This week we celebrate the scholarly accomplishments of WMU graduate students from across the University through research slide presentations. Faculty judges evaluate the presentations and students with the highest scores are awarded prizes. We are pleased to welcome you to this exciting virtual event highlighting the diverse research and scholarly activities of our graduate students.

We are offering this event virtually this year in an effort to keep student and mentor’s intellectual property protected we will be utilizing Mediasite located in Elearning. Student presentations will only be viewable by those who have a Bronco NetID.

Directions: The link for each presentation is embedded in the presentation title. Please click on the link to watch and listen to the presentation. Each presentation is 5-7 minutes in length and includes up to seven slides. Please note it may take a few moments to load each video, the time will vary depending on your internet speed.

Presentations will be viewable April 5-8, 2021
Check our website on Monday, April 12 for results
Alberto Cintron-Colon  
Mentor: Dr. John Spitsbergen  
BIOLOGICAL SCIENCES  
"Effects of Aging and Exercise on Structural-Plasticity of Motor Neurons"  
Abstract: Weakening of the neuromuscular system is the loss of connectivity between motor neurons (MNs) and muscle. Exercise provides neuroprotection by releasing neurotrophic factors like GDNF. This study aimed to examine MN size changes with age and exercise and their relation to GDNF. The lumbar region was processed for immunohistochemical analysis. Results show that cell body size increased from 4 weeks to 6 months of age but declined at older ages in sedentary rats, exercised groups had an increase in cell body size, and GDNF was co-localized at all ages. Understanding the role of exercise and neurotrophic factors is key to understanding the survival of the nervous system.

Ruchi Ojha  
Mentor: Dr. Ben Koestler  
BIOLOGICAL SCIENCES  
"Characterizing the role of Shigella Flexneri Diguanylate Cyclases in Pathogenesis"  
Abstract: Shigella causes bloody diarrhea by invading human colon cells, and infects millions of people each year worldwide; there is no vaccine to prevent Shigella infection. Once ingested, Shigella adapts to different environments in the body by forming biofilms, bacterial aggregates encased in a polysaccharide matrix. Biofilm formation is regulated by the signalling molecule c-di-GMP, which is synthesized by enzymes called diguanylate cyclases (DGC). Shigella has 4 DGC genes (dgcC, dgcF, dgcP and dgcI) and I have shown that deleting Shigella dgcC and dgcF genes reduces Shigella biofilm formation and invasion. We conclude that Shigella DGC’s contribute to virulence phenotypes.

Jake Spitsbergen  
Mentor: Dr. Cindy Linn  
BIOLOGICAL SCIENCES  
"Recovery of Retinal Function in Adult Mouse Eyes Treated with an Alpha-7 nAChR Agonist"  
Abstract: Ocular blast damage such as that seen in modern warfare often leads to irreversible vision loss. A modified paintball gun was used to introduce a 39psi blast of air to the eye of an adult mouse in order to induce ocular trauma. Anatomical damage of the retina was then characterized through staining of retinal cells with DAPI and cell counting. Functional damage was assessed through the use of electroretinogram (ERG) recordings taken from blast-damaged and control eyes. PNU-282987, an alpha-7 nAChR agonist, was applied as eye drops post-blast with the goal of recovering retinal function as assessed by electroretinogram.
Roshan Javanshad  
Mentor: Dr. Andre R. Venter  
CHEMISTRY  
"Serine, the Magical Protein Solubility Enhancer"  
Abstract: Proteins are important biological macromolecules that are undeniably fundamental to life. Therefore, techniques that provide rapid and simple protein analysis and help with understanding protein behavior are crucial to many modern biological and medical research. Electrospray ionization mass spectrometry (ESI-MS) has proven to be an unparalleled technique for protein analysis. However, when coupled to desorption (DESI-MS), it is fraught with complications due to inefficient protein dissolution. Inspired by Nature, naturally occurring amino acids have been used as additives to improve protein stability and solubility. We demonstrated that amino acids, in particular L-serine, improve protein analysis by DESI-MS through improving solubility.

Jaafar Hachem  
Mentor: Dr. Susan Stapleton  
CHEMISTRY  
“LXR and INSIG Act as Differentiators in the Regulation of the Gene Expression of G6PDH and FAS Under Insulin Resistant Conditions”  
Abstract: Diabetes, a chronic metabolic disease that affects nearly 10% of the world’s population can lead to very serious complications such as renal failure, liver cirrhosis, and heart attacks. The most common type is Type 2 diabetes and is diagnosed when a person has elevated amounts of blood glucose due to insulin resistance. This resistance to insulin leads to problems with glucose transport into tissues for subsequent metabolism. Over the years it has been shown that insulin regulates the expression of several key enzymes in both carbohydrate and fatty acid metabolic pathways via the phosphatidyl inositol 3-kinase (PI3K) pathway. Previously, using glucosamine, a precursor of the hexosamine biosynthetic pathway, we had established a model of insulin resistance in primary rat hepatocytes in culture. Using this primary cell culture model, we showed that under insulin resistant conditions, the expression of glucose 6 phosphate dehydrogenase (G6PDH), a key enzyme in carbohydrate metabolism and fatty acid synthase (FAS), a key enzyme in fat metabolism were differently regulated but the mechanism of this differentiation was unclear. Under this model of insulin resistance, we now show that this differential regulation is due to two proteins downstream of PI3K, the liver.

Jennifer Ribble  
Mentor: Dr. Megan Kowalske  
CHEMISTRY  
"Undergraduate Chemistry and Biochemistry Majors' Perceptions of Careers in Chemistry”  
Abstract: In order to recruit students in chemistry, we must first understand what students know about the careers available to someone with a chemistry degree. This study utilized narrative inquiry and case study analysis to examine the experiences of six senior chemistry or biochemistry majors. These participants were interviewed, and a narrative was developed for each participant. Narratives were treated as icases that were analyzed on their own and compared to other interviews. It was found that the participants were unable to identify many careers in chemistry or biochemistry and that they were unsure what those careers consisted of.
Mishal Ahmed  
Mentor: Dr. Mathew Higgins  
ECONOMICS  
"Asymmetric Effect of Sentiment on Equity Returns"  
Abstract: We test the asymmetric impact of positive and negative investor sentiment, proxied by Baker-Wurgler investor sentiment, on expected stock returns in U.S. As a first step, we regress sentiment on fundamentals of financial market and the economy that can affect sentiment. As a second step, we estimate long horizon return regression by regressing future stock returns on sentiment residuals. We find evidence of a statistically significant difference in the impact of negative and positive investor sentiment on expected stock returns. We examine the asymmetric relation for different proxies of investor sentiment and different forecasting horizons. We extend our analysis to different types of stock portfolios, stock market indexes and global stock markets. Long horizon regression is plagued with two econometric problems: overlapping observations and persistent independent variables. We correct for these issues by providing Hodrick (1992) standard errors.

Moumita Ghorai  
Mentor: Dr. Christine Moser  
ECONOMICS  
"The Impact of Extreme Temperature on Mortality in India”  
Abstract: This paper uses district-level panel data for the years 2009 to 2018 to examine the relationship between high temperature and mortality in India. India, a still-industrializing nation, is currently facing a major climate crisis – as she struggles to balance economic growth and the environment. The use of fossil fuel, rapid urbanization, uncontrolled industrial pollution are aggravating the global crisis and require immediate attention. My research shows that increasing temperature has a highly significant impact on mortality in India. Firstly, I find that high temperature substantially increases mortality in urban India immediately. Whereas rural India experiences a more prolonged impact of the temperature shock.

Marilyn E. Markel  
Mentor: Dr. Jean Kimmel  
ECONOMICS  
"Earnings Differentials of Gender and Sexual Identities Using Open-Ended Response Questions”  
Abstract: I examine the relationship between sexual orientation, gender identity, and socioeconomic outcomes using data collected from an anonymous online survey in the United States. I present a broad choice of sexual orientations and gender identities, including open-ended text responses in this survey. The limited research at the intersection of Labor Economics and LGBTQ+ Studies, while groundbreaking, is constrained by incomplete data. This paper will inform future survey design and add to general knowledge on Labor Economics and LGBTQ+ Studies, which can inform future education and labor policy.
Alex Brandow  
Mentor: Dr. Ramona Lewis  
EDUCATIONAL LEADERSHIP, RESEARCH & TECHNOLOGY  
"The Role of Diversity, Equity, and Inclusion in Michigan Community Colleges"  
Abstract: The purpose of this research project was to explore the Diversity Equity & Inclusion (DEI) initiatives across Michigan community colleges. Attempting to address issues of access and inclusion many community colleges have been reconsidering and adapting their policies and operations in efforts of creating more socially just campus practices. To explore this topic, I conducted interviews with educational leaders from all the 28 community colleges in Michigan. Preliminary findings suggest that many of these college’s campuses aren't reflective of their communities, and shown how the pandemic has affected diverse student populations with three common themes: access to technology, mental health concerns, and isolation. As of now, results are still pending while I continue to conduct my interviews.

Joshabel De La Cruz  
Mentor: Dr. Eric Archer  
EDUCATIONAL LEADERSHIP, RESEARCH & TECHNOLOGY  
"Exploring the Lived Experience of Dominican Fulbright-MESCYT"  
Abstract: This transcendental phenomenological study explores the lived experience of six Fulbright-MESCYT alumni who completed a master’s degree in the United States and returned to their home country. This study also examines how alumni make meaning of their long-term international exchange and their re-engagement in Dominican society. This study uses demographic profiles, two in-depth, semi-structured phenomenological interviews and a photo to revive memories of their Fulbright-MESCYT experience. Participants express common themes of engaging with diversity, faculty contact, effective student services, and extensive contact with other international students, and report increased critical thinking, open-mindedness, and ability to innovate upon their return home.

Yunzheng Zheng  
Mentor: Dr. Jianping Shen  
EDUCATIONAL LEADERSHIP, RESEARCH & TECHNOLOGY  
"The Relationship Between School-Level Social Networks and Student Achievement: An Exploratory Study"  
Abstract: Researchers are becoming increasingly aware of the importance of social networks in education, but empirical studies have rarely been conducted to determine the impact of a school-level social network. In this exploratory study, 76 schools in a school improvement program were surveyed about their interactions with each other. A hierarchical linear modeling method was used to analyze the relationship between the characteristics of social networks and student achievement. The results indicate that the following aspects are associated with higher student achievement and higher student achievement growth: (a) having more out-bond connections, (b) having more reciprocal relationships, and (c) being connected to more “centered” schools. The findings have implications for educational research, policy, and practice.
Maryam Salman Boujulaia
Mentor: Dr. Brandy Anne-Skjold Pleasants
MALLINSON INSTITUTE FOR SCIENCE EDUCATION
"Saudi High School STEM Teachers’ Understanding and Practices of Creativity in the Classroom"
Abstract: This paper aims to assess Saudi high school STEM teachers’ understanding of creativity. The study was conducted in Saudi Arabia with nine Saudi high school STEM teachers from public schools. The qualitative data collection strategy included semi-structured interviews. The analysis approach was a priori coding. The analysis shows that Saudi high school STEM teachers have mixed definitions of creativity, valued creativity, and claimed practicing creativity through instructional practices that promote thinking. On the other hand, Saudi high school STEM teachers were not satisfied with the Ministry of Education’s professional development and technical support.

Madison Lyn Fitzgerald-Russell
Mentor: Dr. Megan Kowalske
MALLINSON INSTITUTE FOR SCIENCE EDUCATION
"Experiences of Queer Science Major Undergraduate Students in Their Departments"
Abstract: This study explored how the feelings of comfort and safety of LGBTQ+ undergraduate science majors in their departments at a midsize Midwestern university affected their academic success. There is little literature connecting campus climate to STEM departments and LGBTQ+ undergraduates. Three participants participated in two interviews each for six total interviews, which were analyzed using emergent coding. The most interesting findings were about passive negative experiences or general negative feelings about expressing identities. This study found LGBTQ+ undergraduates in science departments may experience microaggressions because of their sexuality but lack the language to describe them or identify them as harmful.

Asghar Pervaiz Gill
Mentor: Dr. Charles Henderson
MALLINSON INSTITUTE FOR SCIENCE EDUCATION
"Pakistani Chemistry Teachers’ Understanding, Beliefs, and Teaching Practice about Climate Change"
Abstract: Teachers’ personal beliefs and understanding about science topics impact students’ learning. This is relevant for teaching climate change a scientifically complicated and socioeconomic issue. Thirteen Pakistani chemistry teachers were interviewed to investigate their knowledge, beliefs, and practice about climate change. We found that teachers believe it is important to teach climate change in schools, they reported insufficient climate change curriculum content, do not face any obstacles teaching it, and teachers have insufficient scientific knowledge about climate change. We suggest including climate change in teacher training programs, adding more content in the curriculum, and testing climate change in final exams.
Nitchada Kamlue  
Mentor: Dr. Laura R. Van Zoest  
MATHEMATICS  
"The Art of Struggling Productively"

Abstract: To effectively bring the Common Core State Standards Mathematical Practices (MPs) into future classrooms, prospective teachers need to both experience the practices themselves and reflect on what those practices mean for their future teaching. We analyzed videotapes and written documents when prospective teachers engaged with a challenging engaging problem (Frogs) to investigate the struggles they encountered and how those struggles supported their developing understanding of the MPs. We share our findings and the insights we gained about how the idea of productive struggle extends beyond learning content to learning about teaching.

Iqbal Singh Chahal  
Mentor: Dr. Muralidhar Ghantasala  
MECHANICAL & AEROSPACE ENGINEERING  
"Driveline Torque Measurement Using Virtual Torque Sensor"

Abstract: Heavy duty trucks currently estimate the torque produced by an engine using Controller Area Network (CAN) bus with an accuracy of 5 to 30%, resulting in additional fuel consumption and driving difficulties. Our team developed a virtual method to measure real time torque within ± 5% accuracy. Test results of the developed sensor were compared with values obtained from a commercial sensor. In addition, fuel saving with improved torque accuracy is estimated using a simulation software under different driving conditions. This predicted fuel savings up to 3.5% for class 8 heavy duty trucks. Thus, improved fuel economy will reduce the overall trip cost for the fleet owners.

Lulu Cao  
Mentor: Dr. Marc Alspector-Kelly  
PHILOSOPHY  
"On Internal/External Validity: The Tradeoff Claim"

Abstract: Many researchers are concerned with choosing among different types of experiments due to their concerns about the tradeoff between internal and external validity. This paper/presentation argues that the tradeoff claim is misconceived for two reasons: 1) internal and external validity can rely on the same factors; 2) some threats to internal validity can also threaten external validity. Therefore, researchers should focus on eliminating factors that decrease internal and external validity, instead of the "tradeoff" between the two.
Daniel Kosacz  
Mentor: Dr. Charles Kurth  
PHILOSOPHY  
"Emotion and Error"  
Abstract: Can you be mistaken about your emotions? That is can you be happy all while denying that that you are? The received view in emotion theory takes feelings to be an essential feature of emotions, and in doing so denies any possibility of emotional error. Proponents of the received view point to commonsense as justification for their position. However, to date, there has been no systematic investigation of what commonsense says about the possibility of emotion error. In this paper, we present results from five empirical studies, which indicate that commonsense takes emotion error to be possible for a wide range of emotions and situations. We also explain how our results shed new light on central debates about the nature of emotion and emotional experience.

Grecia Sánchez Blanco  
Mentor: Dr. Sandra Borden  
PHILOSOPHY  
"I Still Feel Like Me: Epistemic Justice and Philosophy for Children Pedagogy for Students from Immigrant Backgrounds"  
Abstract: The project begins with the assumption that philosophy has a socio-political impact in local and global communities, which can flourish when given opportunities for philosophical exploration and debate. In this way, Philosophy for Children pedagogies can be instrumental for grassroots change in organizations such as El Concilio, a non-profit, community-focused organization that helps Latinx residents support their families, contribute to society and appreciate their cultural significance in the region. Hence, the main function of this on-going project is to generate philosophical content for the immigrant community in Michigan. Specifically, bilingual philosophical content was generated for P4C sessions where philosophical/ethical questions on justice, ethical duties, and identity are being explored.

Amaury Pineda  
Mentor: Dr. Priscilla Lambert  
POLITICAL SCIENCE  
"A Tale of Two Chambers: How Gender Quotas Impact Women’s Representation in Dominican Republic"  
Abstract: Female legislators elected by gender quota laws are likely to feel ‘mandated’ to advocate for women’s interests (Franceschet and Piscopo 2008). However, no study has tested this thesis empirically in the context of Latin America. To close this gap, this study uses the rare natural experiment of the Dominican Republic to compare legislators’ attitudes and behavior towards the representation of women’s interests. The results show that female legislators elected by quota are more committed to representing women than their male and female colleagues who are not elected by quota.
Qihai Liu  
Mentor: Dr. Hyun Bin Kang & Dr. Kevin Lee  
STATISTICS  
"Mixture of Functional Graphical Models"  
Abstract: Many scientific areas are faced with the challenge of extracting information from large complex data. As a part of such effort, a mixture of functional graphical model is developed to extract the conditional dependence structure among random functions. An Expectation-Maximization (EM) algorithm for finding both the subgroup of each individual and the conditional dependence structure in each subgroup is proposed. The motivation comes from analyzing the Attention Deficit / Hyperactivity Disorder (ADHD)-200 brain fMRI dataset, and the analysis of low-dimensional functional data, sugar fluorometric spectra, is discussed in this preliminary study.

Dale Brown  
Mentor: Dr. Dini Metro-Roland  
TEACHING, LEARNING, AND EDUCATIONAL STUDIES  
"A Theoretical Review on the Role of Humanization in Carceral Higher Education”  
Abstract: This theoretical paper explores the strengths of a humanizing pedagogy that is based on the humanities in the context of higher education for incarcerated people. I propose that a new concept, which I call “DeadTime,” describes the dehumanizing forces of incarceration better than the commonly used metaphor of warehousing. Reviewing the work of theorists in the fields of education and social work, I defend carceral higher education for the sake of humanization, as opposed to punishment or revolution. In the fight against DeadTime, a humanizing approach to higher education that is based on the humanities can foster genuine dialogue, robust relationships, a sensitivity to individuals’ adverse experiences, and an awareness of individuals’ intersectionality.

Xin Li  
Mentor: Dr. Regena Nelson  
TEACHING, LEARNING, AND EDUCATIONAL STUDIES  
"Preparing Multicultural Teachers: A Two-Tier Multicultural Teacher Education Model”  
Abstract: To prepare culturally competent teachers, many institutions have included multicultural education content in their teacher education programs. However, the research of multicultural preservice education is inconclusive. Thus, this paper seeks to address this issue. First, this paper provides an overview of multicultural teacher education models and empirical studies. Secondly, this paper presents the proposed Two-Tier Multicultural Teacher Education model, grounded in complexity theory that integrates two approaches to multicultural education. This study would be particularly helpful for preservice early childhood teachers to better understand multicultural education and multicultural practices.
Makayla R. Long  
Mentor: Dr. Megan Kowalske  
INTERDISCIPLINARY (BIOLOGICAL SCIENCES & CHEMISTRY)  
"Understanding STEM Instructors’ Experiences with and Perceptions of Deaf and Hard-of-Hearing Students: The First Step Towards Increasing Access and Inclusivity”  
Abstract: Deaf and Hard-of-Hearing (D/HH) people are underrepresented in STEM and instructors play a crucial role in their success. This study captured experiences of WMU STEM instructors and their understanding of resources available to them given their direct impact on D/HH students’ ability to receive a post-secondary degree. Through an anonymous survey we examined STEM instructors’ experiences teaching D/HH students. Our findings support the claim that instructors are not aware of the needs of D/HH students, have limited experience with them, feel unsupported in meeting their needs, and lack knowledge and/or access to adequate resources to support D/HH students.

Thank you for joining us today!  
Check our website on Monday, April 12 for results.