lead to continued attendance at TSGs post discharge leading to decreased substance use, increased coping skills and improved relational and occupational status.

POSTER 58

Effects of a Discharge Checklist on Patient Satisfaction

Rebecca Holtkamp / Faculty Sponsor: Mr. Christopher Webb

The medical/surgical oncology floors at Norton Downtown Hospital have achieved low satisfaction scores on HCAHPS scores regarding discharge teaching. Specific areas of satisfaction below facility goals include nurse communication, medication information, side effects of medications, understanding of self-care, and overall discharge teaching information. After assessing information, a survey was created and given to patients who underwent discharge teaching. A discharge teaching checklist was created and a brief teaching on its use and importance was given to each nurse on the 5K/5R oncology floors. The same survey was then given to patients after discharge teaching by nurses who used the discharge checklist. A final survey was given to nurses who used the checklist to assess likes and dislikes of the tool. The study was completed in order to assess if a new discharge tool is efficient in improving satisfaction scores on the unit, which in turn improves patient outcomes and increases reimbursement funds through the hospital.

POSTER 59

Compassion Fatigue in ICU Nurses

Amanda Hughes / Faculty Sponsor: Ms. Beverley Bone

Compassion fatigue has been shown to affect the job performance and overall health of nurses who work in oncology, intensive care, and emergency departments. A study conducted by Mooney in 2017 showed that nurses who have high levels of compassion fatigue, as measured by the Professional Quality of Life Survey (ProQOL), are more likely to experience secondary traumatic stress and are at increased risk of burnout. This project focused on assessing the levels of compassion fatigue, secondary traumatic stress, and burnout in the ICU nurses at Norton Brownsboro Hospital. An emphasis was placed on identification of specific interventions appropriate for the staff to increase compassion satisfaction and reduce secondary traumatic stress and burnout. To assess the staff the ProQOL survey was used and an additional 14 questions were added in order to better analyze demographics and nursing experience. The survey results were analyzed according to the age of the nurse, the shift worked, and by gender. The results showed that there was a higher compassion satisfaction score for nurses over 40 years of age and that nurses who work nights had a lower level of compassion satisfaction and a higher incidence of burnout and secondary traumatic stress than day shift nurses. After the surveys were analyzed an educational series and staff debriefing opportunity was provided for the unit. The interventions recommended for this unit were based on low levels of compassion fatigue and included; quiet space for nurses to use in cases of extreme stress, the use of education on compassion fatigue and self-help strategies, and further investigation into the use of monthly debriefing sessions for the unit.

POSTER 60

Improving Patient Throughput in the Emergency Department

Eric Markovitz / Faculty Sponsor: Mr. Christopher Webb

Hospital emergency departments have been becoming increasingly crowded resulting in lengthened wait time and length of stay for patients. From 1995-2009, annual US ED visits increased 41% while the amount of EDs decreased by 27% (Sayah, Rogers, Devarajan, Kingsley-Rocker, Lobon, 2014). As a result, patient wait times increased, prolonged ambulance diversions were seen in 70% EDs, patient complaints increased, staff and physician satisfaction decreased, and higher numbers of negative patient outcomes were seen (Willer et al, 2010). A literature review was performed using 8 studies to assess methods to decrease ED patient wait time, length of stay, and improve department throughput.

POSTER 61

Obtaining Vascular Access

Madison Mobelini / Faculty Sponsor: Mr. Christopher Webb

Vascular Access Guidelines are recommendations that assist health care providers in determining if obtaining vascular access is appropriate in specific patient care. The Intensive Care Unit (ICU) at Norton Women's and Children's Hospital (NWCH) in Louisville, KY has recently experienced an increase in vascular access insertion; 186 central lines were placed over the past year. This study investigated the effectiveness of bedside education on guidelines and algorithms set in place by NWCH for obtaining vascular access compared to classroom base seminars in increasing appropriate vascular access compliance.

POSTER 62

Decreasing Safety Risk in Primary Care: A Literature Review

Trena Seago / Faculty Sponsor: Mr. Christopher Webb

The purpose of this literature review is to investigate training methods purported to decrease safety risks in the healthcare setting. Through high-fidelity simulation, used to create an experiential learning environment, healthcare professionals can acquire best practices to prevent sentinel events. The findings suggest that high-fidelity simulation increases teamwork and confidence among healthcare providers, thereby promoting positive patient outcomes. Nurse practitioners can be leaders in promoting optimal safety practices in primary care through the use of simulation training to prevent sentinel events from occurring, affording a tremendous asset to the role of nurse practitioners as providers.

POSTER 63

Postpartum Depression Education Bundle

Johanna Snyder / Faculty Sponsor: Ms. Ramona Psiones

An estimated 1 in 9 women experience symptoms of postpartum depression (PPD) (Centers for Disease Control and Prevention [CDC], 2017). Women affected with PPD experience feelings of guilt, worthlessness, exhaustion, anxiety, sleep disturbances, irritability, decreased concentration, or suicidal thoughts (Logsdon et al., 2012). Traditionally, women receive an antenatal psychosocial screening by their healthcare provider prior to delivery and a postnatal assessment by the pediatrician weeks later during their newborn baby's well check-up. Patients screened after delivery and prior to discharge and provided with mental health resources had lower depression scores than those without these interventions (Chu, 2016). The purpose of this project was to provide a standardized process of screening, educating, and referring patients at risk for PPD. A literature review was completed utilizing the CINAHL and Joanna Briggs databases. A convenience sample surveyed inpatient women's health nurses to determine current policy and practices for screening, educating, and referring patients at risk for PPD. Baptist Hospital LaGrange (BHLA) screens every postpartum patient utilizing the Edinburgh Postnatal Depression Score (EDPS) without a further policy regarding PPD education and referral. A PPD Education Bundle was created, which consisted of a policy and procedure, an algorithm, and a resource guide. Implementation and evaluation of the PPD Education Bundle efficacy is currently ongoing. The proposed result surveys patients upon discharge to determine if the intervention was given, encourage patients to self-report utilizing the Pregnancy Risk Assessment Monitoring System (PRAMS), and perform chart audits to evaluate documentation and follow up provided by the women's health nursing staff.

POSTER 64

Baptist Health Floyd Neuro-Heart Unit (NHU) Microsystem

Jessica Sumner / Faculty Sponsor: Ms. Michelle Pendleton

Understanding a microsystem can lead to improving the system. One such microsystem at Baptist Health Floyd is the Neuro Heart Unit (NHU). NHU a twenty-bed stepdown telemetry unit that focuses on the care of the cardiac and neuro patient. The unit is a high-volume unit with a mixed acuity. This unit is in the process of transitioning from a five to one nursing ratio to a four to one nursing ratio. They are also preparing to change to a progressive care unit or intermediate step-down unit. With the

transition that is occurring, it is extremely important to understand the factors that impact the unit to ensure that excellent patient care is provided along with ensuring staff satisfaction with their working environment. The purpose of this poster is to describe a microsystem analysis of NHU which includes purpose, patients, processes, professionals, and patterns unique to the unit to identify further opportunities for improvement (The Dartmouth Institute, 2001).

POSTER 65

Effects of Yoga on Parkinson's Patients: A Review of the Literature

Dyna Zehnder / Faculty Sponsor: Mr. Christopher Webb

Parkinson's Disease is a progressive neurodegenerative disease that affects approximately one million people in the United States. The disease affects muscular strength, flexibility, tone and control as well as cognitive function and mood. It damages the person's ability to move, speak, and even breathe. Particularly impaired is the ability to balance, therefore, the risk of falling is common. Even the patient's ability to smile falls away. Many who acquire the disease struggle to function and feel disabled and depressed. The purpose of this study is to review the literature to determine if using yoga as an alternative therapy is a viable treatment option to reduce the symptoms of the disease.

PHYSICS

POSTER 66

Robotics with Humanoid Robot NAO and Hexapod (Robotic Spider)

Carlos Galindo / Faculty Sponsors: Dr. Akhtar Mahmood, Dr. M. Saleem and Mr. Stephen Brown

Robotics is an exciting field. Various types of robotics devices are being used in many sectors of the industry, in NASA's Mars missions, hospitals and movies, among others. Since robotics technology has witnessed a remarkable growth, there is a need to educate the next-generation undergraduate STEM students in robotics. We have been conducting research in fully-autonomous robotics with our Humanoid-Robot NAO and in semi-autonomous robotics with Hexapod in our Robotics Lab. We have programmed a humanoid robot, called NAO that has the ability to detect the surroundings and can hear, communicate, carry out conversations with humans and can even sense/detect being touched. We have programmed NAO in Python to become fully-autonomous. NAO has 25 degrees of freedom and has multiple touch sensors, and hence is able to carry out specific tasks in the lab and can work alongside students. NAO is controlled by a specialized Linux-based Operating System, called NAOqi, which allows NAO to interpret and understand data received by its sensors. NAOqi powers the robot's hardware, which includes four microphones (for voice recognition and sound localization), two speakers (for multilingual text-to-speech synthesis) and two HD cameras (for vision, including facial and shape recognition).

Natural and human-created disasters often leave search-and-rescue missions reliant on human efforts in dangerous scenarios. We have experimented with applying semi-autonomous functionality by building a Hexapod robot using a PlayStation-2 controller

that can be used to aid human operators in search-and-rescue operations. Using this controller, we are able to investigate the movements of the hexapod and understand its physical capabilities, which is necessary to determine whether a hexapod could function in diverse environments. We will highlight the advantages of implementing semi-autonomous human-operated robotics.

POSTER 67

Photon Simulation Studies for the Dark Energy Science Collaboration (DESC) at LSST (Large Synoptic Survey Telescope) Using Bellarmine University's Tier2 Grid Supercomputer

Russell Sexton and Stephen Denny / Faculty Sponsors: Dr. Akhtar Mahmood and Dr. M. Saleem

Bellarmino University is part of the LSST (Large Synoptic Survey Telescope) project and is a member of LSST's Dark Energy Scientific Collaboration (DESC). LSST will have a 3.2 Gigapixel camera (the world's largest digital camera once completed). LSST will conduct a 10-year survey of 37 billion stars and galaxies that will deliver large volumes of images and data sets (astronomical catalogs) that is thousands of times larger than previously compiled to address some of the most pressing questions about the structure and evolution of the universe, such as understanding Dark Energy that is driving the acceleration of the cosmic expansion. LSST is a Big Data Science project in Astronomy and Astrophysics. LSST will produce 15 Terabytes of raw data images per night. LSST will produce about 100 Petabytes of imaging data over 10 years of operation, which will be the largest astronomical data set in the world. We are pioneering and spearheading the LSST grid computing efforts using the OSG cyberinfrastructure. The LSST project is developing a set of sophisticated simulation tools to produce realistic LSST images. Photon Simulator (PhoSim) is one of the major simulation tools for the LSST project. Our research efforts are aligned with the LSST-DESC Science Roadmap. We have implemented a dedicated grid site at Bellarmine University using the Open Science Grid (OSG) cyberinfrastructure in order to run the PhoSim Monte-Carlo simulation tasks and some of the LSST DC2 (Data Challenge2) simulation jobs on the grid for the LSST's Dark Energy Science Collaboration (DESC). PhoSim package uses FFTs (Fast Fourier Transforms) and fast intercept calculations to determine a comprehensive physical description of the atmosphere and the LSST telescope & CCD camera in order to simulate realistic optical/Infrared astronomical images.

PSYCHOLOGY

POSTER 68

A Study of Disclosure and Awareness

Ryan Coleman / Faculty Sponsor: Dr. Thomas Wilson

It is commonly accepted in the field of psychology that, if a participant cannot report the influencing variables in an experiment, then they were not aware of it. The experimental conditions can then be assumed to be implicitly processed. This experiment aims to challenge that assumption by replicating a study conducted in 2011 that concluded that its participants were not aware that they had been primed to disclose information about themselves. My experiment aims to show that participants are in some way aware of the experimental effects, even if they cannot report that they were.

Comparing Fear Responses in a Cross-Sectional Sample of Typically and Atypically Developing Children

Mairin Cotter / Faculty Sponsor: Dr. Christy Wolfe

This project investigates fear responses in children who have been diagnosed with Autism Spectrum Disorder (ASD) and how these responses may serve as an early intervention behavioral marker. ASD is a neurological and developmental disorder that involves a range of impaired social interaction and communication skills, as well as impaired recognition of facial expressions and emotions. As a result, children identified with ASD are often unable to appropriately identify and react to fearful situations or people. In order to examine at what ages these abnormal reactions occur, a survey was given to parents of children with ASD of ages 2-17 asking questions related to their child's response to various stimuli and situations. The same survey was given to parents of typically developing children to serve as a control. These results may contribute to diagnostic criteria for early identification and intervention for ASD.

HONORS THESIS PRESENTATIONS SUNDAY, APRIL 22

Reception • 12:30 p.m.

Session I • 1:00-2:30 p.m. • Group A

- Sierra Hall, “Devonian Stromatoporoid Interactions at the Falls of the Ohio State Park, Clarksville Indiana” — Advisor, Dr. Katherine Bulinski
- Erin Crone, “Comparison of Habitat and Water Quality in the Blue River’s South and Salem Forks in Southern Indiana to Support Watershed Management” — Advisor, Dr. Martha Carlson Mazur
- Kate Zecher, “Performance Anxiety and the Benefits of Proper Breathing for Singing.” — Advisor, Dr. Mark Kano

Session I • 1:00-2:30 p.m. • Group B

- Elizabeth Dugan, “Determining the Effects of Quercetin on Cadmium Toxicity in Kidney Cells” — Advisor, Dr. Mary Huff
- Jacob Drescher, “Cytotoxicity of Chalcones Against MiaPaCa-2 cells” — Advisor, Dr. Amanda Krzysiak
- Mary Elaine Kuo, “Cytotoxic Evaluation of a Chalcone Derivative Library on A549 cells” — Advisor, Dr. Amanda Krzysiak

Session II 2:45-4:15 p.m. • Group C

- Ryan Coleman, “A Study of Self-Disclosure Priming and Awareness” — Advisor, Dr. Tom Wilson
- Mairin Cotter, “Comparing Fear Responses in a Cross-Sectional Sample of Typically and Atypically Developing Children.” — Advisor, Dr. Christy Wolfe
- Katie Neff, “The Associations Between Gaming and Cortisol Production” — Advisor, Dr. Mary Huff and Dr. Christy Wolfe

Session II 2:45-4:15 p.m. • Group D

- Matthew Kondrat, “‘May the hour of retribution be near at hand for the traitor,’ John L. Haynes in the Civil War” — Advisor, Dr. Eric Roorda
- Clare Hagan, “Where Literature and Philosophy Meet and Diverge.” — Advisor, Dr. Evanthia Speliotis
- Molly Phelps, “Gender and Spiritual Possession in *The Tale of Genji*.” — Advisor, Dr. Jon Blandford

