

10TH Annual Andrews University

Celebration of Research & Creative Scholarship

October 26, 2018 | Buller Hall

PROGRAM AND ABSTRACT BOOK



“At Andrews University, research is an inextricable part of the education experience. It informs our commitment to knowledge, faith and service.”

~Andrea Luxton, President

WELCOME



Welcome to the Tenth Annual Andrews University Celebration of Research and Creative Scholarship. We are pleased that you have joined us this year as we mark this important milestone—a decade of celebrating research and creative scholarship.

Andrews University faculty and students have been productive. In the 2017-2018 academic year, 98 faculty members published 242 peer-reviewed books, book chapters, and articles, with an additional 111 general audience publications, many of them co-authored with students. Furthermore, 142 faculty members gave or co-authored with students 696 professional presentations. The range of topics covered in today's plenary, oral, and poster presentations demonstrates the commitment to research and creative scholarship of the Andrews community. Again this year, there is much to be celebrated!

Three Plenary Presentations will be given by recipients of the Siegfried H. Horn Excellence in Research and Creative Scholarship Award—Charles Reid (2018), Denis Fortin (2017), and Marcia Kilsby (2014). Stanley Patterson, professor of Christian Ministry, also received the Horn Award in 2018; however, he is unable to join us today. Charles Reid, associate professor of Voice, will talk about learning to trust your creative instincts. Denis Fortin, professor of Historical Theology, will address the organizational structure of the Seventh-day Adventist Church and how this impacts decision-making. Marcia Kilsby, professor emerita in Medical Laboratory Sciences, will reflect on ten years of applied research in the developing world.

The Horn Award was established in 2011 to honor Siegfried H. Horn's legacy of scholarship and contribution to the field of biblical archaeology at Andrews University. The award recognizes lifetime achievement in research and creative scholarship for faculty members of Andrews University.

After the plenary session, please join us for refreshments during our poster session in the Buller hallways, followed by four parallel oral sessions covering faculty and student research and creative scholarship across the disciplines.

Thank you for joining us for this celebration. I hope you enjoy engaging the breadth and depth of research and creative scholarship, and I hope you will be encouraged to continue focusing your own creative and intellectual energy into future research projects. Additionally, we invite you to join us on March 8, 2019, to celebrate the accomplishments of our undergraduate students at the Honors Scholars & Undergraduate Research Poster Symposium. To learn more, please visit www.andrews.edu/research.

Sincerely,

A handwritten signature in black ink that reads "Gary W. Burdick".

Gary W. Burdick
Dean of Research



The first Celebration of Research & Creative Scholarship in 2009.

Cover: (1) Marcia Kilsby leading lab work in Asia (June 2018 Christian Friends of Korea Newsletter); (2) Charles Reid performing on the campus of Andrews University; (3) Ellen White speaking at the 1901 General Conference held at the Dime Tabernacle in Battle Creek, MI (Center for Adventist Research, Adventist Digital Library).

SCHEDULE OF EVENTS

12:30–2:00 pm

Plenary Session (Buller Hall, Room 251)

Welcome and Introduction – **Andrea Luxton**, President

Introduction of Speakers – **Gary Burdick**, Dean of Research

*Presentations by recipients of the Siegfried H. Horn Excellence in Research and Creative Scholarship Award.
See page 4 for program abstracts.*

PL-1 **Charles Reid**, Associate Professor of Voice
Finding Your Voice

PL-2 **Denis Fortin**, Professor of Historical Theology
Church Unity and Church Governance in Times of Conflict

PL-3 **Marcia Kilsby**, Professor Emerita, Medical Laboratory Sciences
Applied Research: A Look Back at 10 Years of Application Research in a Developing Country

2:00–3:00 pm

Poster Presentations (Buller Hallways)

See pages 5-16 for poster abstracts. Refreshments served.

Humanities, Education, Social Sciences & Business

P-01-04 Archaeology

P-05 Religion

P-06-07 Psychology

P-08-10 Education

P-11 French

P-12-15 English

P-16-17 Library

P-18-20 Business

P-21 Social Work

Health Professions

P-22-24 Nursing

P-25 Physical Therapy

P-26 Public Health, Nutrition & Wellness

STEM

P-27 Agriculture

P-28-34 Biology

P-35-39 Chemistry & Biochemistry

P-40-42 Mathematics

P-43 Physics

3:00–4:15 pm

Oral Breakout Sessions (Buller Classrooms)

See pages 17-22 for program abstracts.

Session A Biology & Engineering (BUL 251)

Session B Religion (BUL 250)

Session C Education & Political Science (BUL 208)

Session D Music (BUL 207)

PLENARY PRESENTATIONS

PL-1 *Finding Your Voice*
Charles Reid, Associate Professor of Voice

Join Charles Reid, professor of vocal studies at Andrews University Department of Music, in pursuit of "Finding Your Voice." This presentation focuses on the importance of cultivating, understanding and trusting your instincts within the context of research and creativity. Professor Reid draws upon his experiences as an internationally renowned performer of opera, oratorio and song recitals.

PL-2 *Church Unity and Church Governance in Times of Conflict*
Denis Fortin, Professor of Historical Theology

That the Seventh-day Adventist Church is currently facing a moment of crisis is an understatement. Recent conversations regarding enforced compliance of church regulations have highlighted some major differences of understanding of the role of various levels of organization in the decision-making process of the church. Although the system of church governance we have adopted has its weaknesses, it is well capable to face this crisis and come out stronger. But can it prevent a schism? Can unity be enforced? And what is the relationship between church governance and unity?

PL-3 *Applied Research: A Look Back at 10 Years of Application Research in a Developing Country*
Marcia Kilsby, Professor Emerita, Medical Laboratory Sciences

Application research in implementation of quality laboratory diagnostics and improving healthcare delivery systems in a developing country. A ten year retrospective assessment.

POSTER PRESENTATIONS

Archaeology

P-01 *Community Archaeology: Theory and Practice*

Oystein LaBianca¹, Elena Maria Ronza², ¹Professor of Anthropology, ²Institute of Archaeology

The poster will make the case for a more inclusive vision of archaeology in the lands of the Bible. Such a vision is needed in order to address biases resulting from the expeditionary model that has been the mainstay of much biblical archaeology. Under this traditional model, discoveries unearthed by excavations and surveys in these lands that did not pertain to biblical times and events were either discarded or ignored. Also, host communities were seen as ancillary, as a source of labor, but not much more. Andrews University archaeologists working in Jordan have pioneered a new approach to biblical archaeology that is both inclusive in terms of time periods studied and in terms of engaging with the local host community. This new model is called community archaeology. The approach has been well received by our Jordanian hosts and by our scientific colleagues, and it has been adopted by many other archaeological projects working in Jordan and beyond. It has also been embraced as the way forward for the future of archaeology by the Department of Antiquities of Jordan. The poster will highlight the inter-disciplinary nature of this new approach and include a brief overview of best practices of community archaeology as crystallized by the Hisban Cultural Heritage Project.

P-02 *Bringing Virtual Narration to Biblical Archaeology: A Case Study of Biblical Heshbon (Tall Hisban)*

Stanley Lebrun, Graduate Student, Religion

The purpose of my project is to demonstrate: (1) how using a Geographical Information System (GIS) tool such as Environmental Scientific Research Institute's (ESRI) ArcGIS Pro 2.2 and ArcGIS Enterprise in collaboration with Autodesk Revit could help leverage visualization and documentation within a 3D environment; (2) how the use of current technology could assist in the virtual narration of the biblical history of Tell Hisban; (3) visually how human and natural events have impacted the landscape of Biblical Hisban in order to show the reader of the Bible how the biblical world was different from today; (4) how ArcGIS Enterprise is able to provide an environment of collaboration within the archaeological community while at the same time creating an avenue for those who cannot travel to Tell Hisban to visit and preserve the culture and history of the Ancient Near East.

P-03 *Archaeological Evidence for the Role of Women in Early Christianity*

Carina Prestes, Graduate Student, Archaeology

The primary focus of my research is Christian women in the Greek speaking areas of the West, namely, Magna Graecia - South Italy, Sicily, and the other southern Italian islands. The Andrews team found at least three women buried inside a fourth-century Christian basilica in San Miceli, Sicily, Italy. Until the present, the discussion around women's participation and role in the early Christian church has focused mostly on ancient epigraphic and literary evidence. However, archaeology combined with social sciences and iconography have the potential to feed the wealth of knowledge, and if considered together with literary sources, they have an even greater potential. Therefore, I analyze the following aspects: (1) archaeological data of specific sites (house churches, earliest Christian basilicas—especially funerary basilicas, catacombs, Christian cemeteries, and demographic data on early Christian communities—such as San Miceli that can be derived from settlements and burial areas); (2) iconographical data (as depicted in mosaics, frescos, graffiti, gravestones, relics, etc.); (3) ancient literary evidence in order to ascertain what conclusions emerge from it; and (4) social sciences. The picture that emerged from the research is that the participation of women was far greater than traditionally stated and at the same time, it was greatly suppressed by male religious leaders. The female role was frequently one of authority and leadership in Early Christianity.

P-04 *QUOD VULT DEUS (What God Wants): The Beginning of Christianity at San Miceli*

Randall Younker, Professor of Archaeology and History of Antiquity

This poster summarizes the special exhibit that will be shown at the Municipality Museum of Salemi in the town of Salemi, Trapani, Sicily. The exhibit will comprise three rooms of the museum that will present the results of the first five seasons of excavations at the paleo-Christian village of San Miceli (north of Salemi). The exhibit will include 15 posters with color images of the excavation and finds with explanations in Italian and English, as well as six large exhibit cases that will display approximately 80 artifacts from the dig, including pottery, tools, weapons, jewelry, glass, oil lamps, etc--each of which help tell the story of San Miceli's people, history and their journey to Christianity. The information on the posters and in the cases will also be presented in a color catalogue that will be available for sale at the museum. The catalogue is also in Italian and English.

Religion

- P-05** *How Will They Hear If We Do Not Listen?: Theological Method and Engaging the Secular*
Jenifer Daley, Graduate Student, Seminary

The poster examines several themes related to theological methodology for contemporary secular society: how to do Christian theology in contemporary western society which is influenced by the effects of modernity, especially in this period considered to be post-modernity. The poster will highlight that it is important for theological methodology to be sensitive and responsive to society's self-perception, while remaining true to the fundamental principle that the Bible is Christian theology's first, final and sufficient rule of faith and practice.

Psychology

- P-06** *Faith, Hope and Love: An Integrated Conceptual Framework for Examining Religious Outcomes in a Global Church*
Karl G. D. Bailey¹, Duane C. McBride², Shannon M. Trecartin³, ¹Professor of Psychology, ²Professor of Sociology, ³Assistant Professor of Social Work

The 2017-18 Global Church Member Survey conducted by the General Conference of the Seventh-day Adventist Church is designed to assess the quinquennial Church Strategic Plan (2015-2020). In designing this survey, we considered a variety of theoretical frameworks that could explain relationships between the target outcomes in the Strategic Plan. The resulting novel theoretical framework is based on Biblical principles and an integration of a number of frameworks in the social sciences: motivation (Deci & Ryan, 2008; Greenberg, Solomon, & Arndt, 2008; Koole, Greenberg, & Pyszczynski, 2006; Pyszczynski, Greenberg, & Goldenberg, 2003; Ryan & Deci, 2000) and hope (Bernardo, 2010; Snyder, 2002) from psychology, faith development (Dudley, 1994; Ji, 2004) from religious studies, social bonding (Hirschi, 1969; Yang et al., 2017) from sociology, and social capital (Häuberer, 2011; Putnam, 2003) from economics and development. Our integration proposes that religious actions are motivated by on-going social relationships and hope for the future and that those motivations can be directed towards other human beings or towards God. In our poster, we provide a description of this integrated framework, summarize the research literature justifying the framework, and propose lines of research that are emphasized through this theoretical framing. In particular, we focus on the possibilities within this data set for examining the motivational profiles (the levels and combinations of the four motivational types in the framework) of individuals with disabilities (Kaye & Raghavan, 2002; Snyder, 2000), with different family routines (Fiese, 2006), with different conversion experiences (Granqvist, 2003), and from different historical-cultural backgrounds (Stark, 2011).

Education

- P-08** *Exploring the Influence of Identity and Spiritual Development on Student Teacher Responses to Challenging Social-emotional Student Behavior*
Charity Hannah Garcia, Assistant Professor of Curriculum & Instruction

Research about teacher identity development and spiritual development have individually increased in frequency and scope during the last fifteen years. However, little research has explored the way these two areas may be related to or influence each other, and more specifically to student-teacher responses to challenging student behaviors. During student teaching, many student-teachers experience significant shifts in their identity as they more tangibly grapple with the realities of fulfilling their teacher responsibilities. Managing challenging student behaviors are among one of their biggest fears. While the Adverse Childhood Experiences Study (ACES) helps to account for why these behaviors exist, and subsequent studies have spurred research into best practices in responding to these challenging student behaviors, some educators have expressed concern about their role in addressing these behaviors within an academic context. There is a clear connection between personal and professional identities; teacher identity is very closely linked with teacher practice. As student-teachers within a Christian institution, the role of spirituality as a core component of overall identity development and its influence on ways they engage with student behavior provides an interesting course of study relevant to the field of education. This research project will explore the influence of identity development, inclusive of spirituality, of Andrews University 2018-2019 student-teacher responses to challenging social-emotional elementary and secondary student behavior during their student teaching semester. Case study methodology will be utilized to conduct this study. A purposeful sample will be followed throughout the students' student-teaching experience. Data will be collected and analyzed concurrently, increasing intensity as the research project continues and after data collection is completed. Triangulation, disclosure of researcher bias, and member check will ensure the validity and reliability of this study.

P-09 *Community Engagement: Afterthought or Core Value?*

Desmond Murray¹, Paula Dronen², ¹Associate Professor of Chemistry, ²Assistant Dean, School of Architecture & Interior Design

This presentation focuses on what Adventist education would look like if we were totally committed to community engagement rather than treating it as an afterthought or add-on. Embedded in this vision is a constructive critique of our status quo. It calls for us to use the tools of academic research to access our current philosophy, pedagogy and practice regarding community engagement in our mission, our curriculum, our syllabi, our teaching, our classrooms, our system of tenure, and our budget. Do our current practices reflect a core value or is community engagement an afterthought?

P-10 *Synergies of Research Across Secondary - Tertiary Science Education Levels*

Desmond Murray¹, Denise Smith², ¹Associate Professor of Chemistry, ²Professor of Biology

This presentation focuses on the synergies of engaging and embedding research across the high school-undergraduate-graduate education spectrum. It highlights an ongoing interdisciplinary collaboration between biology and chemistry principal investigators and provides specific examples from over 15 years of practice, collaborations and implementation.

French

P-11 *The Use of Short Stories in Intermediate French Textbooks in the USA*

Sonia R. Badenas, Assistant Professor of French

The use of short stories in second language education has proven to be beneficial for stimulating the development of students' written and oral skills. Previous research has shown that students who were exposed to short stories in the Intermediate French classroom got better results in written expression than those who had not been exposed to reading/using short stories. But do Intermediate French textbooks actually include short stories? This research intends to evaluate the inclusion of short stories in ten of the most current Intermediate French higher education textbooks in the United States. The reason is twofold: first, because short stories and poems are the only literary genre that can be included in their integrity in a textbook, and second, because language teachers usually rely on textbooks, either because their institution requests one or for convenience. We will try to answer the following questions: What texts do French textbooks use? Where are these texts located in the unit/chapter? What is their purpose within the unit? How many exercises derive from the reading and what type of exercises? Do the texts and exercises respond to the textbook theoretical framework? Are these stories compatible with Christian values and therefore be used also to convey moral development?

English

P-12 *Power, Ideology, and Women's Ordination: Discursive Strategies in Three Roman Catholic Documents*

Eun-Young Julia Kim¹, Beverly Matiko², ¹Professor of English, ²Associate Professor of English

This study analyzes through a linguistic lens three official documents of the Roman Catholic Church on women's ordination; it identifies various discursive tactics utilized by text creators to reinforce gender hierarchy within the Church. Drawing from Fairclough's three dimensional discourse framework, we examine the ideological message embedded in the linguistic features and the role each text plays within a matrix of power relations. Through close readings of *Inter Insigniores: On the Question of Admission of Women to the Ministerial Priesthood*, *Ordinatio Sacerdotalis* of John Paul II, and "Women and the Priesthood," we demonstrate how discourse analysis can serve as a useful tool for identifying logical fallacies, inconsistencies, dilemmas, and manipulative tactics in religious discourses.

- P-13** *The Limits of Generic Hybridity: Comedy Meets Hip Hop in the Q Brothers' Othello: The Remix*
Vanessa Corredera, Associate Professor of English

The Q Brother's *Othello: The Remix* (2012), debuted as part of the Globe to Globe Festival, with this reimagining of Shakespeare's *Othello* as a rapper on the rise destroyed by a jealous member of his crew serving as the U.S. production. The Q Brothers applied a genre that, though global, has long been associated with black America as a way of making Shakespeare accessible to modern audiences. Consequently, this entry positioned U.S. national identity as progressive, multiethnic, and irreverent via hip hop, a hotly debated and racialized genre. *Othello: The Remix* thus pushed back on both Shakespeare and the Globe as high-status national symbols of British identity imbricated in a white, colonial history and reputation. Indeed, anxiety over this radical approach informs the performance, which contains a purpose-written prologue explaining the Q Brother's mission and justifying their approach, which they shortened and altered in subsequent U.S. performances. In it, they identify two strategies for making *Othello* relevant: the use of hip hop to reframe the play and an emphasis on the comedy they locate in Shakespeare's tragedy. Though effective regarding audience appeal, when the genres of comedy and hip hop intersect in this performance, they create competing racial narratives. The comedy skews toward stereotyping even as the hip-hop framing gestures towards the difficulties pervasive in a black man's rise "to the top." Ultimately, the push and pull ceases; comedy takes center stage, thereby muting the performance's exploration of racial identity and racial representation. Indeed, because of its heightened humor, the performance marginalizes hip hop's potential for progressivism and racial polemic. What the audience is left with instead, then, in The Globe's authorizing space, is an operetta progressive in its Shakespearean appropriation but one that says little about race and identity—an often decidedly *un-humorous* topic. The effective hip-hop framing is therefore neutered, functioning simply to uphold common critiques of hip hop as a genre—namely, an emphasis on violence, glorification of gangster culture, and rampant misogyny—without the dialectic of its most valued feature: its ability to potently reframe and communicate the cultural experience of blackness.

- P-14** *The Disappearing Moor: Race, Authenticity, and the Nation's History in "Wolf Hall" and "Bring Up the Bodies"*
L Monique Pittman, Professor of English

The 2015 BBC televisual adaptations of Hilary Mantel's *Wolf Hall* (2009) and *Bring up the Bodies* (2012) strive to match an "authenticity" standard claimed by their novelistic sources, notably Mantel's remarkable attention to the minutiae of Tudor quotidian habits—household regulations, food preparation, religious rituals, and various social customs. Further authorized by a literary genealogy including Shakespeare and Fletcher's co-authored play, *Henry VIII* (1613), the BBC adaptations twin the racial codes embedded in two genres—the history play and heritage film—to reinforce an exclusively white story of England. Even as she replicates the particularities of material daily life in Tudor England, Mantel argues that received notions of historical truth must be disrupted, "We need to pass on the stories but also impart the skills to hack the stories apart and make new ones." This mandate results in her novels' controversial reassessments of Thomas Cromwell and Thomas More; however, what remains untouched in her work and the BBC adaptation is the "hallowed" whiteness of the English Renaissance past. Tracing the sanitized fate of one troubling reference to blacking-up—a disappearing moor—illustrates the BBC's recognition of racially problematic tropes. Nonetheless, in its representational choices, the adaptation perpetuates the blind spots of Mantel's novels, denies the impact made by persons of color on the emergent English nation, and insists on a dubious historical authenticity.

- P-15** *"Flycatchers" and "Action Adventure Promo"*
Scott Moncrieff, Professor of English

I will present a poster on two poems I wrote that have recently been published. The poster covers how I came up with the ideas for each poem, the difference between a first draft and a final draft, and the process of journal submission and publication.

Library

- P-16** *Citation Analysis of Andrews University Seminary Dissertations*
Cynthia Mae Helms¹, Bernard Helms², ¹Head, Department of Information Services, James White Library, ²Acquisitions/Periodicals Librarian, James White Library

Citations found in the Seventh-day Adventist Theological Seminary Ph.D./Th.D. dissertations completed between 2006 and 2010 at Andrews University were analyzed to determine how much of the cited resources were held by the library, what types of resources were used, and their age. The study showed that 69% of the citations were books, 84% of the citations were in James White Library holdings, and a majority of the material used was within 60 years of the dissertations' completion date. The study also revealed that five of the 27 most frequently cited periodicals were included in ranked lists of three similar studies.

- P-17** *One Million Downloads Later: The Digital Commons @ Andrews University*
Terry Dwain Robertson¹, Felipe E. Tan², ¹Associate Dean of Libraries, James White Library, ²Senior Cataloger, James White Library

On August 29, 2018, the Digital Commons @ Andrews University recorded its one millionth download. The poster graphically depicts the achievements of Andrews University scholarship and its global impact. A timeline of achievements, key collaborators, and a brief narrative are presented.

Business Administration

- P-19** *The Impact of Executive Servant Leadership on Organizational Citizenship, and Organizational Cynicism among American and Chinese Universities: A Test of Structural Equation Modeling*
Jerry L. Chi¹, Grace Chi², ¹Professor of Management, ²Professor of Nursing

Organizational cynicism can be described as being negative and pessimistic about the organization. Employees who are cynical can influence the entire organization and can hinder the organization from reaching its goals. Organizational citizenship behaviors refer to employee acts that support the broader social and psychological environment in which tasks are carried out in organizations. The major research interest for this study was to discover whether the bottom-up servant leadership theory to “serve” first and “lead” second can be truly practiced by the president of a university and whether it is valid and effective in reducing employee’s organizational cynicism and enhancing employee’s organizational citizenship. Therefore, the purpose of this Structural Equation Model (SEM) analysis is to examine how the executive servant leadership impact employees’ organizational cynicisms and organizational citizenship among China and American universities. The results show that full-time employees of the Andrews University and Guangzhou Medical University perceived high level of executive servant leadership in five dimensions: Interpersonal Support, Building Community, Altruism, Egalitarianism and Moral Integrity, which are positively and highly conducive to Organizational Citizenship Behavior (Altruism, Civic Virtue, Courtesy, Conscientiousness, Sportsmanship) and contradictory to Organizational Cynicism (Cognitive, Affective and Behavioral).

- P-20** *CEO Engagement and the Impact on Social Media Strategy*
Kimberly S. Pichot, Associate Professor of Marketing

The purpose of this study is to analyze CEO engagement in social media and theorize about the value of social media and credibility for senior management. This qualitative study looks at CEO participation in Twitter and LinkedIn, and their level of involvement based on frequency of posts and two-way communication. Also examined is the content of social media strategy articles in Inc, Forbes, and Entrepreneur to observe how small and mid-size businesses are using SM to drive strategy. Discussion touches on implications for top leadership to engage with customers in a systematic and strategy-driven manner.

Social Work

- P-21** *Identity and Experience: The Lives of Women Living with Symptomatic Uterine Fibroids*
Krista Cooper, Assistant Professor of Social Work

It is estimated that approximately 70 percent of women during their reproductive years are impacted by uterine fibroids (Stewart, Cookson, Gondalfo & Schluze-Rath, 2017). Uterine fibroids are growths in the uterus that may also be imbedded in the uterine lining. While these growths are not malignant, their presence may produce varied levels of discomfort, including symptoms that may impact quality of life, daily functioning and fertility (De La Cruz & Buchannan, 2017). Several pharmacological, surgical and epidemiological studies have been conducted on uterine fibroids, additional research is needed to better understand the psychosocial and identity impacts on women living with symptomatic uterine fibroids. This research explores identity and lived experiences of women living with fibroids by querying woman about knowledge, education, and experience of their bodies during formative years, symptomology and diagnosis of SUF, social supports, relational, emotional, and professional impacts, treatment options, and personal perceptions of their fibroid experience. Ten women recruited through two groups on Facebook utilizing purposive and snowball sampling were interviewed using a semi-structured interview guide. While research and analysis is still ongoing, preliminary analysis yielded the following codes: anger, less than, anger, delay, life impacts, and diagnosis. These preliminary themes appear to impact identity for the women engaged in the study. Additional interviews and re-interview of participants will be undertaken.

Nursing

P-22 *Factors Contributing to 30-Day Readmission in Postsurgical Patients: A Hospice Policy Evaluation and Proposal for Change*
Miriam Morgan-Skinner¹, Bea Ade-Oshifogun², ¹Graduate Student, Nursing, ²Department Chair, Nursing

Background: Readmission can cause much frustration for patients and families. The Center for Medicare and Medicaid Services (CMS) has emphasized the importance of finding ways to decrease readmissions within 30 days of discharge. The goal of the study was to identify the causative factors for the readmissions and make appropriate suggestive changes. This project identified the factors contributing to the 30-day readmission rate in selected abdominal surgeries between January 2016 and July 2017 and developed a policy to address the predominant factor. **Method:** The project author conducted a retrospective charts review using the electronic health record (EHR) database at a southwest healthcare hospital system. 299 charts were selected. Thirty charts met the inclusion criteria and were analyzed using descriptive statistics. The FADE Model for quality improvement served as the basis for practice review and changes through policy. **Result:** Among all the factors examined, infection diagnosis accounted for 43 percent of reviewed readmissions, followed by small bowel obstruction, which accounted for 10 percent of readmissions, and abdominal pain which accounted for 7 percent. The lack of communication with the patient about their treatment and plan of care is the most suggested cause of infection noted by the focus group. The project author developed a policy to improve the plan of care for postsurgical patients using CDC Policy process. The FADE Model helps to prioritize the process of policy development, which will improve patient care by reducing infection rates in surgical patients. **Conclusion:** Postsurgical infection was the main factor contributing to 30-day readmission and a change in policy that was developed by the project manager and subsequently instituted by stakeholders has the potential of decreasing the readmission rate in the southwest healthcare hospital system.

P-23 *Relationship between Shift-hours Worked, Patient Load, and Nurses' Burnout: A Study across Acute Care Units in a Community Hospital*
Liliane Nyamuziga¹, Bea Ade-Oshifogun², ¹Graduate Student, Nursing, ²Department Chair, Nursing

Background: Nurses are expected to provide quality care to patients, and work demands in the health care system are increasing, resulting in burnout from persistent mental and physical exhaustion. Increased turnover of nurses was observed in a southwest Michigan hospital which may be from burnout. **Purpose:** To evaluate the significance and level of perceived burnout in nurses who work a 12-hour shift as compared to those who work an 8-hour shift; to investigate the relationship between nurse-to-patient ratios and burnout; and to compare burnout levels between nurses working day versus night shifts. **Methodology:** This project utilized a cross-sectional approach with convenience sampling of nurses from the hospital acute care units. Survey data was obtained from nurses using the MBI questionnaire between August 2017 and March 2018. The survey comprised of 22 questions distributed via online and paper-format. Three domains of the MBI were tested: Emotional Exhaustion, Depersonalization, and Decreased Personal Accomplishment. Data analysis was completed using ANOVA and MANOVA statistics ($p = 0.5$). **Results:** A total of 118 nurses participated in the survey. Ninety-seven nurses worked full-time, and 94 nurses worked 12-hour shifts. Forty-eight nurses worked night shifts, and 61 nurses had a heavy patient assignment (5-8 patients/shift). Though mean scores were very close to burnout threshold, none of the groups' scores were significant for burnout. However, a significant difference was observed in the domain of "emotional exhaustion" between day shift compared to night shift nurses $F(1, 116) = 3.93, p = .05$. Nurses who have a higher patient load also have higher but not significant levels of emotional exhaustion. **Conclusion:** Though MBI scores did not reveal burnout in nurses working in this southwest Michigan hospital, emotional exhaustion was a significant factor with day shift nurses. Higher patient loads should be further assessed for its potential impact on nurses' work and burnout.

Physical Therapy

- P-25** *Effect of NeuroMyoskeletal Dry Needling (NMDN) on Knee Extension Lag Post ACL Reconstruction in Athletes*
Rahul Shah, Graduate Student, Physical Therapy

Introduction: The Knee joint is one of the most important joints in the lower limb pertaining to its functions of providing great stability, movement and weight bearing function. In athletes the most commonly occurring injury is ACL tear, and the most common treatment method is anterior cruciate ligament reconstruction (ACLR). One of the most common complications after anterior cruciate ligament reconstruction (ACLR) is loss of knee extension, which often is functionally worse than preoperative instability. It is most common in early post operative phase around 2 weeks and due to hamstring muscle tightness. Hence, this study was performed to see the effect of NMDN on extension lag in athletes. **Methodology:** The study included 80 athletes (46 male and 34 female). The average age was 24.8 (ranged between 18-35). Athletes involved into competitive sports were included and recreational were excluded. Also any fractures, dislocation were excluded. They were assessed 2 weeks (13-15days) post ACLR and their active and passive knee extension range was assessed. Athletes with more than 5degrees of extension lag on passive ROM were included and explained about the research and their consent was taken. Post this, Neuro Myoskeletal Dry Needling™ (NMDN) technique was used to release hamstring tightness and then their active and passive ROM was checked and the result and statistics were formed. **Result:** The results, shows that after 1 session of Neuro Myoskeletal Dry Needling™ (NMDN) for hamstring tightness, 88.75 percent (71 out of 80) of patients showed improvement in passive ROM and 73.75 percent (59 out of 80) showed improvement in active ROM. **Conclusion:** Neuro Myoskeletal Dry Needling™ (NMDN) is significantly helpful in improving both active and passive range of motion, reducing the extension lag caused due to hamstring tightness which ultimately helps in better and faster rehabilitation and recovery of athletes post ACLR.

Public Health, Nutrition & Wellness

- P-26** *Association of Metabolic Syndrome with Chronic Diseases among African American Women*
Padma P. Tadi Uppala¹, Sozina Katuli², Dixon Anjejo³, Melody Page⁴, Michael Raj Uppala⁴, Victoria Rios-Rivas⁴, Sherine R. Brown-Fraser³, ¹Professor of Public Health, ²Associate Professor of Physical Therapy, ³Associate Professor of Public Health, ⁴Graduate Student, Public Health, Nutrition & Wellness,

The emergence of the obesity epidemic worldwide has been associated with increases in metabolic syndrome, breast cancer, and type 2 diabetes in the industrialized countries. The clinical significance of these associations remains controversial because of limited human data. It is unclear whether overweight women, or those with abdominal obesity or those with metabolic syndrome, are at increased risk for breast cancer, diabetes and cardiovascular disease. The purpose of this study was to find an association between metabolic syndrome and chronic diseases such as cardiovascular disease, diabetes, and cancer. **Methods:** 41 African American women were enrolled into the study. Women completed a demographic and breast cancer survey and a validated food frequency questionnaire. Cardiochek Analyzer was used to measure metabolic syndrome blood parameters that included glucose, triglycerides, LDL cholesterol and HDL Cholesterol. Body composition was assessed with a Tanita Body Composition analyzer. IBM SPSS v.24 was used for statistical analysis. Chi-square tests were used for categorical variables. **Results:** The age of the study population ranged from 23 to 84. The mean body mass index was 30.8 ± 7.24 , and mean fat percent was 41.57 ± 6.33 . Of the participants, 34.1 percent had high triglyceride levels and 70.6 percent were overweight or obese. Breast cancer cases previously and currently diagnosed were 30 percent. Chronic diseases reported included breast cancer, diabetes, hypertension, thyroid problems and migraines. Glucose and cholesterol levels were normal for most participants due to the use of medications. **Conclusion:** The majority of the participants exhibited metabolic syndrome characteristics and self-reported related chronic diseases (cancer, cardiovascular diseases and diabetes, with hypertension being the most frequently reported). Although blood glucose and cholesterol levels were normal because of the use of medications, most women had high body fat percent and waist circumference. Thus, lifestyle intervention may be appropriate for preventing and controlling chronic diseases in this population.

Agriculture

P-27 *The Correlation between the Milk Somatic Cell Count and the Differential Leukocyte Count in the Blood of Cows That Have a Positive Milk ELISA Test for Antibodies to the Bovine Leukosis Virus*

Katherine Koudele¹, Timothy Newkirk², Melissa Poua³, ¹Professor of Animal Science, ²Assistant Professor of Medical Laboratory Sciences, ³Instructor in Medical Laboratory Sciences

Bovine leukosis (BL) is a naturally-occurring transmissible retrovirus disease of cattle caused by the bovine leukosis virus (BLV) that is considered to be of economic importance in the international trade of animals and animal products. Eighty-nine percent of dairy herds in the U.S. have at least one infected animal. Presence of the virus is determined by measuring the BLV antibodies in a cow's milk using an ELISA test. About 30-40 percent of cows that are infected show an increase in the quantity of white blood cells (WBCs) circulating in the bloodstream, however, the characterization of the types and ratios of WBCs has not yet been examined. It is hypothesized that some of these excess WBCs would end up in the udder since the lactating udder receives a very high blood flow, and this would therefore contribute to the elevated somatic cell count (SCC) in the milk. (For every liter of milk produced, 500 liters of blood circulate through the udder.) Therefore, a cow that is positive for BLV is likely to also have an elevated SCC in her milk. Research Questions: (1) What is the correlation between the infection level by bovine leukosis virus and somatic cell count in cows' milk? (2) What is the differential white blood cell count of the blood of cows that are negative for BLV, and those that test low-positive and high-positive for the virus? (3) What white blood cell type, if any, is more prevalent in BLV positive cows?

Biology

P-28 *Searching for the Function of an Intestinal Peptidase*

Peter Lyons, Associate Professor of Biology

Carboxypeptidase O (CPO) is a metallo-carboxypeptidase that is expressed in the small intestine. CPO is able to cleave C-terminal polar and, more readily, acidic amino acids. It is not strongly regulated by pH, does not contain a prodomain, and has been observed both on the plasma membrane and intracellularly. Hence, CPO appears to exist as a constitutively active enzyme with broad subcellular localization. The physiological function of CPO remains somewhat of a mystery, and has been the focus of our research for a number of years. Currently, four working hypotheses are being considered: 1) CPO has no important function, but is a remnant of genomic change. Analysis of the gene suggests that it has been subject to many changes, including duplication and pseudogenization events. 2) CPO functions in dietary protein digestion. This was initially proposed based on its location and fundamental role as a peptidase. 3) CPO is necessary for the processing and absorption of folate produced by the intestinal microbiome. Folate, a vitamin necessary for many cellular biosynthetic reactions, is naturally produced with a polyglutamate extension, which must be proteolytically removed for absorption. 4) CPO is involved in lipid absorption and processing in the intestine. We have shown that CPO associates with intracellular lipid droplets and the presence of CPO increases lipid droplet formation. Due to similarities in the processes of lipid droplet and chylomicron formation, we hypothesize that CPO may play a role in chylomicron formation in the small intestine. Evidence exists for each one of these hypotheses, opening many doors for future research into the pleiotropic functions of this enzyme.

P-29 *Preparing to Test the Effects of Omega-3 Fatty Acids on Inositol Levels and ISYNA & IMPA1 Gene Expression in Mammalian Cells*

Christina Rosette¹, Marlene Murray², ¹Graduate Student, Biology, ²Professor of Biology

Characterized by a manic phase and a depressive phase, Bipolar Disorder affects many individuals around the globe. Current pharmaceutical therapies for Bipolar Disorder, valproate and lithium ions, target the phosphatidylinositol 2nd messenger system and the inositol biosynthetic pathway in brain cells. In clinical trials, the omega-3-fatty acids docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA), have also been shown to help reduce symptoms of the depressive phase, with little to no known side effects. It is not well understood how these omega-3 fatty acids reduce depression symptoms. However, studies conducted by Murray and colleagues indicate that omega-3 fatty acids target proteins within the inositol biosynthetic pathway - including proteins encoded for by the IMPA1 and ISYNA genes. The aim of this study is to compare expression of the IMPA1 and ISYNA genes and the effects of DHA and EPA on the expression of these genes in cells obtained from individuals with and without bipolar disorder. IMPA1 and ISYNA, each play important roles in the synthesis of inositol. To determine the effects of omega-3 fatty acids on gene expression in cells obtained from individuals with and without bipolar disorder, real-time quantitative polymerase chain reaction (RT-qPCR) will be used to quantify and compare the mRNA of the IMPA1 and ISYNA genes from cells obtained from individuals without bipolar disorder and cells obtained from individuals with bipolar disorder grown in the presence of DHA and EPA.

P-30 *Designing and Preparing for a Genome-wide Synthetic Lethal Screen in Baker's Yeast*
R. Christian McDonald¹, Peter J. Lyons², ¹Graduate Student, Biology, ²Associate Professor of Biology

Many enzyme families contain both catalytically active and inactive members. Although these inactive enzyme-homologs (pseudoenzymes) share significant similarity with their active counterparts, key active site modifications seem to suggest a loss of traditional catalytic activity. A key technique for elucidating the function of non-essential genes, including those producing pseudoenzyme products, is the genome-wide synthetic lethal screen. Biochemical pathways typically involve multiple gene components and many of these provide redundancy in the event that other genes experience deleterious mutations. The synthetic lethal screen is used to identify novel mutant yeast strains whose survival is dependent on a particular gene of interest. Colonies that contain a putative synthetically lethal gene pair are kept alive and identified by harboring a color-reporting plasmid that supplements the deletion of the endogenous gene of interest. Here we demonstrate the construction of this integral pSLS1 plasmid harboring a gene of interest that was amplified and isolated from a wild-type yeast strain using a high-fidelity polymerase chain reaction. Additionally, we demonstrate the validation of pSLS1 plasmid constructs and the determination of gene insert orientation using restriction endonucleases and agarose gel electrophoresis. Finally, we demonstrate the preparation of target yeast strains using drug resistant deletion cassettes and subsequent validation using low-fidelity polymerase chain reactions.

P-31 *Neural Plasticity and Behavioral Changes as a Result of Male-exposure in Females of an Insect Model*
Benjamin Navia¹, Chelsea Kent², Shakinah Dosunmu², ¹Associate Professor of Biology, ²Undergraduate Student, Biology

Syllable-period selective phonotaxis in female cricket (*Acheta domesticus*) as well as the corresponding response of neural elements such as the AN₁/L₁, AN₂/L₃ and ON₁ neurons (which have been demonstrated to influence phonotaxis) have been the focus of multiple studies. Such studies have reported individual variability in both responses (behavioral and neuronal). However, differences in responses based on age are typical for this species. The behavioral and neuronal responses reported in the literature correlated, and ranged from selective to unselective for young and old females respectively. The subjects of these studies have been virgin females raised in isolation. The current project investigates the apparent influence in the phonotactic and neuronal responses of male-exposed females of different ages. It had been proposed that the presence of males would significantly reduce selective phonotaxis in females in response to model calls. Preliminary results suggest that in contrast with previous studies, there does not seem to be an age correlation in the phonotactic response exhibited by male-exposed females. Regardless of age, male-exposed females do not seem to discriminate between an attractive or unattractive model call and respond to a similar number of syllable periods tested. Additionally, intensity of the call may also affect syllable-period selective phonotaxis in these females. The potential effects of male exposure in the response of prothoracic auditory interneurons such as AN₂/L₃ are unknown. When presented with attractive calls only, L₃s in young virgin females exhibit decrement (reduction in the number of action potentials to consecutive sound pulses within a chirp; and thus is syllable-period selective). Preliminary results suggest that regardless of age, AN₂/L₃s of male-exposed females exhibit similar levels of decrement in response to auditory stimuli, irrespective of syllable period. Exposure to males seems to affect the females' underlying neuronal connections, which influence recognition and selective phonotaxis, both of which are crucial for reproduction.

P-32 *Correlating Neural and Behavioral Responses in an Insect Model and the Effect of Neuromodulators in Cricket Phonotaxis*
Benjamin Navia¹, Brandon Shin², Cassie Kim², ¹Associate Professor of Biology, ²Undergraduate Student, Biology

Phonotaxis in female cricket *Acheta domesticus* can be selective or unselective in response to model calls with varying syllable periods. Discriminating a model call and walking towards it implies that a certain network(s) of neurons is activated when the call is recognized as attractive. Several approaches to demonstrate the role of auditory neurons in phonotaxis have been used with different levels of success. One approach (the current study) seeks to evaluate the behavioral and neuronal responses in the same animal, using identical auditory stimuli. This approach allows us to establish a correlation between the neuronal and behavioral responses, as well as to predict behavior based on the response of the neuron. The L₃ prothoracic auditory neuron has been suggested to influence syllable period selective phonotaxis in this species. In response to calls with attractive syllable periods, the L₃ produces a burst of action potentials, which diminish in response to consecutive syllables. Such a decrease in the number of action potentials is called decrement. Preliminary results indicate that syllable periods that produce positive phonotaxis also elicit higher decrement values in the neuronal response of the same animal. In the lab, young (5-10 days) virgin females are more likely to respond phonotactically to calls with syllable period ranging between 50 and 70 ms. Older, virgin females (greater than 20 days) exhibit more variability in the range and number of syllable periods they respond to. Neuromodulators such as juvenile hormone III (JHIII) have been shown to modify phonotactic selectivity. The effect other neurochemicals may have on cricket phonotaxis remains to be evaluated. Octopamine has been shown to increase aggressive behavior in crickets. Preliminary prothoracic nano-injections of octopamine show decreased phonotactic responsiveness in young females. A second neuromodulator, chelerythrine chloride (CC), a protein kinase C (PKC) blocker is believed to be part of the signaling mechanism in crickets, particularly regarding JHIII pathway. When older females are nano-injected with JHIII, selectivity increases. When CC is nano-injected in young females, selectivity decreases. We hypothesize that older female crickets which are more likely to be unselective, will show little or no change in selectivity following CC injection. This exploratory component of the current study seeks to identify neurochemicals which may be of importance in modulating cricket's phonotactic behavior.

- P-33** *The Taxonomic Diversity of Microfossils among Selected Study Sites of The Black Mountain Turtle Layer*
Jeremy A. McLarty¹, H. Thomas Goodwin², ¹Graduate Student, Biology, ²Professor of Biology

A model has been proposed for the deposition of specific fossil-rich horizons within the Bridger Formation, Wyoming. This model was developed to explain the unusually high density of turtle fossils found in certain stratigraphic intervals of these horizons. In this model, a lake system filled with volcanic ash causing a mass death of turtles in the lake, eventually changing the area from a lake system into a floodplain environment. A subsequent study investigated microfossils from different geographic locations within one of the fossil-rich horizons, the Black Mountain Turtle Layer. A taxonomic analysis of the microfossils found that although aquatic taxa were present, the dominant taxa were terrestrial. This finding disagreed with the lake system model developed by the original study. Further taxonomic analysis of more sites within the Black Mountain Turtle Layer, will give us a deeper understanding of the paleoenvironment. It will provide us with a better understanding of the taxonomic makeup of the Black Mountain Turtle Layer, which could have implications in understanding how ecosystems change over time. Extending the taxonomic analysis geographically could also help reconcile the differences between previous studies.

- P-34** *Seasonal Diet Variation of Thirteen-Lined Ground Squirrels (*Ictidomys tridecemlineatus*) in Southwestern Michigan*
Austin Menzmer, Graduate Student, Biology

The study of ground squirrel diet is almost a century old, beginning with *Uroditellus columbianus* of the Pacific Northwest in 1925 and California's *Citellus lateralis* in the 1960's. *Ictidomys tridecemlineatus* was studied in Iowa and Indiana in the 1920's and 1970's respectively, and investigators found that the consumption of insects - as opposed to plant matter - increased as summer turned into fall. I am studying *Ictidomys tridecemlineatus* in southwest Michigan, the farthest east and northern location the diet of this squirrel species has ever been studied. All of the above studies used stomach content analysis to track squirrel diet. I am aiming to accomplish the same task but with fecal sample collection, thus keeping the creatures alive and gaining more data in the process. Prior work in the Goodwin lab has documented late season shift to C₄ plants in squirrel diet, but the identification of C₄ plants has not been done. I hope to identify the spring, summer, and especially fall diet choices of the squirrels through microhistological and isotopic analysis. I began trapping and collecting data from squirrels in June 2018, and will continue to do so each month through October. Trapping involves visually locating the creature, staking a trap over the burrow, and waiting for the squirrel to enter the trap. Data collection includes procuring the weight of the squirrel, attaching an ear tag, and collecting fecal samples in a vial. At the present time I do not have any results as I am still collecting data.

Chemistry & Biochemistry

- P-35** *Paper Analytical Devices Method and SERS Method in Detecting Some Illicit Drugs*
Getahun Merga¹, Tammy Leong², Noah Chan², Michael Trujillo³, Tracy Cleary³, Jon P. Camden³, and Marya Lieberman³,
¹Professor of Chemistry, ²Undergraduate Student, Department of Chemistry, ³Student, University of Notre Dame

Paper test cards coupled with surface-enhanced Raman spectroscopy (SERS) gives a simple method to identify common illicit drugs. We have successfully detected samples of cocaine hydrochloride, crack cocaine, heroin, and methamphetamine, and can discriminate between these drugs and a variety of distractor substances and legal medications. The initial step involves running multiple color tests in parallel using a paper analytical device (PAD). However, the PADs have limitations of quantifying these drugs. Therefore, for authentication and quantification of these drugs we are incorporating a surface-enhanced Raman scattering (SERS) functionality on the paper cards. SERS spectra utilizing both citrate stabilized as well as naked metal colloids would be monitored by aggregating silver or gold nanoparticles with 0.1 – 1.0 mM cocaine hydrochloride or methamphetamine.

- P-36** *Omega-3-fatty Acids: Potential Anti-Bipolar Agents*
Marlene Murray, Associate Professor of Biology

Bipolar disorder is a debilitating mood disorder characterized by recurring episodes of mania and depression. It affects 2.6 percent of adults and has a lifetime prevalence among adults of 3.9 percent. Current mood stabilizers such as valproate are not always effective for and/or are not well tolerated by a large number of patients. Therefore there is a need to develop or identify a more effective and less harmful treatment. Omega-3- fatty acids have been shown to alleviate bipolar disorder symptoms without the harmful side effects. Since depletion of myo-intracellular inositol is one of the mechanisms hypothesized by which mood stabilizers exert their therapeutic effect, the goal of this study was to determine the effects of the omega-3 fatty acids decosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) on intracellular myo-inositol levels and the expression of the INO1 and INM1 genes. To do so, cells were grown in the presence and absence of DHA and EPA and myo-inositol was assayed in the cell extracts and gene expression determined by RT-PCR. Our results showed that unlike valproate, the omega-3- fatty acids increased intracellular myo-inositol and decreased INO1 expression. We therefore conclude DHA and EPA may exert their therapeutic effect on bipolar disorder by mediating myo-inositol levels.

P-38 *Developing Hybrid Drugs Capable of Activation by Enzymatic Catalysis*
Desmond Murray¹, Jacob Jackson², ¹Associate Professor of Chemistry, ²Undergraduate Student, Education

We are currently working on synthetic methodology focused on making hybrid drugs that can be activated and released in vivo by enzymes. Our approach is based on creating and utilizing mixed acylals – geminal diesters, which can be cleaved by esterases. The mixed acylals are constructed via a one-flask, two-step sequential process involving electrophilic carbonyl addition followed by nucleophilic substitution. We anticipate that once optimized this process can ‘pair up’ a broad diversity of carboxylic acid containing drugs to form single ‘hybrid’ molecular entities.

P-39 *Green Organic Synthesis Mediated by Fruit Puree Catalysis*
Desmond Murray¹, Taemin Yoon², ¹Associate Professor of Chemistry, ²Undergraduate Student, Music

In the summer of 2018, we initiated a new area of research called fruit puree catalysis. Our working hypothesis is that un-isolated enzymes found in whole fruits can be utilized as catalysts for organic reactions. So far, we have had varying degrees of success with a variety of fruits that indicates this is a practical, viable and potentially cost-savings organic synthetic method. We are exploring application in one class of reactions but will soon expand to other reaction types, other fruits/seeds and greener reaction conditions.

Mathematics

P-40 *A General Predator-Prey Biological Model*
Joon Hyuk Kang¹, Qizeng Sun², Lucinda Ford², ¹Professor of Mathematics, ²Undergraduate Student, Mathematics

The existence of the positive solution for the generalized predator-prey biological model with some growth conditions were investigated. The techniques used in this paper is mainly upper-lower solutions method with the first eigenvalue and the corresponding eigenfunction of the Laplacian operator with homogeneous boundary condition.

P-41 *Involute and Evolute Submanifolds*
Yun Oh, Associate Professor of Mathematics

The idea of involute is credited to C. Huygens (1658), and he is also known for his work in optics. He found involutes while trying to build a more accurate clock. Now, the involute and evolute is a well-known concept to study space curves in. I have been working on rectifying curves in (or Minkowski space) under some different settings and several results have been published. In this project, we would like to investigate the involute and evolute submanifold by extending the results from involute and evolute curves in 3D space.

P-42 *A Curve Satisfying $T/K=1/s$ With Constant $K > 0$*
Devin Garcia¹, Yun Myung Oh², ¹Undergraduate Student, Mathematics, ²Associate Professor of Mathematics

According to the Fundamental Theorem of Curves, any regular curve with a smooth positive curvature and smooth torsion can be completely determined up to its position. Helices have the property that the ratio of torsion to curvature is a constant. For rectifying curves, the ratio of torsion to curvature is a linear function. In this paper, we study a space curve whose ratio of torsion to curvature is given by $1/s$, where s is an arc length. For this problem, we consider the curvature is constant. After reparametrization, we use a series solution to solve a third-order differential equation and obtain the general equation of the curve.

Physics

P-43 *Doing Astronomy with Gravitational Waves*
Tiffany Summerscales, Professor of Physics

With the first detection of gravitational waves on September 14, 2015, the new era of gravitational wave astronomy began. Gravitational wave detections, along with observations made by optical telescopes, have given us new information about the universe. This includes new estimates of the numbers of black holes in the universe and their properties, as well as confirming theories about the sources of some gamma ray bursts and how those sources produce heavy elements.

P-44 *A Statistical Analysis of X-Ray Bursts Using Mutual Information*

Jesse M. Snelling¹, Jacob Willard², Jay R. Johnson³, Simon Wing⁴, ¹Undergraduate Student, Department of Physics, ²Undergraduate Student, Department of Engineering & Computer Science, ³Professor of Engineering and Physics, ⁴Researcher, Johns Hopkins University Applied Physics Laboratory

A statistical study on solar flares stronger than C1 class detected by the Geostationary Operational Environmental Satellite (GOES) from 1975 to 2017 was performed. A sequence of waiting times (time elapsed between adjacent X-ray flare peaks) was constructed from the data. A surrogate waiting time distribution (WTD) is produced using a time varying Poisson firing rate from the Bayesian Block procedure (Scargle et al., 2012). Utilizing Shannon entropy, the mutual information of the original and surrogate waiting time sequences is then computed at various look-aheads. It is shown that the observed waiting time sequence has a mutual information greater than the constructed sequence that is statistically significant at relatively small timescales. This suggests there is structure not sufficiently captured by a non-stationary Poisson distribution, despite accurately representing the observed distribution.

ORAL PRESENTATIONS

A - Biology, Chemistry & Engineering (Buller Hall, Room 251)

Session Chair: Benjamin Navia

A-1 *Benzothiazoles as Novel Hybrid Anti-Invasion Agent Against Glioblastoma*

Priscilla Kyi¹, Denise Smith², Desmond Murray³, ¹Graduate Student, Biology Department, ²Professor of Biology, ³Associate Professor of Chemistry

3:00 pm

This presentation discusses the progress we are making regarding the efficacy of our novel synthesized hybrid benzothiazole compounds against a rare and extremely lethal brain cancer called glioblastoma. This cancer, for which there is currently no effective treatment, has been in the news recently as the cause of death for former U.S. Senator John McCain. The presentation will cover the purpose, design, and strategy of the project and the work that has been accomplished to date.

A-2 *The Effects of Novel Dihydropyridine Derivatives as Anti-invasive Agents Against Glioblastoma*

Tendai Hunyenyiwa¹, Denise Smith², Desmond Murray³, ¹Graduate Student, Biology Department, ²Professor of Biology, ³Associate Professor of Chemistry

3:15 pm

This presentation discusses the progress we are making regarding the efficacy of our novel synthesized hybrid dihydropyridine derivatives as potential anti-invasive drugs against a rare and extremely lethal brain cancer called glioblastoma. This cancer, for which there is currently no effective treatment, has been in the news recently as the cause of death for former U.S. Senator John McCain. The presentation will cover the purpose, design and strategy of the project and the work accomplished to date.

A-3 *Exploring Soil Texture Effects on Mustard Seed Meal Suppression of the Weed Velvetleaf*

DahEun Harning¹, Robert Zdor², ¹Undergrad Student, Biology Department, ² Professor of Biology

3:30 pm

The use of mustard seed meal (MSM) as a biofumigant in managing weeds in agricultural settings has been well documented. However, it has been suggested that soil types may differ in their ability to foster the deleterious effects of the meal on undesirable plants. Work with MSM in altering velvetleaf seedling soil growth has shown that certain soils were better suited for weed suppression than other soils. The most effective soils had elevated levels of sand in comparison to less effective soils. Furthermore, enriching the sand content in soil resulted in reduced seed germination and growth. It is hypothesized that elevated sand content in soil creates air spaces resulting in the effective diffusion of inhibitory volatile MSM compounds throughout the soil and maximizing seed/seedling contact with these compounds. In contrast, soil mixtures with elevated silt/clay content should result in less weed inhibition by MSM due to reduced diffusion of volatiles. Experimental results testing this prediction will be discussed.

A-4 *Characterization of Side Scan-sonar Images Produced by Amazonian River Dolphins (Inia geoffrensis) to Reduce Potential Confusion during Surveys of Amazonian Manatees (Trichechus inunguis)*

Daniel Gonzalez-Socoloske¹, Camila Carvalho de Carvalho², Miriam Marmontel³, ¹Associate Professor of Biology, ²Graduate Student, Universidade Federal de Rio Grande, ³Wildlife Researcher, Instituto de Desenvolvimento Sustentável Mamirauá
3:45 pm

Side-scan sonar (SSS) has been successfully used to detect West Indian and West African manatees; however, confirmed sonar images of Amazonian manatees have not yet been obtained. One potential difficulty with this methodology is differentiating manatee images from other large aquatic vertebrates. While West Indian and West African manatees share habitat with small cetaceans in estuarine and marine habitats, their potential confusion in sonar images has been avoided because of their reluctance to approach the boat during surveys. In contrast, the Amazonian manatee shares most of its habitat with two cetaceans, the Amazonian River dolphin (ARD, *Inia* spp.) and the Tucuxi (*Sotalia fluviatilis*). In this study we characterize the sonar image produced by ARD and make notes on behavior observed during surveys for Amazonian manatees. Boat surveys using SSS were conducted during the high (July) and low (December) water seasons in Amanã Lake, Amazonas, Brazil. Sonar surveys were recorded and then analyzed with ReefMaster Sonar Viewer (v. 1.0.36). ARD produced a characteristic wavy tail in the shadow of the image. Unlike the acoustic images produced by manatees, ARD acoustic images contain sharper angles and the shadow is narrower. ARD in Lake Amanã repeatedly followed our boat for kilometers during several hours. They would swim under the boat and approach the SSS transducer. ARD were seen in small pods; however, several pods would aggregate over time around the boat.

A-5 *Development of Cell Phone Based ECL Sensor*

Hyun J. Kwon¹, Elmer Rivera², Rodney Summerscales³, ¹Professor of Engineering, ²Visiting Scholar, ³Associate Professor of Computing
4:00 pm

An electrochemiluminescence (ECL) based biosensor was developed utilizing ubiquitous mobile technologies. ECL offers great advantages over fluorescence based measurement: ECL allows high signal-to-noise measurement; ECL is a highly localized and time-triggered detection method; and instrumentation can be minimized as it requires only voltage to trigger the reaction. Cell phone-ubiquity and connectivity creates opportunities to simplify healthcare instrumentation, brings closer to end users, and enable instant data sharing. A highly compact and affordable instrumentation was designed and constructed using the mobile technology replacing the traditional ECL detector, computer interface, and data analyzer in an all-in-one mode. Ru (bpy)₃²⁺ was embedded in silicon nanoparticles and sandwich immunoassay was conducted. One antibody is conjugated to the Silicon nanoparticles where Ru (bpy)₃²⁺ is embedded and the other antibody is attached to magnetic bead so that the bound complex can be attracted to the electrode surface separating the false positive signals. Coreactant tri-n-propylamine (TPrA) or 2-(dibutylamino) ethanol (DBAE) was tested for their ability to enhance the signal. TPrA provided stronger signals for carbon electrodes and optimal concentration was determined for low signal measurements. The challenge of using disposable screen-printed electrode (SPE) was discussed as the binding materials and its geometry in SPE altered the electrode behaviors. The sensing conditions were optimized by experimenting with variables of buffer conditions, trigger voltage, and electrode conditions. The target sensing molecule of vitamin-D binding protein (DBP) was detected at the hundreds of nano-molar level with the optimized conditions.

B - Religion (Buller Hall, Room 250)

Session Chair: Mordekai Ongo

B-1 *Improving Biblical Language Teaching and Learning with BibleOL*

Oliver Paris Glanz¹, Rodney Lee Summerscales², ¹Associate Professor of Old Testament, ²Associate Professor of Computing
3:00 pm

Biblical Hebrew and Greek can be challenging languages for students. Practice with the language is essential. BibleOL is an online learning environment that allows students to practice Biblical Hebrew and Greek grammar and translating Biblical Hebrew and Greek texts. This tool has been effective for improving students' mastery of oth languages. We have collected performance data of Hebrew students over the last two years at the SDA Theological Seminary. Our statistics show that the average student performs 11 percent better when BibleOL was utilized as a major learning tool in the course. One reason for the performance difference is that BibleOL enables students to use their learned vocabulary and grammar in real Hebrew and Greek Bible passages. In addition, students only get graded for their best exercise run. This stimulates students to repeat exercises until they are satisfied with their grade (gamification effect). Our current work involves adding an examination mode to BibleOL. This new feature would allow English, Spanish, and German speaking seminaries and institutions to automatize their Hebrew and Greek exams.

B-2 *Same-sex Marriage and the Apocalyptic Consciousness of Seventh-day Adventism*

David Hamstra, Graduate Student, Seventh-day Adventist Theological Seminary
3:30 pm

Arguments made for and against affirming same-sex marriage in Seventh-day Adventism rely on typical moral background presuppositions about immanent and transcendent goods identified by Charles Taylor in his philosophical genealogy, *A Secular Age*. Arguments made only in terms of marriage's immanent goods have the potential to diminish the plausibility of a uniquely Adventist way of imagining the transcendent: apocalyptic consciousness focused on the immanent/imminent restoration of Eden by Jesus Christ following the second coming. Comparing marriage to the this-worldly and next-worldly benefits of divergent Adventist Sabbath-keeping practices foregrounds the availability of immanentized moral presuppositions to make sense of Adventist ethical hermeneutics. But practices that entail giving up immanent goods for the transcendent good of Eden restored can be authentically sustained through communal recognition. Adventism should develop practices of recognition both to alleviate losses incurred by those who make sacrifices for traditional marriage as a transcendent good and to reinforce the fuller sense of meaning found in self-denial for the sake of the soon-coming Savior.

B-3 *The Eye as Metaphorical Agent in Deuteronomic Law*

A. Rahel (Schafer) Wells, Associate Professor of Hebrew Bible
3:45 pm

Laws found in Exodus and Leviticus reference the eye as a specific body part, such as Exod 21:26, where damage to the eye of a slave results in the slave's freedom. However, Deuteronomic law shifts from this literal reference to a metaphorical usage of the eye. For instance, bribes are said to blind the eyes of the wise in Deut 16:19, but receiving money in order to insure a certain action or decision does not lead to actual physical blindness. Most of the remaining examples involve just retribution or punishment where the law specifies that the eye should not pity the one being punished (cf. Deut 13:8; 19:13, 21; 25:12). These passages indicate a metaphorical use of the eye to represent the emotions (or the heart), a part of the brain that is affected and moved by those who are suffering or punished. None of these laws discuss physical eyes or eyesight, but use the body part which normally is associated with physical eyesight to refer to mental and emotional thought-processes. Physical eyesight may certainly be involved in provoking these thought-processes, but the metaphor carries the meaning of the law into categories that would not require physical sight. For example, a blind person could still be bribed, described as the blinding of the eyes of their mind. A blind person could also still pity the one being punished for sin, described as the eyes of their emotions pitying the guilty. This paper explores the reasons for this metaphorical usage of the eye in Deuteronomy, as well as ramifications for metaphors found in legal material.

C - Education & Political Science (Buller Hall, Room 208)

Session Chair: Harvey Burnett

- C-1** *Periphery and Centrality: A Literature Review of Social Networks in Higher Education Classrooms*
Anneris Coria-Navia, Associate Professor of Curriculum and Instruction
3:00 pm

The study of social relationships and interactions in educational settings in general and in classrooms in particular remains of interest in social sciences and education. Nevertheless, the research in this area is underdeveloped and the results underutilized. Social network analysis (SNA) provides the tools for answering questions concerning relationships and the effect that those relationships have in the experience of students. Educators can use this information to facilitate the formation of strong and effective networks for optimizing the learning experience. Students can use the knowledge gained from the study of networks to be intentional about creating relationships that will positively influence their educational experience. This presentation will focus on a review of the literature available on social networks in the higher education classroom and its implications on the learning experiences of college and university students.

- C-2** *Developing An Adventist Philosophy, Pedagogy and Practice of Research*
Desmond Murray, Associate Professor of Chemistry
3:15 pm

This presentation seeks to engage us in development of a distinctive Adventist philosophy, pedagogy and practice of research. It proposes some fundamental ideas toward this objective and offers a critique of our current approach.

- C-3** *Nursing Students' Perception of the Nursing Educational Environment at Andrews University*
Bea Ade-Oshifogun¹, Gisela Schmidt¹, ¹Professor of Nursing
3:30 pm

Aim: The aim of this study is to describe how nursing students perceive their educational environment. **Objectives:** The objectives of this study are to (a) measure nursing students' perception of their educational environment and (b) compare nursing students' perception of educational environment within cohorts (sophomore, junior and senior). **Background and Rationale:** As the Nursing program at Andrews University went through decreasing enrollment, the university began making plans to make positive changes. A baseline measure will give reliable data to inform these planned changes. The educational environment of a nursing school has different determinants which affect the way studentd perform, and some of these determinants are captured in the Dundee Ready Education Environment Measure (DREEM) questionnaire (Roff 2005). DREEM is a quantitative assessment of five domains: Perceptions of Learning (PL); Perceptions of Teaching (PT); Academic Self –Perceptions (ASP); Perceptions of Atmosphere (PA); and Social Self-Perceptions (SSP). **Research Methodology:** This is a cross sectional research study utilizing a convenience sample of students enrolled in the nursing program during the Fall 2015 semester. Hard copies of the DREEM questionnaire were given to students, and completed copies were submitted anonymously via sealed envelopes. Total DREEM scores were compared across cohorts, and subscale data were analyzed using ANOVA to determine any significance (p = 0.05). **Results:** Thirty-nine students were surveyed (16 sophomores, 8 juniors, and 15 seniors). Scores showed 20 percent of seniors perceived their educational environment as having lots of problems, and this filtered through all the DREEM domains. The perception of teaching was good across all cohorts, with no significant difference. Twenty percent of seniors have more negative perception of their learning while other cohorts had positive perceptions. **Conclusion:** This study highlights the need to focus on the senior year of the nursing program. A detailed analysis of the experience of the senior year will help reveal the factors causing dissatisfaction with seniors, especially in their social life.

C-4 *Risk and Protective Factors for Substance Abuse*

Duane C. McBride¹, Alina M. Baltazar², Curtis VanderWaal³, Karl Bailey⁴, Stephen J. Eccles⁵, Dominique Gummelt⁶,
¹Research Professor of Sociology, ²Associate Professor of Social Work, ³Professor of Social Work, ⁴Professor of Psychology,
⁵Graduate Student, Community & International Development, ⁶Health & Wellness Director
3:45 pm

Every five years since the 1990's, the Institute for the Prevention of Addictions, with funding from the General Conference of Seventh-day Adventists, has conducted the Andrews University Health Risk Behavior Survey. The research project has focused primarily on substance use; however, in more recent years, the study has added sexual behavior risks, screen time and other behavioral risks. These were generally the dependent variables in the study. The independent variables have been such protective relationships as religion, family, mental health and general wellness behaviors. Analysis of these data has focused on trends in substance use, cultural leveling in use patterns, and the relationship of substance use to other health and health risk behaviors, as well as significant risk and protective relationships. Overall, the data show that alcohol use has declined among Andrews's students, while marijuana use has increased. Both of these findings are consistent with national use trends among college students. Analysis has also found that religion, acceptance of the health message, and belief internalization are the most protective variables. Relationship with parents and community service are also protective. Major risk variables include trauma and mental health problems. There were significant interrelationships between many types of risk behaviors. In terms of healthy behaviors, we are a *sometimes* campus. We will also focus on the future of this research project—methods, conceptual frameworks, the increasing importance of data management, multi-year integration, and utilization of the data for further research and programs.

C-5 *Formalizing the Informal: Analysis of the Formalization of Informal Institutions in Madagascar*

Joel Raveloharimisy, Associate Professor, Behavioral Sciences
4:00 pm

The purpose of this paper is to explain the processes involved in the formalization of informal institutions during the recurring crises in Madagascar since its independence in 1960. The process is complex and marked by successive political events engineered by Malagasy political entrepreneurs. The formalization of the informal institutions does not neutralize any given political crisis. Instead, it reduces the effects and intensities of the crisis and displaces it to a different sphere until the emergence of another crisis. The recurring crises are within a cycle that seems “unbreakable” because of the strategic approaches that the Malagasy politicians use. Process tracing will be used to conduct the analysis.

D - Music (Buller Hall, Room 207)

Session Chair: Karin Thompson

D-1 *Waterfowl, Waterfall? A Creative Journey in Transformation*
Kenneth Logan, Adjunct Faculty, Department of Music
3:00 pm

In June and July of 2018, I pursued a composition retreat in a rural area of British Columbia, Canada. As in previous years, this year's retreat centered primarily on the geography of a particular ranch. This retreat was highly inefficient technologically yet highly productive creatively. The oral presentation will engage in a multi-sensory exploration, including video, of the creative transformation of portions of a William Cullen Bryant poem, "To a Waterfowl." Central in this creative process was a side trip to a spectacular waterfall. Geography, creative play, and other opportunity provided a context for the rewriting of portions of the poem and contrasting the result with analogous portions of Bryant's original poem. The resulting choir-and-organ musical composition drafts varied greatly in both overall expression and expressive details, while both communicating a similar message about God's profound guidance in circumstances of need.

D-2 *Collection 186: The Papers of Composer Blythe Owen (1898–2000) as a Window into Midwestern Musical Life in the Twentieth Century*
Marianne Kordas¹, Kleberon Calanca², David Ortiz², ¹ Director, James White Library Music Materials Center, ²Graduate Student, Music Department
3:15 pm

Despite being named composer of the year in 1981 by the Michigan Music Teachers Association, winning numerous awards for her compositions, and studying piano, theory, and composition with several famous figures of the twentieth century, Dr. Blythe Owen is not well known to music historians today due to the lack of published material by and about her. I believe, however, that her papers—housed as Collection 186 in the Andrews University archives in Berrien Springs, MI—provide an extensive and unique window not only into the life and work of one female American composer navigating the challenges of the Midwestern professional landscape throughout the breadth of the twentieth century, but also into the workings of the institutions in which she studied and taught (Roosevelt University, Northwestern University, Le Conservatoire Américain de Fontainebleau, the Eastman School of Music, and Andrews University). Moreover, the papers offer a distinct perspective on the lives of the influential musicians with whom Owen interacted, people such as Rudolf Ganz, Florence Price, Alfred Nolte, Robert Casadesus, Nadia Boulanger, and Howard Hanson. The majority of this valuable information is contained in a trove of over 2,000 letters written by Owen to her mother from the early 1920s to the early 1960s, and in her diaries dating from 1954–1991. The current presentation will cover a brief overview of Owen's biography and compositions (with an emphasis on her 40-year career in Chicago), a description of the multifaceted Blythe Owen Project founded by Linda Mack in 1998 to document and disseminate information on Owen's life and work, and an in-depth exploration of the contents of Collection 186 with a special focus on the scope and contents of Owen's letters and diaries. It has been my mission over the past five years to properly process and describe Collection 186. We are now at an exciting juncture where the collection is ready to be newly opened up for research in a number of scholarly areas: twentieth-century American composition, the influence of French music and musicians in American musical life, the Chicago musical scene throughout the core of the twentieth century, and women in music. There has been a curious paucity of musicological scholarship on twentieth-century musical life in Chicago and the greater Midwest. Blythe Owen—via her papers in Collection 186—provides an important source for filling that vacuum.

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Upcoming Research Events

Fall Honors Thesis Symposium

November 15, 2018, Buller Hall, <https://www.andrews.edu/services/honors/>

Seminary Scholarship Symposium

February 12, 14-16, 2019, Seminary, <http://digitalcommons.andrews.edu/sss/>

Michigan Academy of Science, Arts and Letters (MASAL)

March 1, 2019, Alma College, <https://www.alma.edu/offices/michigan-academy/>

Medical Laboratory Science Research Symposium

March 7, 2019, Halenz Hall Amphitheater 107

Honors Scholars and Undergraduate Research Poster Symposium

March 8, 2019, Buller Hall, <http://digitalcommons.andrews.edu/honors-undergraduate-poster-symposium/>

AU Teaching and Learning Conference

March 28, 2019, Chan Shun & Bell Hall, <http://digitalcommons.andrews.edu/autlc/>

Summit on Social Consciousness

April 11-13, 2019, <http://digitalcommons.andrews.edu/scs/>

Honor Thesis Symposium

April 12, 2019, Buller Hall, <https://www.andrews.edu/services/honors/>

Michigan High School Math & Science Symposium

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Andrews Research Conference: Early Career Researchers in the Arts & Humanities

May 15-19, 2019, Buller Hall, <http://digitalcommons.andrews.edu/arc/>