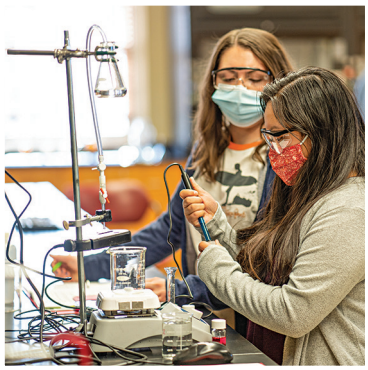

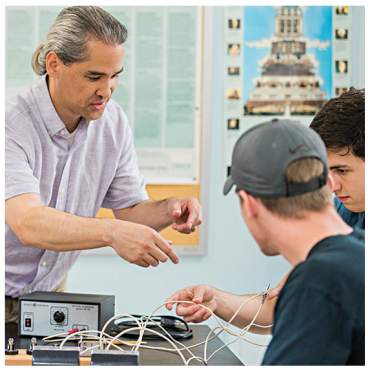

SYMPOSIUM

EIGHTEENTH ANNUAL UNION UNIVERSITY SCHOLARSHIP SYMPOSIUM

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EIGHTEENTH ANNUAL UNION UNIVERSITY SCHOLARSHIP SYMPOSIUM

TUESDAY, APRIL 20, 2021

Visit **uu.edu/events/uuss/2021**

Poster Presentations (P)

Virtual Event	Student Presenters
	Joshua Marcotte (BUS)
	John Charles Tidwell III (Trey) (EGR)
	Emory Craft, John Mayer, and Reagan Oliver (EGR)
	William Parker Rice (EGR)
	Roger Baker (EGR)
	Michael Drury, Luis Larrinaga, and Davina Norris (EGR)
	Benjamin Marsch and Tobey Taylor (EGR)
	Kristina Michaud (NUR) | Christina Davis (NUR)
	Taheim Eady, Ndey Fatou Njie, and Rebekah Omoruyi (NUR)
	Juanjeca Barrow, Shayla Cue, and Laquitta Wilkins (NUR)
	Ashton Joyner, Carey Grace Peebles, and Rachel Reeves (NUR)
	Teresa Johnson, Ashley Jones, and Timothy Lovelace (NUR)
	Lori Hurlbut, Casey White, and Marcus Williams (NUR)
	David Barrera Jr., Hoa (Henry) Nguyen, and Jesús R. Zambrano (NUR)
	Katherine Faltot, Cory Riley, and Olivia Sognesand (NUR)
	Inga Paige Juchheim and Asmait Rezene (NUR)
	Aaron Drees, Jamie Ellerbrook, and Colton Gramse (NUR)
	Kristen Butler and Christina Lumpkin (NUR)
	Roman Comer, Mason Matzek, and Oktay Mustafayev (NUR)
	Jennifer Bunte, Ashley Diaz, and Chuncey Ward (NUR)
	Stacy Stahl (NUR) | Morgan Grones (NUR)
	Matthew Bell (NUR) | Reni Valimattathil (NUR)
	Joel Ryan Palmer (NUR) | Abe Rummell (NUR)
	Holden McCall (NUR) | Brenda Ramirez-Lopez (NUR)
	John Shields (NUR) | Rebecca Woods (NUR)
	Jaspa Kungu (NUR) | Meagan Meketi Seratt (NUR)
	Aaron Davis (NUR) | Shelby Darnell (NUR)
	Alan Bowles (NUR) | William Cobb (NUR)
	Lekeisha Carter (NUR) | Ruben Dettman (NUR)
	Roger Brewer (NUR) | Brittney Wright (NUR)
	Amy K. Howell (NUR) | John "Adam" Miller (NUR)
	George Sciple (NUR) | Jennifer L. Neyman (NUR)
	William Spratlin III (NUR)
	Ashley Mendez (PHARM)
	Scott Morris (PHY)
	Katherine Ward (PHY)
	Jonathan Van Neste (PHY)

SCHEDULE

Oral Presentations (O)

Dept.	Room	Student Presenters	Time
ART/BUS/COM/ PSY/SOC Session Chair: Chris Nadaskay	BAC 44	Hannah Cobb (ART) Sara Nevius (ART) Raymond Chahyadi (BUS) Hannah Eason (COM) Madison Garner, Lydia Goins, and Grace Peecher (PSY) Caleb Allen (SOC)	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m. 3:20 p.m. 3:40 p.m.
BIO Session Chair: Andy Madison	WH 101	Sarah Childress Elyssa Smith Christopher Johnson Samantha Jones Darius Mullin *Break* Dylan Parmely Amber Rhodes Jordan Crawford	1:20 p.m. 1:40 p.m. 2:00 p.m. 2:20 p.m. 2:40 p.m. *3:00 p.m.* 3:20 p.m. 3:40 p.m. 4:00 p.m.
BIO Session Chair: Faith Zamamiri-Davis	WH 102	Kristen Bukowsky Lisa Hamilton Grace Ingram Bailey Krebs Hayden Rash *Break* Luke Spivey Leigh Walker	1:20 p.m. 1:40 p.m. 2:00 p.m. 2:20 p.m. 2:40 p.m. *3:00 p.m.* 3:20 p.m. 3:40 p.m.
CSC Session Chair: G. Jan Wilms	PAC A-7	Anton Nguyen Austin Smith Alexys Lee Christopher Griffin and Hunter Walker	2:00 p.m. 2:20 p.m. 2:40 p.m. 3:00 p.m.
CHE Session Chair: Jimmy Davis	PAC A-9	Abby Mausey Paige Bogard Jacob Greene	2:00 p.m. 2:20 p.m. 2:40 p.m.
EGR Session Chair: Georg Pingen	PAC D-3	Palmer Bell, Ben Marsch, and Dakota Stedman Luis Larrinaga and Davina Norris Emory Craft, John Mayer, and Reagan Oliver Michael Drury and Tobey Taylor	2:00 p.m. 2:30 p.m. 3:00 p.m. 3:30 p.m.
ENG/ICS Session Chair: Phillip Ryan	PAC D-53	Grace Runkle (ENG) Lydia Ezell (ENG) Laura Griffith (ICS) Ethan Judge (ICS)	2:00 pm. 2:20 p.m. 2:40 p.m. 3:00 p.m.

STM	JEN 325	Melanie Nassif	2:00 p.m.
Session Chair:		Samuel Sadler	2:20 p.m.
Jacob Shatzer		Caleb Green	2:40 p.m.

NUR (GR)	ONLINE	Ellouise Harris Knox	2:20 pm.
Session Chair:		Megan Pittman	2:40 p.m.
Elizabeth 'Charley' Elliott			

ART

Body Image Series: Being Transparent with One's Outward Appearance as it Relates to Society's Standards for Women (O)

Presenter: Hannah Cobb
Faculty Advisor: Chris Nadaskay

Women's bodies are constantly being critiqued by society. The way in which women view their own body can be easily swayed by that of public opinion. When body image is addressed in our society, we include components such as height, weight, and shape. Women's views of themselves are shaped by what they can relate their bodies to and where their own body lies on a spectrum of significance that has been largely dictated by society's standards for the "perfect" body type. All bodies have value and are significant because they were created within the aspect of Imago Dei. Finding beauty and confidence in one's body image is a step in the right direction to challenging public opinion.

Exploring Mental Health through Drawing (O)

Presenter: Sara Nevius
Faculty Advisor: Chris Nadaskay

Nearly one in five adults in the United States live with a mental illness. Unfortunately, there is still a stigma surrounding mental health in our society. Seeing mental illness represented through the arts is impactful and brings a new perspective. This body of work illustrates different mental disorders through the use of mixed media on paper. It allows the viewer to put themselves in other people's shoes and can spur conversation and bring awareness of mental health, as well as working against the stigma through the power of visual communication. ■

BIOLOGY

BIOLOGY

A Preliminary Study of Avian Populations on Agriculture Land Being Converted to Bottomland Hardwood Forest (O)

Presenter: Elyssa Smith
Faculty Advisor: Andy Madison

The continued destruction of wetlands for agricultural or urban development has resulted in habitat fragmentation of local flora and fauna. In 2020, the Pictsweet Company created a conservation easement on 238.69 ha of agriculture land to be converted into a bottomland, hardwood forest, located in Rossville, Tennessee. A preliminary study of avian populations was conducted using 500m transects within 3 different habitats (woods, grassland, and edge) across 5 sites located throughout the area. Results showed no differences between grassland and woods habitat regarding species richness, but the woods habitat did have more bird abundance than grassland habitat, although it was not significant. Edge habitat had the greatest species richness and abundance, which was expected since it is the mixture of the 2 habitats. We suggest that research should be conducted again in ~10 years to determine mitigation site progress.

The Biotic and Abiotic Correlates of the Abundance and Distribution of Seagrasses in Lake Worth Lagoon, Palm Beach County, Florida (O)

Presenter: Samantha Jones
Faculty Advisor: James Kerfoot, Jr.

Seagrass beds have undergone massive declines, and the goal of this study was to model potential patterns of environmental parameters and community structure that may correlate with its decline in Lake Worth Lagoon (LWL) over time. Nine transects and 4 polygonal areas throughout the LWL were visited annually (2007-2019) and environmental parameters (e.g., temperature), seagrass and macroalgae Braun-Blanquet (BB) scores, and community structure were recorded. Akaike Information Criterion (AIC) assessed the models developed to explain seagrass abundance for the transect data and community structure for polygonal areas. The transect AIC indicated that an interaction between year and macroalgal abundance best explained seagrass abundance. Interestingly, seagrass BB score showed a decline in 2013, with seagrass and macroalgae remaining very low. The polygonal AIC showed an interaction between year and site best explained the shift in community structure over time. Only certain sites experienced a shift in community structure correlating with 2013.

Investigating a Cricket's Worst Nightmare: Description of a New Species of Parasitoid Wasp (Vespoidea) (O)

Presenter: Darius Mullin
Faculty Advisor: Jeremy Blaschke

The genus *Rhopalosoma* (Cresson) (Hymenoptera: Rhopalosomatidae) contains rarely encountered wasps with the unusual lifestyle of cricket ectoparasitism. Only one *Rhopalosoma* species, *R. nearcticum* (Brues), has been described from America north of Mexico. However, molecular evidence from rhopalosomatid larvae collected in Cypress Grove Nature Park (Jackson, TN) has revealed the presence of two genetic clades—at least one of which must represent a new species record. Adult *Rhopalosoma* specimens were subsequently collected from Cypress Grove Nature Park using a Gressitt-style Malaise trap from Aug. 5–Sep. 17, 2021. A total of eighty-three specimens were collected and their morphology was compared with known species of *Rhopalosoma*. As a result of this analysis, we report a new species, *Rhopalosoma cupressi*, and include a morphological description of key traits, including ocellar characteristics, wing venation, and its distinction from the closely related *R. nearcticum*.

Interstate Effects on a Woodlot's Bird Population (O)

Presenter: Sarah Childress
Faculty Advisor: Andy Madison

This project compared bird abundance and diversity in the Union woods and a Union-owned woodlot adjacent to I-40. This project provided a baseline for birds living in the I-40 woodlot and to determine if interstate noise negatively affects bird abundance and diversity. I performed 10 min. point counts at 3 sites in each location from September to October and recorded all birds seen or heard. Point counts were conducted at all 3 sites 12 times for each location. No significant difference in diversity or abundance between the locations was found. Additionally, there were no species found significantly more in one location than the other. This indicates that bird diversity and abundance were similar between the Union woods and the I-40 woodlot, and that I-40's noise does not affect birds more than noise from roads adjacent to the Union woods.

Investigation of the Role of Deiodinase-3 in MCF-7 Cancer Cells Using CRISPR (O)

Presenter: Leigh Walker
Faculty Advisor: William Thierfelder

Clustered Regularly Interspaced Palindromic Repeats (CRISPR) technology can be used to knock out a targeted gene within a cell using the endonuclease Cas9. Recent studies have recognized the significance of deiodinase expression in cancer cells. In the human breast carcinoma cell line MCF-7, activity of iodothyronine deiodinase-3 (DIO-3), a deactivator of the hormone triiodothyronine (T3), was shown to increase in certain conditions. This project explores the importance of DIO-3 expression for the growth of MCF-7 cells, as well as how these cells respond to pro-inflammatory molecules (IL-6) and anti-inflammatory molecules (IL-10) when no longer expressing DIO-3. To investigate this response, 4 different guide RNAs targeting human deiodinase-3 and 2 non-targeting guide RNAs, were successfully cloned into a Cas9 expression plasmid and stably transfected into MCF7 cells, generating 6 lines containing the plasmids. Experiments to determine whether targeting and Cas9-mediated knockout of DIO3 were achieved are in progress.

Development of Plant Regeneration Protocols for the Globally Rare *Crataegus harbisonii* (O)

Presenter: Grace Ingram
Faculty Advisor: Michael Schiebout

This research focused on developing plant regeneration protocols for the globally rare *Crataegus harbisonii* (Harbison hawthorn). The research began in the field, with the objective of verifying previously identified *C. harbisonii*'s populations and collecting cuttings that were used in a bud regeneration protocol. A second phase used 222 seeds harvested from a cultivated *C. harbisonii* specimen and investigated the effects of cold stratification, scarification, and light quality/shade tolerance on seed germination. Finally, we investigated stem grafting and leaf tissue culture protocols on 2 commercial *Crataegus* species (*C. viridis* and *C. phaenopyrum*) with the goal of developing procedures in these species that could be transferred to *C. harbisonii*. Wild specimens were found, but the bud regeneration procedure was unsuccessful. For phase 2, none of the collected seeds germinated. For phase 3, 33% of the *C. viridis* stems developed roots. Progress has been made developing a standard leaf tissue culture for hawthorn.

Validation of Environmental DNA Surveillance to Detect the American Alligator (*Alligator mississippiensis*) in Controlled Experiments (O)

Presenter: Dylan Parmely
Faculty Advisors: Micah Fern and William Thierfelder

American alligator (*Alligator mississippiensis*) sightings have become more common recently in West Tennessee. The re-expansion of this cryptic species has led to the need of further investigation. As alligators dwell in the environment, they slough off DNA that can be used for environmental DNA (eDNA) detection, through a series of tests. Polymerase chain reaction (PCR) was used to detect eDNA by a primer specifically developed for the alligator. Alligator tissue samples were taken to test the primer's specificity to alligator DNA. Gel electrophoresis showed positive reactions by a band at roughly 100 bp. To further confirm the correct gene was amplified, the gel band was sent to Saint Jude for sequencing (results pending). Water samples were taken from alligator display tanks at Bass Pro Shops (Memphis) and DNA will be extracted to be used in PCR for a positive control (results pending).

BIOLOGY

Optimal Root Structure for *Thalassia testudinum* (O)

Presenter: Amber Rhodes
Faculty Advisor: Michael Schiebout

Turtlegrass *(Thalassia testudinum)* is a dominant seagrass species in the Atlantic that provides habitat, food, and carbon storage for many ocean communities. Turtlegrass communities are decreasing in many areas of its range. This lab-based study investigated the best root structure of *T. testudinum* for growth in culture with the goal of using these cultures for reintroduction or for additional lab studies. The 3 root structures were bare root, grow bag, and attached via rhizomes. All plants within grow bags died while both of the other treatments (rhizome and bare root) yielded leaf growth, a T-test indicated that this growth was not significantly different (p=0.8). Additionally, a field portion of the study investigated the effects of varying Photosynthetically Active Radiation (PAR) ratios on *T. testudinum* growth in Jobos Bay Puerto Rico. Preliminary calculations suggest a weak relationship between PAR ratios and seagrass density.

Chemical and Physical Factors Promoting Biofilm Formation of *Candida albicans* (O)

Presenter: Hayden Rash
Faculty Advisor: Esther Choi

Introduction: Oral Candidiasis is a result of the overgrowth of *Candida albicans* within the oral cavity. The fungi, a commensal organism, can become pathogenic when forming biofilm. The goal of this study was to determine what chemical and physical factors promote its biofilm formation. *Methods:* C. *albicans* were plated on microtiter plates, incubated for 48 hours. After removing planktonic C. *albicans*, firmly attached biofilm was stained with crystal violet. *Results:* Biofilm formation of C. *albicans* was significantly less in synthetic media when compared with complex media, and less in 37 °C than in 30°C.

Discussion: Taken together, these results indicate that C. *albicans* biofilm formation requires optimum concentration of carbon and its natural growth temperature rather than human body temperature. Our results can be used to prevent C. *albicans* biofilm-mediated infection in immunocompromised patients.

Detection of Environmental DNA (eDNA) for Identification of Freshwater Turtles in West Tennessee Ponds (O)

Presenter: Kristen Bukowsky
Faculty Advisor: Micah Fern

Use of Environmental DNA (eDNA) through polymerase chain reaction (PCR) analysis is a valuable molecular ecology research method for identifying species indirectly within a given ecosystem. This study aims to establish a procedure for the identification and validation of freshwater turtle eDNA within the water of a closed pond. Specifically, it investigates whether a species' eDNA can be identified from water within a tank of known organisms and a pond of relatively unknown organisms using species-specific primers designed to target the mitochondrial cytochrome c oxidase subunit 1 (COI) gene. Results are currently pending.

Effect of CRISPR Knockout of NF-kB in Mouse Macrophages on Deiodinase-2 Expression during Inflammation (O)

Presenter: Luke Spivey
Faculty Advisor: William Thierfelder

The inflammatory response is essential for human survival. Nuclear Factor kappa-light-chain-enhancer of activated B cells (NF-kB) is a complex of transcription factors responsible for expression of many inflammatory genes. NF-kB is thought to regulate the thyroid hormone activating type 2 iodothyronine deiodinase (DIO2) in astrocytes, but its role in mammalian macrophages is still unknown. To investigate DIO2 regulation by NF-kB, we used intracellular clustered regularly interspaced palindromic repeats (CRISPR) technology to disrupt the NF-kB p50 subunit in a mouse macrophage cell line. We plan to induce the cells with lipopolysaccharide (LPS) and test for upregulation of DIO2 by qRT-PCR. We predict that non-transformed cells will upregulate DIO2, while transfected cells will not. If this is the case, one can infer NF-kB indeed regulates DIO2 in mammalian macrophages.

Analysis of Cytokinins for Callus Production in *Araucaria araucana* (O)

Presenter: Jordan Crawford
Faculty Advisor: Mark Bolyard

The purpose of this project was to observe *Araucaria araucana* callus formation and growth. Three different cytokinins, 6-(γ,γ-Dimethylallylamino) purine, phloroglucinol, and meta-topolin, along with the auxin naphthapenacetic acid (NAA), were used to treat preexisting calluses which had been formed on media containing NAA and a variety of other cytokinins. Results indicated that callus growth continued in all the media treatments, but no shoot formation was noted. Callus treated with meta-topolin (55.6%; n=9) and phlorogluconol with NAA (47.6%; n=21) had the highest percentage of leaves with over 50% green callus, although the meta-topolin had a smaller sample size.

DNA Sequencing and Barcoding of Rhopalosomatidae Wasps and Its Phylogenetic Consequences (O)

Presenter: Christopher Johnson
Faculty Advisor: Jeremy Blaschke

The cricket-assassin wasps of family Rhopalosomatidae are one of the few remaining taxa within Hymenoptera lacking a comprehensive family-level molecular analysis. To remedy this, rhopalosomatid specimens from around the world were gathered for DNA extraction and sequencing. The genes elongation factor 1 (EF-1a) and RNA polymerase II (POL II) were chosen based on their high number of phylogenetically informative sites. Rhopalosomatidae specimens from each genus (*Olixon, Liosphex, Rhopalosoma, and Paniscomima*) were included, with Vespula (Hymenoptera: Vespidae) as an outgroup. Maximum likelihood and Bayesian analyses were performed and results from each gene were compared individually and together against current morphological classifications of the family. The traditional classification of Rhopalosomatidae was recovered with the unusual taxon *Olixon* as sister to the rest. In contrast, the new-world genus *Rhopalosoma* was recovered paraphyletic with respect to the old-world *Paniscomima*, potentially indicating common ancestry and the need to synonymize these two taxa into a single genus.

Tracking Autism Risk Gene Mutations in Zebrafish after Exposure to Glyphosate (O)

Presenter: Lisa Hamilton
Faculty Advisor: Hannah Henson

The purpose of this research was to determine the effects of glyphosate, a component of Roundup, on developing zebrafish (*Danio rerio*) embryos. Residue from glyphosate can enter the food chain through crops and water sources, and previous research has shown that exposure to glyphosate may disrupt neurodevelopment. *Shank3* is a popular gene associated with neurodevelopmental disorders and autism. Zebrafish possess homologues of this gene, shank3a and *shank3b*. Demonstrating the effects of glyphosate on *shank3a/b* expression in zebrafish embryos can model the dangers these pesticides may pose to aquatic life and humans, specifically in early development. After exposing zebrafish embryos to glyphosate for 96 hours, their RNA was extracted, and quantitative PCR was used to detect changes in *shank3a* and *shank3b* expression. Results are pending

Molecular Phylogenetics of the Cricket-Assassin Wasp (*Hymenoptera: Rhopalosomatidae*) (O)

Presenter: Bailey Krebs
Faculty Advisor: Jeremy Blaschke

Rhopalosomatidae are unusual wasps whose larvae parasitize crickets. The family is composed of 4 genera: *Olixon, Liosphex, Paniscomima,* and *Rhopalosoma*. Currently, the systematics of this family are based on morphology alone without the use of molecular data. To investigate intergeneric relationships within Rhopalosomatidae, DNA from 30 specimens representing the worldwide diversity of rhopalosomatids was extracted, amplified, and sequenced. Added to this data matrix were 35 COI barcode sequences from the Barcode of Life Database. The resultant maximum likelihood phylogeny showed high statistical support throughout, providing molecular evidence that largely matches previous morphological evidence (e.g. *Olixon* sister to the other genera) with one exception: *Paniscomima* was found to be nested within *Rhopalosoma*, indicating a possible need to merge these two genera into a single monophyletic genus. Future studies including additional genetic evidence and taxa are required to resolve this question. ■

BUSINESS

Mortality, Income Inequality, and Education: A Study of Indonesian Provinces (O)

Presenter: Raymond Chahyadi
Faculty Advisor: Colene Trent

A problem faced by many developing countries is a lack of understanding of the factors impacting mortality. A proper understanding of mortality is crucial since it allows countries to take proactive measures that can improve the lives of citizens. Cross-sectional studies of education, inequality, income, and mortality are very common in developed countries such as the United States, but similar studies using Indonesian data are rare. This paper uses cross-sectional 2020 census data of Indonesian provinces and multiple regression analysis to analyze education, inequality, and GDP per capita as predictors of mortality. The regression analysis indicates that education is not a significant predictor of mortality in Indonesia.

Minimum Wage: Why $15 is Too High (P)

Presenter: Joshua Marcotte
Faculty Advisor: Daniel Slater

Currently, the Democratic Party is trying to pass a bill that would more than double the minimum wage from $7.25 to $15 an hour nationwide by the year 2025. This proposal was rejected as part of President Biden's COVID relief bill but will still be pursued in the future in an attempt to implement this nationwide. Never in history has the minimum wage been doubled in such a short time. If this happens, the increase in wages would cause the cost of living to increase as well, therefore canceling out the raising of the minimum wage. Corporations will have to raise prices and layoff millions of workers. A jump like this would send unemployment levels higher than they have ever been before, and the only ones that would really benefit from a wage increase like this are those chosen to stay and work. The rest would be out of a job and in a worse spot than before. The minimum wage has not been increased as a nationwide mandate since 2009, and to more than double the wage between 2021-2025 seems like a short-sighted attempt to decrease poverty in the U.S., when other measures could be taken. I propose that over the course of these four years, the wage be increased in increments to $10 an hour. This large an increase in just four years would still be the highest in history and would be able to effect change in the economy, but not to the point where businesses fail, and millions are laid off. ■

CHEMISTRY

Potential Models of a Biochemical Catalyst (O)

Presenter: Paige Bogard
Faculty Advisor: Jimmy Davis

The objective of this research was to find a better method to polymerize phenols that are now polluting many water sources. The compounds that were investigated included DAPTT complexes and porphyrins; propylphenol was used as the phenol to be polymerized. The products of these reactions were compared to the product of the dioxane control experiment with the only compound that seemed to yield significant results being Fe porphyrin. These products were characterized through FT-IR, DSC, ^{13}C NMR, and 1H NMR. The results supported the idea that two different polymers, a phenylene polymer and an oxyphenylene polymer, formed with two possible terminal endings, a quinone and an alcohol ending.

Potential Catalysts for the Polymerization of Phenols (O)

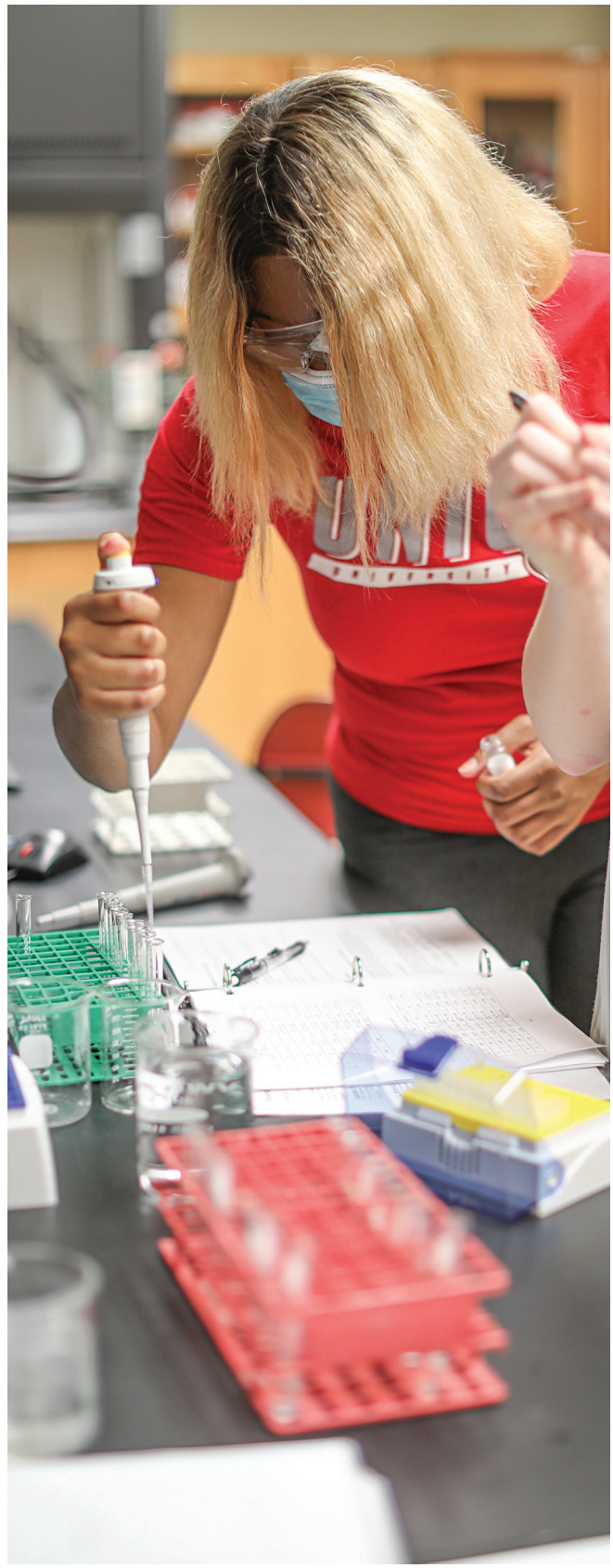
Presenter: Jacob Greene
Faculty Advisor: Jimmy Davis

Diacetylpyridine bis benzoic acid hydrazide (DAPBH) compounds were investigated for their ability to catalyze the polymerization of phenols in the presence of hydrogen peroxide. These compounds were compared to hematin as a control catalyst. None of the DAPBH complexes formed a significant amount of product. The product formed by hematin was investigated using FTIR, hydrogen-NMR, and carbon-NMR to determine the polymer structure.

Automatic Expansion of 3D Motif Palette for RNA Tertiary Structure Design (O)

Presenter: Abby Mausey
Faculty Advisors: Randy Johnston and Joseph Yesselman

RNA is a component of a multitude of biological systems. To perform these cellular functions, RNAs must fold into complex 3D structures. RNA's tertiary structure is unique as it is composed of discrete and module building blocks known as motifs. These motifs can be approximated as static LEGO blocks and have been assembled into a diverse set of RNA nanostructures for many practical applications. The goal of this project is to generate a self-updating library of motifs to be used in RNA design. This library will automatically query the Protein Databank (PDB) to identify new RNA structures. When new structures are identified, they will be processed using DSSR (Dissecting the Spatial Structure of RNA) to separate them into their constituent motifs. By creating a centralized location for all known RNA structural motifs and creating RNA structures from the use of the motif database, this research will achieve its long-term goal. ■



COMMUNICATION ARTS

Libel Law and Personhood (O)

Presenter: Hannah Eason
Faculty Advisor: Chris Blair

It is a well-known fact that the words we say matter. This project explores the ways in which libel law adds to that meaning and how it helps to shape the experience of being a participating member in society. This is accomplished by giving a brief history of the landmark libel cases that shape what we know as libel law today, as well as through extensive interviews with experts in the law. The history is incredibly important, as it sets the precedent for how libel lawsuits are decided. However, this research seeks not only to understand the history, but to understand what libel law means for members of society on a deep, personal level. ■

COMPUTER SCIENCE

Invisible Influences: Data Questionnaire & Visualization for Professional Development Business Use (O)

Presenters: Christopher Griffin and Hunter Walker
Faculty Advisor: G. Jan Wilms

Wolf Prairie (WP) is a business that equips leaders and company employees for better personal and professional flourishing. They needed an assessment and visualization tool that analyzes certain 'invisible influences' in categories that measure, bias, experience with, and comfortability with various people groups or topics. The presentation will explore the digital creation of this product for Wolf Prairie, the learning objectives, challenges and roadblocks along the way, the end-result questionnaire, and the final take-ways for both client and developers.

Virtual Breadboard (O)

Presenters: Alexys Lee
Faculty Advisor: G. Jan Wilms

Physical equipment for education tends to degrade quickly through frequent use. In the Engineering department, it is something they have to be aware of as they teach their digital logic and circuits classes. For this project, I am creating a virtual desktop application that models the breadboards that the engineering department uses and allows for students to design and test circuits without having to create them physically on a breadboard. This desktop application will use Java, as well as JavaFX to aid in the creation of a drag and drop user interface. It will be different from other circuit making software the department uses, because it will allow the student to transfer the exact circuit they made over to a physical breadboard.

Branding, Web Design, and Web Development for Give Back Memphis (O)

Presenters: Anton Nguyen
Faculty Advisor: G. Jan Wilms

Give Back Memphis is a non-profit organization that offers pro-bono consulting to local nonprofits. Operating on a skills-based volunteering model, they recruit very efficient, smart consultants with a lot of heart and an incredible variety of business expertise. These service-minded individuals work to strengthen the Memphis non-profit community and have collaborated with over 30 organizations. However, while *Give Back Memphis* has found great success, the consultancy needs help with their visual identity and online presence. Therefore, this project has two major components: 1) crafting a distinct brand identity, and 2) developing a website that best serves their audience of clients and consultants. *Give Back Memphis*' new branding will reflect their organizational values and ethos of constant growth, and the website will inform online visitors of their mission, services, and consulting process.

Church Attendance APP (O)

Presenters: Austin Smith
Faculty Advisor: G. Jan Wilms

Most Southern Baptist churches have a Sunday morning bible study commonly called Sunday School. Sunday School attendance has long been tracked manually; hard copy paper roles that were hand delivered to the Church office. The Church Attendance APP will automate this process utilizing Apple iOS devices. Individuals attending Sunday School with Apple iOS devices will enter their attendance into the APP and the APP will send that information to the Church office electronically. Sunday School leaders will enter the data for individuals who do not have an Apple iOS device. From there, the office Apple desktop computer will summarize each class and tabulate the total attendance. ■

ENGINEERING

Battery Life of a Laptop and How to Maximize Use Time (P)

Presenter: John Charles Tidwell III (Trey)
Faculty Advisor: Don Van

Almost everyone in school nowadays has a laptop, with a large amount of school work needing to use online resources. Also, almost everyone has experienced the pain of leaving their charger behind when their laptop has little to no charge left. The outcome of this 8th fractional factorial design of experiment is the duration of use of a laptop once fully charged. The overall objective expected of this experimental project is to maximize this operational duration knowing what consumes the battery's charge and to what extent. Factors affecting the outcome of this design of experiments are Brightness, Sound, Background program running, Streaming online, Multiple tabs open, and the environment (outside or room temperature). The results from this design of experiment will benefit the laptop users with tips to change settings and other ideas to conserve a battery's charge life.

Environment's Effect on Memory and Concentration (P)

Presenter: William Parker Rice
Faculty Advisor: Don Van

Academic students would prefer to maximize their studying to yield the best results in terms of memory and concentration. To understand which type of environment and factors yield maximized mental concentration and memorization, the design of the experiment tests 8 factors and their effect on concentration by recording the time to solve a memory puzzle. The factors are as follows: Volume Level of Music (Low or High), Type of Music (Instrumental or Lyrical), Time of Day (Morning or Night), Snack Consumed (Yes or No), Room Temperature (Cold or Hot), Water Consumed (Yes or No), Seating (Couch or Table), Light (Off or On). The experiment utilizes the sixteenth fractional design. The results will show which factor has the largest effect on concentration and memory to maximize their studying habits to the fullest potential.

Regenerative Braking: A Study on Efficiency (P)

Presenters: Emory Craft, John Mayer, and Reagan Oliver
Faculty Advisor: Don Van

Regenerative braking is an energy recovery mechanism that converts a moving vehicle's kinetic energy into storable electrical energy. The team researched the regenerative braking process and thought about how to improve the efficiency of it. The potential solution that was researched and designed took advantage of thermoelectric generators. These generators convert thermal energy, in the form of a temperature gradient, directly into electromagnetic energy through a phenomenon known as the *Seebeck* effect. The team proposes that these devices be implemented near the surface of brake pads in addition to normal regenerative braking systems to collect some of the heat loss that escapes to the atmosphere.

Maximizing Precision (P)

Presenter: Roger Baker
Faculty Advisor: Don Van

The design of this experiment investigated the effects of four factors on the precision of a commercially available small-bore rifle. The objective of this experiment is to maximize the level of precision to be similar to a custom competition rifle. The four factors are the type of ammunition, the torque on the action screw, taping the barrel, and removing the barrel band. As guided by the full factorial design of experiment, a combination of these factors will be changed for each shot group and the group will be measured for distance between impact points. The smallest distance yields the highest precision. This will be repeated until all combinations of the variables have been tried. Each experimental run will then be repeated three times to replicate the data. Lastly the results will be compared to a more expensive competition rifle.

Assistive Eating Device (AED) (O)

Presenters: Michael Drury and Tobey Taylor
Faculty Advisor: Georg Pingen

Cerebral Palsy is a neurological condition caused by damage to the immature brain. Symptoms can include, problems swallowing, walking, reduced range of motion due to muscle stiffness, and tremors. These symptoms impact many aspects of everyday life for these individuals, and many require full time care and assistance. West Tennessee Healthcare contacted Union University regarding a patient who suffers from Cerebral Palsy. The patient has trouble using a fork to pierce food items and spillage when delivering food to her mouth and when drinking out of an open cup. Her posture is also adversely affected during mealtime. Because of these challenges, she has to rely on assistance from others to enable her to eat. West Tennessee Healthcare asked us to design a device that will enable the patient to eat with little to no assistance that she could use while in their care as well as at her own home. After researching Cerebral Palsy and common solutions for the challenges these patients face, we decided to build a device that would help support her arm through the motion of eating and drinking. Our device is based off a simple four-bar linkage utilizing cleverly placed rubber bands to offer the assistance needed to make her arm nearly weightless. The device will support her arm using a sling, which wraps around the center of her forearm and is attached to the top of the four-bar, which provides support and further simplifies the device. We have utilized primarily 3D-printed components in our design to save weight as well as money.

Sun Tracking Solar Panel (P)

Presenters: Michael Drury, Luis Larrinaga, and Davina Norris
Faculty Advisor: Don Van

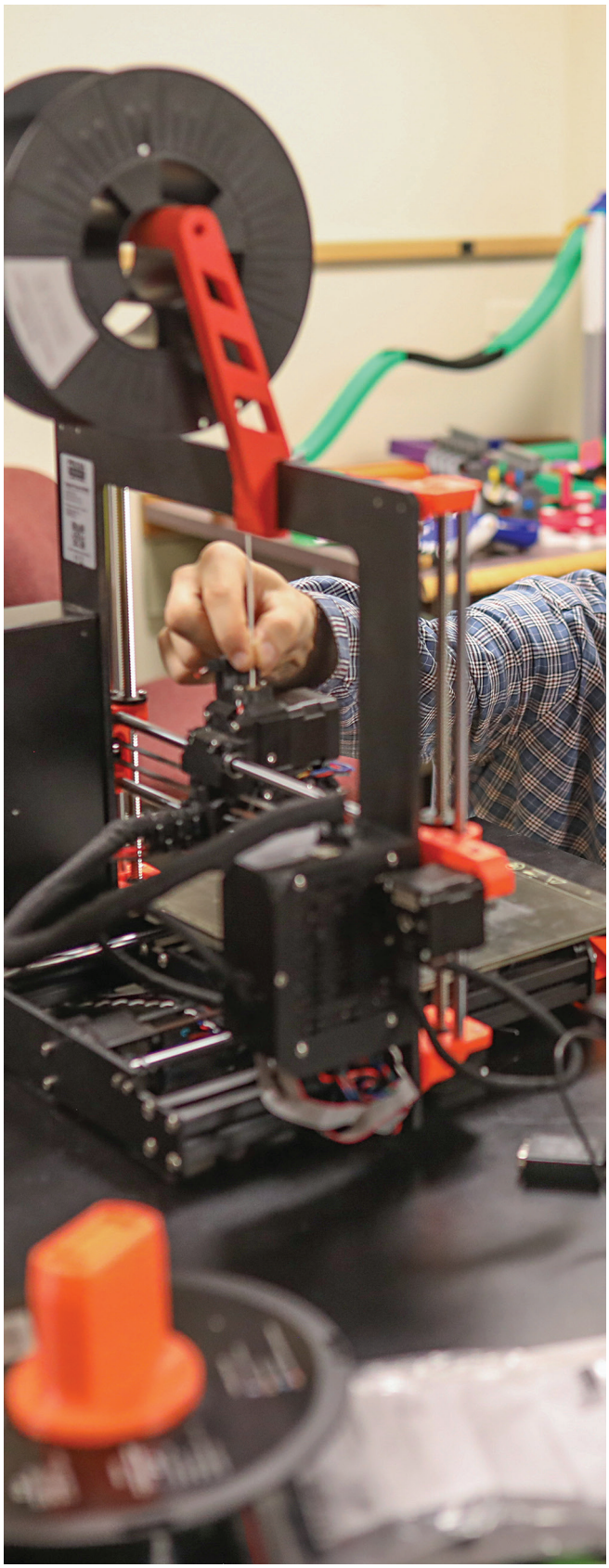
The tilt angle of a solar panel is an important component of solar panel design. The tilt angle has a large effect on the power produced by a solar panel. Many solar panel systems have fixed tilt angles that are optimized for the location of the solar panel. A fixed angle system may be optimized for the average position of the sun, but that does not mean it is optimized for every position of the sun. The alternative to this method is to have a system that allows the solar panel system to track the sun through the sky. This ensures the tilt angle is optimized for every position of the sun throughout the day. For this project we will build a small-scale sun tracking solar panel system, utilizing an Arduino and servo-motors. We would also like to include a Wi-Fi transmitting system so that we can collect solar panel data on a laptop away from the elements, however this is not a priority of the project. We will compare the power output per day with a fixed tilt angle to the power output per day with the sun tracking. The sun tracking system will require power to run the Arduino and motors, we would like to compare the power used by this sun tracking system to the power increase due to the sun tracking system.

The Compost-Heated Coffee Dryer (O)

Presenters: Palmer Bell, Benjamin Marsch, and Dakota Stedman
Faculty Advisors: Jay Bernheisel and Georg Pingen

Coffee is a worldwide staple beverage, and all who drink it rely on coffee farmers from Nepal to Guatemala to Ethiopia and elsewhere to produce the coffee bean. According to Red Beetle Coffee Labs, our client, many of these farms are not massive industrial or agricultural operations, but small businesses run by local families. The current methods for drying beans for shipment are either too expensive for small operations or suffer from inconsistencies like inclement weather. For this project we were asked to provide a cheap and reliable method so that coffee farmers could improve their economic options. We were also asked to incorporate compost heat in the design to incentivize local farms to use their waste sustainably. We began with a comprehensive study of current methods, noting their strengths and weaknesses, and then began developing a controlled dehydrating coffee shed with compost as its heat source.

ENGINEERING



Capturing Energy from Sound (P)

Presenters: Benjamin Marsch and Tobey Taylor
Faculty Advisor: Don Van

Engines, generators, pumps, and all other machines lose significant amounts of energy to the environment in the form of useless heat and sound. Although many scientists and engineers have tried to recapture that heat using various clever methods, fewer efforts have been made to recapture the lost sound energy. We are interested in exploring how much energy exists in such sound. In this study we will attempt to quantify the energy carried in sound lost from a power-producing system. We will then explore some possible methods to extract that sound energy and convert it back into useful energy, noting the advantages and disadvantages of each method.

Exploring Compliant Mechanisms for an Adjustable Thickness Airfoil (O)

Presenters: Emory Craft, John Mayer, and Reagan Oliver
Faculty Advisors: Georg Pingen and Jay Bernheisel

The team investigated compliant mechanisms as a method for dynamically adjusting the thickness of the cross-section of an airplane wing, or an airfoil. Doing this in-flight will improve the performance characteristics of the wing. The team used many different technologies and software, including CAD, topology optimization, and multi-physics finite element analysis packages. During the design process, many airfoils were printed with different materials to determine which material would be best. The final airfoil design was implemented into a functional RC airplane.

Testing for Microbiological Contaminants in Water Filtered by Ceramic Water Filters (O)

Presenter: Luis Larrinaga and Davina Norris
Faculty Advisor: Georg Pingen

Contaminated water is a major problem in many parts of the world, killing thousands of people every year. *Transformation Nepal* is an NGO which works to provide water filtration solutions for the many people in Nepal who suffer from contamination in their water supplies. Our team was tasked with developing methods of testing the ceramic water filters manufactured by *Transformation Nepal* to be implemented in the new water filter factory. Our team designed a testing set up to meet the needed constraints and criteria. The testing lab had to fit a 350 square foot room, be adaptable for a wide range of temperatures, and be able to test 2 to 3 filters out of every batch of 150 filters. Our set up is capable of filling about five water filters at a time, and 2 different brands of bacteria tests were run on each filter. By using a model of our designed set up, we were able to create plans for a testing lab and recommend a brand of bacteria tests as well as testing procedures to *Transformation Nepal*. ■

ENGLISH

Hath Not a Jew Eyes?: Sociology, Prejudice and Shylock (O)

Presenter: Lydia Ezell
Faculty Advisor: Jason Crawford

In *The Merchant of Venice*, Shylock's character has been analyzed through multiple lenses, including economics, race, religion, and history. My research has centered around interpreting the character of Shylock through the work of Sociologists who define prejudice. I examined the interactions between that major characters and Shylock and applied Gordon Allport's definitions of prejudice and Herbert Blumer's four indicators for identifying prejudice. This research indicates that the Christians in the Merchant of Venice are prejudiced against Shylock; however, the group dynamics are not that simple. I explored how certain characters' positions within the dominant group are fragile and how within the dominant group a hierarchy still exists. Applying Sociological theories to Shakespeare's examples of in-group and out-group interactions in *The Merchant of Venice* exposes the same inconsistencies and frailties seen in the ways that modern people create groups.

The Redemptive and Degenerative Grotesques in Flannery O'Connor's Fiction (O)

Presenter: Grace Runkle
Faculty Advisor: Scott Huelin

In her essay, "Some Aspects of the Grotesque in Southern Fiction," Flannery O'Connor explains that grotesques originate from a desire to combine two disparate things: "one is a point in the concrete, and the other is a point not visible to the naked eye but believed in." O'Connor's grotesque characters embody unstable juxtapositions. These coincidences of opposites confound human logic and reveal anagogical truth. A paradox which haunts O'Connor's fiction is the correspondence of ugliness with beauty. Often, an O'Connor character's vision needs to be violently upended in order to unveil Christ's beauty. This paper will trace the degenerative and redemptive grotesque through "Revelation," "Parker's Back," "A Temple of the Holy Ghost," and "The Displaced Person." ■

INTERCULTURAL STUDIES

Inside and Outside the Church: Finding the Intercultural Nature of Hospitality (O)

Presenter: Ethan Judge
Faculty Advisor: Phillip Ryan

Hospitality, at its core, is mainly an intercultural phenomenon. Theories in Intercultural Studies can help unpack the complex dynamics of this phenomenon. Hospitality can be split into four groupings: its definition, the event, the roles of host and guest, and people's mindset towards it. It can be argued, within Christian tradition, that hospitality is central to the gospel and what it means to be Christ's church. It is essential that Christians contemplate the complex influences of hospitality on their lives and the lives of others, inside and outside church settings. This paper will argue, using an interdisciplinarian literature review, that viewing hospitality through intercultural communication can help churches learn the dynamics of hospitality, which prepares them to address issues pertaining to the gospel, such as kingdom building, identity, and justice. This research can function as a literary review for future qualitative research projects on how the church extends hospitality locally.

Community and Narrative as Advocacy: Non-Profit Immigration Services in Jackson, TN (O)

Presenter: Laura Griffith
Faculty Advisor: Phillip Ryan

This research centers on non-profit organizations providing legal services to immigrants in the Southeastern United States and integrates reflections and analysis from a participation-research experience with interdisciplinary academic research. In this presentation, I will first contextualize immigration on national, regional, and local levels and address aspects of the current climate and background. I will then discuss the dynamics of being a faith-based organization. Finally, I will explore immigrant narratives and their power as agents of change within communities through numerous complex pathways. In an age where migration remains a key political and economic issue, policies and ethics related to immigrants are also vital considerations for people of faith. I will demonstrate how non-profit immigrant support services create valuable partnerships with government agencies to advocate for immigrant populations through legal aid and community mobilization. ■

NURSING [GRADUATE]

NURSING [GRADUATE]

Primary Care Nurse Practitioners' Perceived Need for Employer-Sponsored Bereavement (O)

Presenter: Ellouise Harris Knox
Faculty Advisors: Cathy Ammerman and Catherine Aslin

Bereavement is a known response of unprocessed grief to unexpected death. Primary care nurse practitioners experience this phenomenon while providing complex care. While this is a well-known occupational stressor, most employers do not offer bereavement support (ESBS). The purpose of this study was to determine if nurse practitioners delivering outpatient primary care perceive the need for ESBS after experiencing unexpected patient death. An original ten-question survey was developed and implemented with a convenience sample of outpatient primary care nurse practitioners in the Mid-South region of West Tennessee and Mississippi. The results of the study show that outpatient primary care nurse practitioners indeed perceive a need for employer-sponsored bereavement intervention, yet most participants indicate that they are reluctant to participate if such intervention is offered. These research findings demonstrate a need for employer-sponsored bereavement support, yet provide opportunity for further research to understand why there is hesitancy to participate.

Onboarding New Nursing Faculty – What is Missing? (O)

Presenter: Megan Pittman
Faculty Advisor: Elizabeth "Charley" Elliott

This integrative research review is an invitation for would-be nurse educators to feel seen and heard. It calls for career academics to realize the gap that has been inadvertently created over time between the equally necessary nursing disciplines of practice and education. Experienced nurses are uniquely poised to become academic nurse educators, but the barriers both real and perceived may feel insurmountable. Through careful review of available literature, it was discovered that the research begs for the supported transition of well-seasoned and well-prepared nurses into the indispensable discipline of nursing academia. This research will be used to build an adaptable tool that may be shared among academic nurse educators in the pursuit of excellence in onboarding experienced nurses into the academic profession.

Evaluation of an Entrance Exam Such as the Test of Essential Academic Skills (TEAS) in Undergraduate Nursing Curriculum (P)

Presenter: Christina Davis
Faculty Advisors: Denise Thornton-Orr and Cynthia Powers

Retention in undergraduate nursing continues to be a concern. The TEAS exam is a useful tool in that it gives an overall score and then provides sub-category scores in the topics of reading, math, science, and English. Setting a benchmark on the TEAS exam for entrance into an undergraduate nursing program would likely improve retention. This project, through quantitative data analysis, sought to determine if there was a statistical relationship between low cumulative TEAS scores and decreased retention. The data analyzed consisted of student ID numbers, TEAS scores and retention information across undergraduate nursing. After analysis, the data has shown a correlation between low scores on the exam and lower attrition rates. This is evidential confirmation of the need for a target score as criteria for entrance. Further evaluation of the data could even necessitate a need to meet a certain standard in one of the sub-categories, particularly science or math.

Recommendation for Nursing Practice Regulation to Provide Consistency Across States During Public Health Emergencies: Is National Nursing Licensure the Answer? (P)

Presenter: Kristina Michaud
Faculty Advisor: Cynthia Powers

Public health crises demonstrate the importance of professional nurses and their uninhibited movement to respond to the public needs. During disasters and public health emergencies, regulation on nursing licensure is inconsistent at best. Do the emergency changes to licensure indicate the need to change nursing licensure regulation? The purpose of this review is to examine the emergency actions over the last 20 years in response to natural disasters or public health crises such as the COVID-19 Pandemic; it is a precursory investigation into whether nursing licensure regulation hindered any emergency response. Themes identified during literature synthesis include barriers to interstate practice, healthcare worker liability concerns, licensing and occupational reform, and public health and safety. Future research should focus on emergency response barriers within healthcare and a deeper dive into the regulatory changes made during actual emergencies. Consistency should be sought in licensure as well as legal protections for healthcare providers.

Comparison of International Health Care Systems: United Kingdom (P)

Presenters: Taheim Eady, Ndey Fatou Njie, and Rebekah Omoruyi
Faculty Advisor: Shari Wherry

The healthcare system of the United Kingdom (UK) works on providing free healthcare to all. The United Kingdom is inclusive of four countries; Scotland, Wales, Northern Ireland, and England. The UK utilizes taxes to provide free healthcare to its citizens. Their governing body uses the Barnett formula to determine how much money should be distributed to each country (Charlesworth, 2019). Although the national health service (NHS) is often thought to be a national healthcare system, there are noticeable differences across the United Kingdom's four nations (Cylus et al., 2015). There are many pros and cons to the healthcare system infrastructure that the UK employs. This country suffers from a chronic shortage of medical doctors, which reflects the waning quality of care its citizens' experience when they need specialized care. The UK spends the lowest per capita on healthcare system-related research compared to the United States and Canada; however, the UK has shown the most impact on healthcare system performance (Barer & Bryan, 2017).

A Comparison of International Health Care Systems: China (P)

Presenters: Ashton Joyner, Carey Grace Peebles, and Rachel Reeves
Faculty Advisor: Shari Wherry

China has the world's largest population at 1.4 billion people, and its healthcare system has undergone many changes to try to meet individuals' needs (World Bank, 2021b). One of the major changes China made to its system was developing universal insurance coverage (Fang, 2019). As of 2018, the average health expenditure per capita in China was equivalent to $501, which was significantly less in comparison to the United States (World Bank, 2021a). This poster presentation aims to compare healthcare in China with the United States in eight different aspects to identify strengths and weaknesses present in global healthcare systems. The topics to compare include the following: the payer system, financing/supply, reimbursement, production, provider choice, challenges, world ranking, and gross domestic product spent on healthcare.

Comparison of International Health Care Systems: Finland (P)

Presenters: Teresa Johnson, Ashley Jones, and Timothy Lovelace
Faculty Advisor: Shari Wherry

In 2017, the life expectancy at birth in the United States was 78.6 years (Murphy et al., 2017), while in Finland it was 81.7 years (OECD, 2017). Circulatory diseases, including cardiovascular disease and stroke are the leading causes of death, and in recent years, dementia have risen to the second leading cause of death (OECD, 2017). Among 188 countries studied, Finland is in the top seven for healthcare quality (Study, 2018). A poster on the Finnish healthcare system will be created and will discuss the payer system, financing/supply, reimbursement, production, provider choice, challenges, WHO world ranking, and gross domestic product spent on healthcare. This poster will be used for comparing healthcare systems from other countries created by other members of the DNP Nursing Health Policy and Economics class.

Comparison of International Health Care Systems: Egypt (P)

Presenters: Lori Hurlbut, Casey White, and Marcus Williams
Faculty Advisor: Shari Wherry

Egypt has a diverse health care system. This diversity is due to the various public and private providers and financing divisions (Pande et al., 2017). With a population of 82 million, government spending on healthcare has declined, thus causing 60% of healthcare expenses to come from out-of-pocket payments (Rashad & Sharaf, 2015). This presentation will discuss Egypt's economics and healthcare system in comparison to other developing countries. A poster will be presented including the following categories for comparison: payer system, financing/supply, reimbursement, production, provider choice, challenges, world ranking, and gross domestic product spent on health care. The purpose of this presentation will be to educate colleagues at the Union University Scholarship Symposium about the healthcare system in Egypt in comparison to the United States and other countries presented within the class.

Comparison of International Health Care Systems: India (P)

Presenters: David Barrera Jr., Hoa (Henry) Nguyen, and Jesús R. Zambrano
Faculty Advisor: Shari Wherry

This project aims to examine India's healthcare system by presenting an analysis of its overall function and how it reflects on India's economy. India utilizes a universal healthcare system. This healthcare system is free to all, but there are multiple challenges: lack of healthcare awareness, healthcare access, lack of healthcare workers, and cost of healthcare (Kasthuri, 2018). With India's population growing at an exponential rate, there is a possibility that the universal healthcare system may become overwhelmed and fail given their healthcare system ranks 112 according to the World Health Organization (2021). However, over the last thirty years, the private healthcare sector has barged in and alleviated some of this stress but at the same time has caused India patients to pay approximately 75% out of pocket costs to receive healthcare (Kasthuri, 2018).

NURSING [GRADUATE]

Comparison of International Health Care Systems: Australia (P)

Presenter: Juanjeca Barrow, Shayla Cue, and Laquitta Wilkins
Faculty Advisor: Shari Wherry

The purpose of this presentation is to provide a comparison of the economic information for Australia's healthcare system to other nations, as well as Australia's overall world ranking in several defining categories. The Australian structure offers its citizens several options for access and coverage. It operates under a hybrid model where Australian citizens, permanent residents, and refugees can benefit from both a publicly funded Medicare option and purchase privately owned insurance (Dixit & Sambasivan, 2018). The public is taxed 1.5% to fund the public option and 2.5% for families and those without private insurance. In 2019, 9.3% of the Australian gross domestic product (GDP) went to healthcare and averaged $5,187 per capita in healthcare expenditures (OECD, 2021). Some inconsistencies concerning the government's obligations for primary health care has resulted in uncoordinated care amongst health care providers (Freeman et al., 2021). As a result, Australia encounters difficulties such as resource allocation and improvement in patient satisfaction (Dixit & Sambasivan, 2018).

Comparison of International Health Care Systems: Spain (P)

Presenters: Katherine Faltot, Cory Riley, and Olivia Sognesand
Faculty Advisor: Shari Wherry

Spain and the United States both have similarities and differences in their healthcare systems. The overview of this presentation discusses the challenges, healthcare coverage, and provider choice differences in Spanish healthcare. Spain, like the United States (U.S), experiences a large influx of immigrants of diverse backgrounds. Immigration challenges the healthcare systems by increasing healthcare inequalities (Ledoux et al., 2018). In terms of coverage, Spain offers universal coverage of approximately 99.5% (Bernal-Delgado et al., 2018). According to Bernal-Delgado (2018), public health is also provided to those who are unemployed, retirees, and contributors to social security. The provider choice policy in Spain requires patients to opt-out of the Statutory Public System. However, patients can choose their own primary care provider (PCP). Each PCP has a limited number of patients they are allowed at any given time (Abásolo & López, 2017).

Comparison of International Health Care Systems: Israel (P)

Presenters: Inga Paige Juchheim and Asmait Rezene
Faculty Advisor: Shari Wherry

According to Clarfield et al. (2017), Israel remains a country that spends a reasonably low amount per capita in healthcare but has a higher life expectancy compared to other developed countries. Life expectancy is currently 80.9 years (OECD, 2020). An increase of 7.6% in gross domestic product (GDP) has reached a plateau in recent years. Israel's universal health insurance is funded by both government revenue and income tax. Presently, Israel's 8.5 million inhabitants must enroll in a healthcare plan option (Clarfield et al., 2017). The purpose of this project is to assess Israel's healthcare system in terms of choice of provider, production, supply options, finance, reimbursement, payer system, world ranking, challenges, and GDP spending.

Comparison of International Health Care Systems: Mexico (P)

Presenters: Aaron Drees, Jamie Ellerbrook, and Colton Gramse
Faculty Advisor: Shari Wherry

Like the United States, healthcare in Mexico is comprised of both private and public sectors and is divided into three subsystems: the "privately insured, the publicly insured, and the uninsured" (Bautista-Gonzalez et al., 2021, p. 1). Excessive out-of-pocket payments often restrict individual access to services (Organization for Economic Cooperation and Development, 2019). Comprehensive rights to individual health, access to health services, and health care economic reform have become a priority concern for the Mexican health system (Barraza-Llorens et al., 2002). According to the World Health Organization, public resources for health have become more equitably distributed, thereby increasing the access to healthcare for many individuals. Increased federal funding in Mexico is working to establish access for both public and private financing of national healthcare (Frenk et al., 2009). This group will present a poster examining the healthcare structure in Mexico compared to the United States.

Comparison of International Health Care Systems: Russia (P)

Presenters: Kristen Butler and Christina Lumpkin
Faculty Advisor: Shari Wherry

Not since Mikhail Gorbachev and the U.S.S.R., has there been so much discussion about Russia. As of late, current President Vladimir Putin and former President Donald Trump have once again made Russia a household name in the United States. Nonetheless, what does one really know about the status of Russian life today? The US has a reputation of being one of the richest but unhealthiest countries. How does Russia compare? According to Jakovljevic et al. (2019), "The rapidly developing nations of Brazil, Russia, India, China, and South Africa (BRICS nations) have a combined economic output that makes BRICS countries the world's major emerging economies" (p. 516). As part of the learning objectives for NUR 725 Nursing Health Policy and Economics, a poster presentation will be composed that overviews Russia's payer system, financing/supply, reimbursement, production, provider choice, challenges, world health organization ranking (WHO), and gross domestic product (GDP) spent on healthcare.

Exploration of International Health Care Systems: Germany (P)

Presenters: Roman Comer, Mason Matzek, and Oktay Mustafayev
Faculty Advisor: Shari Wherry

Germany's national healthcare system provides high-quality care, maintains reasonable costs associated with health insurance, and allows its citizens to freely choose their healthcare providers (Rajfur & Hys, 2018). Since the passage of Bismarck's Health Insurance Act of 1883, Germany has been a leader in providing universal healthcare to its population (Busse et al., 2017). The current public statutory health insurance program is a primary source of funding for Germany's healthcare-related costs. Roughly 90% of German citizens are covered under the public statutory health program while the remaining 10 % are covered by private insurance (OECD, 2019). According to OECD (2019), 11.2% of Germany's gross domestic product was spent on healthcare in 2017, and Germans reported nearly zero unmet medical needs. However, Germany still encounters many challenges, including sustainability of long-term care, an aging workforce, and over-utilization of hospital care (OECD, 2019).

Comparison of International Health Care Systems: Canada (P)

Presenter: Jennifer Bunte, Ashley Diaz, and Chuncey Ward
Faculty Advisors: Cathy Ammerman and Shari Wherry

The ability to supply adequate, cost-efficient healthcare and fulfill most citizens' differing needs is a challenging task for many developed countries. Governments and healthcare officials wrestle with ways to provide essential services and support their people without crippling the system and stripping the prestige and worth from high-earning degrees in medicine. Some countries have been more progressive and created different ways to manage and improve, while others continue to struggle. The economic and political factors that control these systems vary from country to country and for different reasons. In this poster, we will expand on Canada's healthcare system and compare it to other developed countries. Special attention will be placed on the payer system, financing/supply, reimbursement, production, provider choice, challenges, world ranking (WHO), and gross domestic product spent on healthcare.

NURSING [GRADUATE]

Communication Techniques to Improve the Patient Experience in the Perioperative Setting (P)

Presenter: Stacy Stahl
Faculty Advisor: Gwendolyn Randall

Anesthetists have historically treated the physiological side effects of fear and anxiety through pharmacologic means. The purpose of this study was to assess current evidence and provide evidence-based practice recommendations on whether communication techniques are beneficial in reducing the need for pharmacologic treatment in fearful and anxious perioperative patients. A review of the current literature showed that certain communication techniques can be beneficial in decreasing fear and anxiety in the perioperative patient. It was also found that certain communication techniques or lack of communication can negatively affect the experience of the perioperative patient. This information and examples of communication techniques were compiled into a presentation for nurse anesthesia students and nurse anesthetists practicing in the Memphis, Tennessee area. The information disseminated in the presentation will aid in assisting anesthesia providers in incorporating beneficial communication techniques and avoiding harmful communication techniques into their clinical practice.

Anesthesia Staffing Models Cost-Benefit Analysis: An Educational Tool to Increase Awareness (P)

Presenter: Joel Ryan Palmer
Faculty Advisor: Andrew Rice

Healthcare costs in the United States consistently increases each year and hospitals are always looking for ways to decrease costs while maintaining quality care. Anesthesia-related costs comprise a large expenditure and hospitals can decrease expense and save money based on the anesthesia model used. There are multiple types of anesthesia providers that are able to practice in the U.S., but certified registered nurse anesthetists and physician anesthesiologists make up the large majority of those providers. This study assesses the change in student registered nurse anesthetist's knowledge of anesthesia provider cost-effectiveness and safety. Participants were exposed to an intervention on the subject and the researchers found a significant increase in knowledge after intervention participation.

Pseudocholinesterase Deficiency Treatment in the Postoperative Environment (P)

Presenter: Abe Rummell
Faculty Advisor: Tracy Walker

Pseudocholinesterase deficiency is a rare condition that can have detrimental effects on the surgical patient population. Although, challenging to diagnose, pseudocholinesterase deficiency can cause prolonged neuromuscular blockade, in the postoperative period. These select patients will require prolonged ventilation after surgery. The condition and postoperative care are well documented in literature published for the anesthesia community, but the information is not readily available to the nursing community as a whole. This study aims to create a helpful educational tool to instruct nurses who care for pseudocholinesterase deficiency patients after surgery. Although rare, this condition needs to be well understood by the entire healthcare team that will care for them postoperatively to provide the safest evidence-based care.

The Addition of Dexmedetomidine to Local Anesthetic to Increase the Duration and Effectiveness of Spinal Anesthesia: An Evidenced Based Practice Update for SRNAs (P)

Presenter: Holden McCall
Faculty Advisor: Andrew Rice

A review of current literature indicated that the use of dexmedetomidine as an adjuvant to local anesthetic in spinal anesthesia increases the length and effectiveness of the block. This information was compiled into a presentation for second- and third-year nurse anesthesia students (n=20) currently participating in clinical training. A post-presentation Likert survey was completed by the study participants and the results reflected an increase in knowledge and awareness of dexmedetomidine utilization in spinal anesthesia. The results also indicated that student registered nurse anesthetists are more likely to incorporate dexmedetomidine in their anesthetic plans for patient receiving spinal anesthesia. Increasing awareness and knowledge of this novel use of dexmedetomidine will equip future anesthesia providers with the tools to provide diverse anesthetic techniques to meet patient needs.

Examining the Effectiveness of Education Provided to Student Registered Nurse Anesthetists' (SRNAs) Regarding the Pre-Operative Administration of Midazolam in Patients with Post-Traumatic Stress Disorder (PTSD) (P)

Presenter: Matthew Bell
Faculty Advisor: Jordan Palmer

An integrated research review was performed to collect information regarding the pre-operative administration of midazolam and its effect on emergence delirium in adult patients with PTSD undergoing general anesthesia. Subsequently, a presentation was created to disseminate the results found during the review. To assess the effectiveness of the presentation as an educational component, SRNAs were recruited to participate in a research project to determine if a significant difference in participants' knowledge over the subject matter occurred after viewing the presentation. Pre- and post-tests were created that contained questions over the findings discussed in the presentation. Participants were instructed to complete the pre-test, review the presentation, and complete the post-test. It was found that a significant difference in higher scores occurred between the pre-test and post-test. Since a higher score indicates a higher number of questions answered correctly, the results suggest that the presentation increased participants' knowledge over the subject matter.

Improving Provider Understanding of the Risks and Benefits of Labor Analgesia using Epidural or Combined Spinal Anesthesia vs Natural Childbirth (P)

Presenter: Reni Valimattathil
Faculty Advisor: Jordan Palmer

This research project examines provider's education regarding neuraxial labor analgesia and its risks and benefits. It also focused on common misconceptions regarding neuraxial labor analgesia among parturients. The most common fears about neuraxial labor analgesia among parturients included harm to neonates, back pain and extra cost. Some of the negative effects of neuraxial analgesia revealed by literature review were increase in duration of second stage of labor and an increase in instrumental delivery. The research results were used to create a PowerPoint presentation in order to educate providers regarding the true risks and benefits of neuraxial labor analgesia. A pre-test was conducted followed by review of PowerPoint, and then a post-test. The results of the post-tests revealed significantly improved scores when compared to pre-test. The research has revealed that there is a lack of proper knowledge regarding the negative and positive outcomes of neuraxial anesthesia among parturients and providers.

The Effectiveness of Improving Pulmonary Postsurgical Outcomes in Patients with Obstructive Sleep Apnea and Pulmonary Arterial Hypertension through an Optimal Anesthetic Perioperative Protocol: An Integrated Research Review (P)

Presenter: John Shields
Faculty Advisor: Tracy Walker

Studies indicate that obstructive sleep apnea is the most common undiagnosed co-morbidity in patients presenting for surgery. Understanding its impact on pulmonary hypertension and the best approach to management for these patients, during the perioperative stages of surgery, is imperative. Evidence-based pathways and protocols, for this patient population, are incomplete. Considerations, towards improving anesthesia practice, include consistent interventions involving positioning, continuous positive airway pressure, baseline hemodynamic continuity, and regional/multimodal pain management approaches including peripheral nerve blocks. Databases searched and utilized for this integrated research review included ScienceDirect, EBSCO, PubMed, and CINAHL. Inclusion criteria were publications from the years 2009-2020; patients diagnosed with obstructive sleep apnea and pulmonary hypertension undergoing surgical procedures with general anesthesia were examined throughout each perioperative phase of surgery. Commonly used medications, for the anesthetic management of this patient population, may result in postoperative complications that can be prevented.

Effectiveness of Dexmedetomidine as a Primary Sedative During MAC Anesthesia: An Integrated Research Review of Surgical Procedure Outcomes When Monitored Anesthesia Care is Required (O)

Presenter: Jaspa Kungu
Faculty Advisor: TaMara Carter

Anesthetics used as primary sedatives during monitored anesthesia care (MAC) can cause significant respiratory depression. Recent studies and research indicate dexmedetomidine may have beneficial use as an ideal primary anesthetic that does not cause respiratory depression during procedures requiring MAC. Both low and high-risk patients may benefit from the delivery of dexmedetomidine as a MAC sedative that minimizes adverse reactions and respiratory distress experienced when using propofol, opioids, or benzodiazepines during procedures. The objective is to identify and evaluate research needs in studies offering an assessment of dexmedetomidine utilization as the primary anesthetic during MAC. Further research revealed that dexmedetomidine has demonstrated efficacy for specifically identified procedures and may be utilized without significant respiratory depression. Use of dexmedetomidine is currently cost prohibitive when compared to existing MAC anesthetics. Additional research concerning specific procedure benefits may increase interest and reduce comparative cost differences enough to justify use recommendations for providers.

Effectiveness of Pectoral Nerve Block Versus Thoracic Paravertebral Nerve Block with Mastectomies: Evaluating Anesthesia Provider Awareness, Understanding, and Utilization (P)

Presenter: Morgan Grones
Faculty Advisor: Andrew Rice

Research shows that patients who have a radical mastectomy are likely to have moderate to severe postoperative pain. Two peripheral nerve blocks used to aid in postoperative pain in mastectomy patients are the thoracic paravertebral nerve block and the pectoral nerve block. A literature review was conducted, and the findings were presented to anesthesia providers at Magnolia Regional in Corinth, MS. The purpose of this research was to bring awareness and understanding of the effectiveness of the thoracic paravertebral block compared to the pectoral nerve block in mastectomy patients. At the conclusion of the presentation, a 5-Point Likert Scale was conducted to evaluate the understanding of the blocks prior to the presentation, the effectiveness of the presentation, and the likelihood of the anesthesia providers using each block in their future practice. The presentation of this material proved to be effective and is likely to lead to future practice change.

NURSING [GRADUATE]

Effects of Erector Spinae Plane Block and Postoperative Opioid Consumption: A Quality Improvement Study on Narcotic Use in Patients Undergoing Breast Surgery Following Nerve Block Intervention (P)

Presenter: Brenda Ramirez-Lopez
Faculty Advisor: Andrew Rice

The ESPB is a new interfascial nerve block that has been a successful analgesic intervention for thoracic surgery. The recent implementation of the ESPB for breast surgery pain management has decreased the amount of opioid necessary for analgesia, contributed to multimodal pain modalities, and decreased the current opioid crisis. The purpose of this quality improvement study was to examine current research and review the postoperative analgesic effect of ESPB through the amount of opioid consumption, as well as to evaluate the effectiveness and applicability of the findings to SRNA education and practice.

The evidence showed the ESPB was effective for postoperative pain management after breast surgery. Data from the anonymous survey showed the results were applicable and effective to SRNA education and practice as evidenced by a Likert average score of 4.75 students that strongly agreed, 7 students that agreed, and 0.25 students that neither agreed nor disagreed.

Efficacy of the Sphenopalatine Ganglion Block for the Treatment of Migraine Headaches (P)

Presenter: Rebecca Woods
Faculty Advisor: Jordan Palmer

Migraines are a disabling illness that are still poorly understood and undertreated. While common treatment regimens are often suboptimal, the utilization the sphenopalatine ganglion blockade (SPG) has shown promising outcomes for migraine sufferers. The purpose of this project is to examine the current studies on the effectiveness of local anesthetic application to the SPG for migraine relief. The research concludes that the SPG blockade is a valuable medical intervention, however, this technique is underused due to a knowledge deficit exhibited by health professionals. The development of an education tool which evaluated the anesthesia providers understanding on the SPG blockade revealed that medical professionals benefited from continued education. The hope is that with proper training, providers will gain more competence and confidence in using this type of block.

Perioperative Considerations of Cardiac Implantable Electronic Devices: An Integrated Research Review of Anesthetic Management and Device Magnet Application (P)

Presenter: Meagan Meketi Seratt
Faculty Advisor: Tracy Walker

There is a rising number of patients with cardiac implantable electronic devices (CIEDs) requiring anesthesia for surgical procedures. Significant confusion surrounds the appropriate perioperative and anesthetic management of these patients due to the advancement of CIED technology and diverse programming capabilities of devices. This confusion is especially apparent regarding CIED magnet application and subsequent deactivation of certain device functions. An integrated research review (IRR) was conducted in an attempt to address this issue. This review revealed that more evidence is necessary to formulate a more standardized, evidence-based protocol regarding the perioperative anesthetic care of patients with CIEDs. Further studies should examine the occurrence of clinically significant electromagnetic interference, optimal dispersive electrode positioning, and safety of magnet application versus device interrogation during the perioperative period. Using current evidence, a clinical reference tool was constructed. This tool can be used to facilitate optimal perioperative anesthetic management until further studies can be completed.

Postoperative Delirium and the Use of Dexmedetomidine as a Preventative Modality: A Quality Improvement Project (P)

Presenter: Aaron Davis
Faculty Advisor: Gwendolyn Randall

Postoperative delirium is a frequent psychological complication in adult patients undergoing general anesthesia. It leads to prolonged hospitalizations and increased morbidity and mortality. Literature suggests administration of dexmedetomidine, an alpha-2 agonist as treatment in preventing postoperative delirium, but results have been variable, lacking consensus amongst researchers. The purpose of the quality improvement project was to examine the knowledge of student registered nurse anesthetists (SRNA) regarding the use of dexmedetomidine as an effective adjunct in the prevention of postoperative delirium, based on evidence-based data. Results from this project revealed there was an improved understanding of postoperative delirium amongst SRNAs and a perceived value in the utilization of dexmedetomidine in helping to prevent postoperative delirium in adult patients. Targeting the increase in morbidity and mortality, additional means to prevent postoperative delirium should be explored by anesthesia providers.

Effects of Decreasing Fraction of Inspired Oxygen Concentration During General Anesthesia: An Integrated Research Review (P)

Presenter: John "Adam" Miller
Faculty Advisor: TaMara Carter

Objective: To evaluate current evidence regarding reducing FiO2 levels during general anesthesia in adult patients and the impact this will have on the reduction of atelectasis in the postoperative period. *Background*: The routine use of high FiO2 levels has become prevalent in the anesthesia community. Recent studies suggest that high oxygen concentrations can lead to alveolar collapse, postoperative complications, and poor outcomes. Design. This is an integrative research review. *Methods:* Searched databases included CINAHL, PubMed, Google Scholar, and several anesthesia specific journals. Inclusion criteria were as follows: population must be adult patients undergoing general anesthesia who received either a high or low FiO2 level as an intervention, publication within the last twenty years (2000-2020), and studies must include an outcome for each respective intervention. Results. Results indicate that high FiO2 levels are associated with increased atelectasis formation, increased incidence of pulmonary complications, and have the potential to cause poor outcomes. Once atelectasis occurs, a cascade of events including impaired gas exchange, shunting, and increased free radical release are responsible for negatively affecting patient care. *Conclusions:* Routine use of high FiO2 levels can be harmful and should not be used unless deemed necessary by the provider. *Relevance to clinical practice:* FiO2 levels should be selected based on patient history, assessment, and ideal oxygen saturation needed to safely complete the procedure, avoid post-op complications, and achieve good outcomes.

Student Registered Nurse Anesthetist Stressors and Exercise as a Healthy Coping Mechanism: A Systematic Review with a Presentation (P)

Presenter: Shelby Darnell
Faculty Advisor: Gwendolyn Randall

Nurse Anesthesia Track (NAT) graduate programs are habitually associated with increased stress levels which often lead to pathophysiological effects that hinder student registered nurse anesthetists' (SRNA) abilities to reach their full potentials throughout their NAT programs. Since the 1960s there has been growing recognition that while stress is an inevitable aspect of the human condition, it is coping that makes the big difference in adaptational outcome. The effects of stress are deleterious. This research project was designed to investigate the various coping mechanisms used by student registered nurse anesthetists secondary to the stressful rigors of their educational program, and to evaluate the perceived knowledge regarding the use of exercise as a healthy coping mechanism. There is some research data addressing the topic in the certified registered nurse anesthetist population, but none for student registered nurse anesthetists (SRNAs). Exercise can lead to improved performance in both the clinical and classroom settings.

Acute Flaccid Myelitis from an Anesthetic Perspective: An Integrated Research Review and Quality Improvement Project Concerning the Prevention of Residual Muscle Weakness and Prolonged Ventilation in Acute Flaccid Myelitis Patients (P)

Presenter: Brittney Wright
Faculty Advisor: Jordan Palmer

The increasing prevalence of Acute Flaccid Myelitis (AFM) and its lifelong residual effects increase the likelihood of anesthesia providers encountering AFM in clinical practice. To provide safe and effective care, providers must be knowledgeable of the disease and its anesthetic implications. The objective of this study was to identify anesthetic strategies that prevent perioperative residual muscle weakness and prolonged ventilation in AFM patients so that an educational presentation could be developed, and anesthesia providers' knowledge enhanced. Methods included an Integrative Research Review for the identification of prevention strategies and a Quality Improvement project with a pretest posttest design for the evaluation of providers' knowledge. Inflammatory mediator prevention, lung protective ventilation, lung recruitment maneuvers, rapid sequence induction, and other strategies were found to be crucial in optimizing outcomes in this population. Findings also indicate that educational presentations are an effective method for improving providers' knowledge of the disease and strategies.

NURSING [GRADUATE]

Reducing Surgical Blood Loss and Transfusion Reactions: A Quality Improvement Project of Acute Normovolemic Hemodilution Versus Blood Transfusion (P)

Presenter: William Spratlin III
Faculty Advisor: Jordan Palmer

This study aims to examine current evidence and asses the outcomes of acute normovolemic hemodilution (ANH) versus blood transfusion as it relates to surgical blood loss and transfusion reactions. Based on research, education was provided using evidence-based practice and a quality improvement program was created using a pre and posttest. Recent studies have revealed that although it is not commonly performed, ANH has proven superior to blood transfusions at reducing surgical blood loss, reducing the amount of blood transfusions, and results in fewer blood transfusion reactions. This review revealed that more study is needed before standard practice can be decisively changed. Many practitioners also merit an ethical debate on ANH being the standard of care in blood product management.

An Evidence Based Examination and Description of the Side Effect Profile of Sugammadex (Bridion) a Cyclodextrin Molecule: Quality Improvement (P)

Presenter: Lekeisha Carter
Faculty Advisor: Gwendolyn Randall

This quality improvement project was an examination of current evidence that analyzed the etiology of the adverse reactions of Sugammadex (Bridion). Sugammadex is used for the reversal of aminosteroidal neuromuscular blocking agents. While there are many benefits of using Sugammadex, the development of potentially life-threatening side effects such as severe hypotension, QT interval prolongation, and severe bradycardia have been reported. The goal was to evaluate knowledge deficits, among nurse anesthesia students, and develop a teaching tool to improve the delivery of care based on practice recommendations. The results of this project demonstrates that senior nurse anesthesia students are now able to recognize possible adverse reactions that may occur after Sugammadex administration, potential treatment recommendations, and practice recommendations to decrease its occurrence.

Validation of a 3D Printed Neck Model for Simulated Ultrasound-Guided Internal Jugular Central Venous Cannulation (P)

Presenter: Ruben Dettman
Faculty Advisor: Andrew Rice

Simulation training is beneficial for learning ultrasound-guided central line insertion, but commercial simulation models are often cost-prohibitive. This study compared a self-developed 3D print and silicone elastomer central line insertion model with a BluePhantom training manikin. Nineteen nurse anesthesia students performed blinded central line insertions on each model and rated them for realism of palpation and appearance, ultrasound picture, feel during needle insertion, overall realism, and usefulness as a training tool. Evaluation scores were compared using paired sample t-tests. The self-developed model achieved higher mean scores on all test items, with a statistically significant difference to a p-value of <0.05 for realism of palpation and appearance and overall realism. The material cost of the self-developed model was under $200 compared with a retail value of $1,599 for the BluePhantom model. The self-developed model performed as well as the BluePhantom training model at only a fraction of the price.

An Evidenced Based Comparison of the Ryanodex Formulation Versus Traditional Dantrolene (P)

Presenter: Jennifer L. Neyman
Faculty Advisor: Tracy Walker

This integrative research review aims to examine current evidence and compare outcomes of malignant hyperthermia (MH) patients following administration of either Ryanodex or standard dantrolene, in order to develop a decision-making algorithm for safe and cost-efficient treatment. Current evidence indicates that timely administration of a ryanodine receptor antagonist (Ryanodex or dantrolene) improves patient outcomes. Ryanodex, 150 times more concentrated than dantrolene, can be reconstituted in considerably less time than its predecessor. Research reveals that both formularies result in similar outcomes if administered immediately upon symptom recognition. However, further data is needed to develop a cost-benefit ratio that is facility specific. Clinical practice should focus on knowledge of facility's MH policy, the drug available, and proper preparation and administration to avoid delays in treatment.

Negative Pressure Pulmonary Edema in the Postoperative Period (P)

Presenter: Roger Brewer
Faculty Advisor: TaMara Carter

Objectives. To examine current evidence regarding risk factors, diagnosis, and treatment recommendations for negative pressure pulmonary edema (NPPE) in the postoperative period. *Background*. No recent clinical studies available in the literature characterizing listed objective. *Design/Method*. Integrated research review of Union University's electronic databases. Results. NPPE occurs more often in young, healthy patients and twice as likely to affect males than females and twice as likely when ETT is used versus LMA. Many cases develop after witnessed laryngospasm. Typical presentation of NPPE includes hypoxia, respiratory distress, adventitious lung sounds, production of pink, frothy sputum, and abnormal chest radiography. Treatments vary greatly, but focus on supportive care. Patient outcomes were largely positive with rapid resolution of symptoms. One study citied one fatality. *Conclusions*. This review supports the need for prospective, randomized studies evaluating NPPE in order to develop evidence-based, standardized clinical guidelines for the diagnosis and treatment of NPPE.

What Risk Factors are Known to Increase the Risk of Failed Spinal Anesthesia in Obese Obstetric Patients, and What Can Be Done to Improve Patient Outcomes? A Quality Improvement Project (P)

Presenter: Alan Bowles
Faculty Advisor: Gwendolyn Randall

Administering spinal anesthesia to obese obstetric patients is difficult and can be associated with an increase in failed neuraxial anesthetics. Clinical interventions to improve the success of neuraxial anesthesia in obese patients have been distinguished, and as the obstetric population reflects the national trend of increased body mass these interventions will be utilized more regularly. These interventions include increased training, use of low concentration local anesthetic with opiates, frequent assessment of sensory block, leaving increased length of catheter in the epidural space, identification of vertebral midline using tactile feedback from supraspinous ligament, and identification of the vertebral midline using patient feedback from placement attempt. Currently there is a lack of quantitative studies focusing on the obese parturient and by summarizing research and synthesizing a more complete perspective this Quality Improvement Project will contribute to the body of knowledge regarding the challenges and solutions in providing obese obstetric neuraxial anesthesia.

Diagnosing and Treating an Amniotic Fluid Embolism: A Literature Review (P)

Presenter: Amy K. Howell
Faculty Advisor: TaMara Carter

Objectives: Analyze diagnostic criteria and assess outcomes of patients treated with Atropine, ondansetron, and ketorolac (A-OK) or extracorporeal membrane oxygenation (ECMO) therapy for obstetric patients diagnosed with an amniotic fluid embolism (AFE). *Background:* Rapid diagnosis and treatment lead to better patient outcomes and lower mortality rates. *Design:* A literature review. *Methods:* Searches were conducted on the Union University library website and Google Scholar. Inclusion criteria were peer-reviewed articles published from 2013-2020. The population was obstetric patients diagnosed with AFE who received either A-OK or ECMO. *Results*: No internationally accepted diagnostic tool or criteria used to diagnose AFE exists. The pathophysiology is not entirely understood, making diagnosis and treatment difficult. A-OK and/or ECMO may produce positive outcomes. *Conclusions:* AFE is rare but devastating. It needs to be reported and studied further before best practice can be determined. *Relevance to clinical practice:* Concentrate on education, rapid diagnosis, and treatment.

Evidence-Based Analysis and Guideline Development of non-Naloxone Rescue Drugs for Opioid-Induced Respiratory Depression (OIRD) (P)

Presenter: George Sciple
Faculty Advisor: Tracy Walker

Opioid-induced respiratory depression (OIRD) is a low, but potentially fatal consequence for patients receiving opioid analgesics during both inpatient and/or outpatient surgical and/or diagnostic procedures. Naloxone has been the mainstay of treatment for reversing OIRD; however, its biggest drawback is the reversal of analgesia. Furthermore, renarcotization is also a risk with Naloxone administration. The purpose of this integrative research review (IRR) was to examine current published evidence regarding the use of non-naloxone rescue drugs for OIRD and assess whether non-naloxone drugs are a safe alternative to naloxone for reversing OIRD. Overall synthesis of the results from this IRR demonstrated that the adverse effects seen with naloxone can be reduced by giving small, incremental doses and titrating to the patient's respiratory rate rather than level of consciousness. Additionally, this IRR revealed that further studies are needed before determining if non-Naloxone drugs are safe alternatives to Naloxone for the reversal of OIRD.

The Purpose and Efficacy of Positive Pressure During Extubation Following General Anesthesia: An Integrated Research Review (P)

Presenter: William Cobb
Faculty Advisor: TaMara Carter

This research reviews the purpose of positive pressure during extubation to determine its efficacy in preventing post-extubation complications among general anesthetic patients. Life-threatening respiratory complications can occur during all phases of anesthesia however, they most frequently occur during the extubation and post-anesthesia recovery phases. These complications can be very detrimental to the patient and may even cause the patient to die. Positive pressure during extubation is one method of extubation that is utilized to help prevent respiratory complications after general anesthesia. This technique is mentioned in multiple anesthesia textbooks and in anesthesia literature as playing a significant role in the extubation process. However, very few anesthesia providers consistently use positive pressure upon extubating their patients. Various theories and explanations exist as to its purpose, performance, and the exact mechanism of action that this maneuver entails. ■

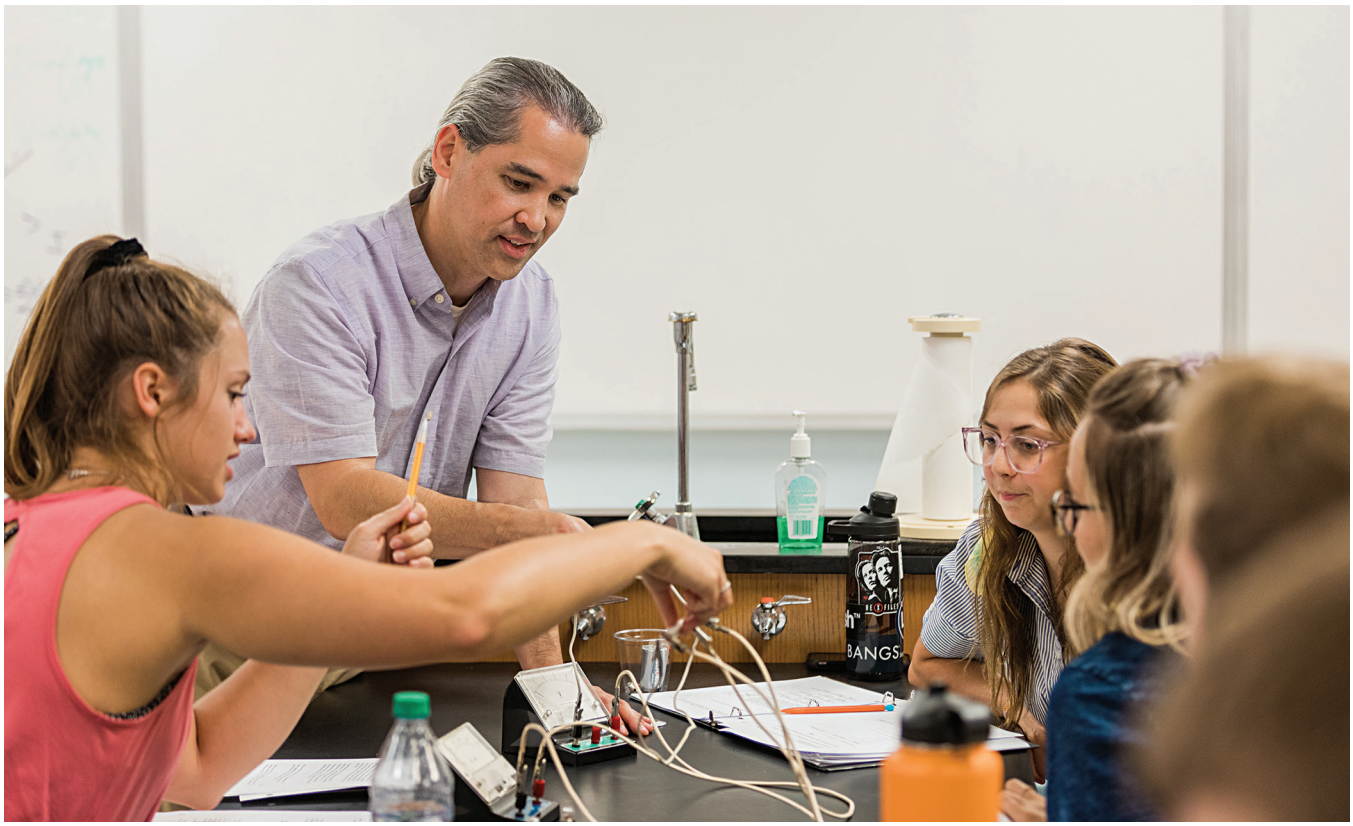
PHARMACY

Uvaria afzelii (UA) Induce Tumor Suppressor Proteins and Induction of ROS in SK-N-SH Human Neuroblastoma Cells (P)

Presenter: Ashley Mendez
Faculty Advisor: Lunawati L. Bennett

Neuroblastoma is a rare cancer caused by genetic mutation which leads to uncontrolled division of immature nerve cells. In the United States, there are around 800 incidences of neuroblastoma per year, which accounts for 50 percent of all cancer in infants younger than 1 year old. Uvaria afzelii (UA) is a small tree or spreading shrub found in West tropical Africa, and it has been known for many healing properties such as anti-tussive, pyrexia, dyspnea, respiratory tract infections, anti-microbial, inflammation/infection of the liver, kidney and bladder. The purpose of this study was to investigate and to understand how UA affects neuroblastoma using SK-N-SH cell lines as the model. Western Blots were performed to detect the genes that were up-or-down regulated in the SK-N-SH cells. HEK 293 kidney cells was used as a control to study the effects of UA on normal cells. UA concentration used in the SK-N-SH and HEK 293 cells were based on prior MTT results. The results of this study suggested that UA caused up-regulation of Apaf-1, Smac/DIABLO, and Bax proteins which are involved in apoptosis, while caused down-regulation of Bcl2, Src, and MMP2 proteins involved in anti-apoptosis, metastasis, and angiogenesis respectively. Further studies are needed to confirm UA effect on other proteins involved in tumor suppressor genes to elucidate its effect as a compound with antineoplastic properties. ■

PHYSICS



Measuring the Chaotic Behavior of Dripping Water (P)

Presenter: Scott Morris
Faculty Advisor: Fonsie Guilaran

The focus of this project is to measure the chaotic behavior of water droplets under various conditions and, if possible, to use these measurements to calculate the Feigenbaum bifurcation constant, δ. According to several published works, the driprate of water does not smoothly and continuously increase over time in response to increasing pressure. Instead, the falling droplet's frequency sharply doubles over distinct intervals until the system eventually becomes chaotic. By adopting and utilizing several different experimental techniques, this research chronicles the efforts in documenting this odd, counterintuitive behavior.

Determination of Liquid Viscosity Using a Bluetooth PASCO Smart Cart (P)

Presenter: Katherine Ward
Faculty Advisor: Geoffrey Poore

The goal of this research project is to experimentally determine the resistance coefficients of viscous fluids and compare to theoretical predictions. This is done by tying a string to a Bluetooth PASCO Smart Cart, running the string over a pulley, and attaching a metal sphere to the string. The sphere is submerged in a viscous fluid, such as water, oil, or honey. When the system is released from rest, it experiences linear drag force that acts on the falling mass. The application of Stokes' Law and the data collected from the smart cart allows for a determination of the viscosity of the chosen fluid.

Simulating the Gösgen Nuclear Reactor Experiment in Search of a Sterile Neutrino (P)

Presenter: Jonathan Van Neste
Faculty Advisor: Fonsie Guilaran

Neutrinos exist in three known flavors which they can oscillate between during neutrino oscillations. A common way to study these oscillations is at nuclear reactors, where electron antineutrinos are emitted towards detectors. One such experiment was performed at the nuclear reactor in Gösgen, Switzerland. Three detectors were 37.9, 45.9, and 64.7 m from the reactor. The Gösgen experimentalists examined χ^2 values, creating an exclusion region for the two oscillation parameters. The results from the Gösgen experiments, however, do not fit the standard three neutrino model. A possible new model adds a fourth neutrino, called a "sterile" neutrino. To examine this model, we constructed a computational model of the Gösgen experiments that reproduces their exclusion region. Then, by adding a routine that graphed $\Delta\chi^2$, we found the four-neutrino analysis fits the data better and favors four specific values for Δm41^2 which are 100 times larger than currently accepted values for Δm_31^2 ■

PSYCHOLOGY

Emotional and Physical Well-being of College Students during the COVID-19 Pandemic (O)

Presenters: Madison Garner, Lydia Goins, and Grace Peecher
Faculty Advisor: Jinni Leigh Blalack

Researchers examined the emotional and physical well-being of college students during the COVID-19 pandemic. Traditional undergraduate college students (ages 18-23) enrolled at Union University (n = 154) were surveyed in the fall semester of 2020 using the Depression, Anxiety, and Stress Scale (DASS-21), Big Five Inventory (BFI), and Insomnia Severity Index (ISI). Information on lifestyle behaviors, such as sleep and exercise, was also collected. The primary finding of this study suggests that college students who indicated COVID-19 as a significant stressor in their lives were found to have diminished well-being as measured by depression, anxiety, stress, and neuroticism. In addition, students who reported more frequent exercise sessions and greater quantities of sleep, perhaps utilized as coping skills, were less prone towards depression, anxiety, and stress. ■

SOCIOLOGY

An Assessment of Biblical, Integrationist, and Christian Psychological Approaches to Marriage Counseling (O)

Presenter: Caleb Allen
Faculty Advisor: Phil Davignon

There is an ongoing debate within the Christian community about the best approach to faith-based counseling. Biblical Counselors believe counseling should be almost exclusively based on scripture and scriptural principles. Integrationists rely heavily on secular concepts but seek ways to include Christianity within their counseling as well. Christian Psychologists are a mix between these two extremes, using secular models but also drawing on scripture and sources from the church's history. Marriage is highly valued within Christianity, and the Bible makes some profound claims about this sacred union (such as the beliefs that it is created by God and is meant to be lifelong). Since scripture has much to say about marriage, the Christian counselor should consider the need for scripture within marriage counseling. Scripture has many teachings and principles that could be greatly beneficial to marriage. This paper explores how different Christian counseling styles approach marital counseling, arguing that scripture is a necessary tool for improving marital quality and resolving conflict. ■

THEOLOGY AND MISSIONS

Irony in the Three Life-Stages of Søren Kierkegaard (O)

Presenter: Samuel Sadler
Faculty Advisor: Randall Bush

One of the central issues to German Idealism in the early modern era is that of the subject-object problem. Even Descartes dealt with the challenge of our consciousness of other things. Kant bridged the gap between the empiricist and rationalist approach, but his successors continued to develop ways to solve the subject-object divide. Fichte, Hegel and Schelling represent three approaches which try to solve this divide through a primarily rational synthesis. Schelling is unique in his elevation of the will over the rational principle, yet his solution still relies heavily on dialectic. Søren Kierkegaard offers a different solution to the subject-object problem which relies on a paradoxical synthesis through faith. In this schema, irony represents an essential part of the individual's existence in the world.

Justice in Augustine's 'City of God' and How it Relates to Critical Race Theory (CRT) (O)

Presenter: Caleb Green
Faculty Advisor: Jacob Shatzer

This paper will argue that the three primary aspects of Justice within Augustine's City of God are justice within man, justice between God and man, and justice in the city. Justice within man is determined by the correct ordering of the soul. Justice between God and man is determined what man owes God. Justice in the city is determined by how the men within the city relate to God. These three aspects of justice will be used to critique justice within Critical Race Theory. CRT does not factor in God when thinking about justice, it assumes God is not needed for a just city and ignores the centrality of justice in man's relationship to God.

An Exploration of Tradition in the Eastern Orthodox Church (O)

Presenter: Melanie Nassif
Faculty Advisor: Jacob Shatzer

This research project explores the importance and essence of Tradition in the Eastern Orthodox Church. Through the centuries, the apostolic faith has been discerned by weighing subjects and questions in light of the Tradition of the Church. Using this Tradition to understand the Scriptures, articulate doctrines, and answer theological questions is a complicated process that lies at the very heart of Orthodox theology. This research will first define Tradition, for the Eastern Orthodox understanding is different from Western Christians. It will then examine how the different parts of Tradition sanctify the Christian, each edifying the life of the individual believer in a unique way. Finally, this project will explore key theologians that are representative of various periods of church history. These significant thinkers show us exactly how Tradition was used to discern true apostolic faith. While examining their works, we can learn how Tradition operates and find the answers to many common objections to the Orthodox view of Tradition today. ■

RESEARCH GRANT RECIPIENTS *Fall 2020*

Undergraduate

Jeremy Blaschke, Christopher Johnson, and Bailey Krebs "Molecular Phylogenetics of the Cricket-assassin Wasps (Hymenoptera: Rhopalosomatidae)"

Esther Choi and Hayden Rash "Chemical Factors Promoting *Candida albicans* Biofilm Formation on Primary Oral Epithelial Cells"

William Thierfelder and Austin Spivey "Effect of CRISPR Knockout of NF-kB in Mouse Macrophages on Deiodinase-2 Expression during Inflammation"

James Kerfoot, Michael Schiebout, and Allison Schiebout "The Population Dynamics of *Thalassia testudinum* in Southeast Florida: A Mesocosm Study"

James Kerfoot and Samantha Jones "The Biotic and Abiotic Correlates of the Abundance and Distribution of Seagrasses in Lake Worth Lagoon, Palm Beach County, Florida"

Micah Fern and Dylan Parmely "Development and Performance Evaluation of Environmental DNA (eDNA) for the Detection of *Alligator mississipiensis*"

Hannah Henson and Lisa Hamilton "Investigating Changes in Autism-Related Gene Expression in Zebrafish after Exposure to Glyphosate"

Jay Bernheisel and Davina Norris "Testing for Microbiological Contaminants and Arsenic in Water Filtered by Ceramic Water Filters from Nepal"

Georg Pingen and Emory Craft "Reducing Flow Separation using Variable Thickness Airfoils"

Graduate

Esther Choi and Emilee Atkins "The Inhibitory Function of Quorom Sensing Molecules in Biofilm Formation of *Staphylococcus epidermidis*"

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