2022

SWOSU Research and Scholarly Activity Fair 2022

SWOSU Office of Sponsored Programs

Thirtieth Annual

SWOSU Research and Scholarly Activity Fair

Thursday, April 14, 2022

On behalf of Southwestern Oklahoma State University, welcome to the Thirtieth Research and Scholarly Activity Fair! We are proud to host students and faculty from universities and community colleges from across the state at this meeting of scholars. Research and scholarly activity ranging from Business Administration, Education and Professional Studies, Fine Arts and Design, Liberal Arts, and Mathematics and Science.

We wish to extend special thanks to all who played vital roles in making this event happen, particularly: President Diana Lovell and Provost Joel Kendall, for their support of research and scholarly activity at all levels; Mr. Scott Miller, Mr. Nate Downs, and Ms. Radonna Sawatzky, and their staff for helping to set up the facilities and providing catering services. We also recognize the faculty, staff, students, and administrative sponsors & collaborators who dedicate significant time and effort toward integrating students into various forms of research and scholarly activity.

We personally would like to acknowledge the members of the University Research and Scholarly Activity Committee for their dedication and hard work to make this event a reality. The members include Dr. Jieun Chang, Dr. Jared Edwards, Dr. Jeremy Evert, Dr. Jon Henrikson, Dr. Sophia Lee, Mr. Frederic Murray, Dr. Anne Pate, Dr. Horrick Sharma, Ms. Leticia Castro, Ms. Audra Crisp, Mx. Arianna Martin, Dr. Lori Gwyn, Ms. Jennifer Cook-Johns, Mr. C.J. Smith, Ms. Morgan Mitchell and Mr. Gustavo Tineo.

Student research is an essential ingredient in undergraduate education. It fosters collaboration, critical thinking, and creativity in identifying and working to solve a question, and it provides the opportunity to communicate results. From the student's perspective, there is the added excitement of potentially being the first to make a discovery, understand a problem, provide a solution, and/or make a creative contribution to the world. We hope you will continue to participate in events such as this in sharing your university's research and scholarly activity accomplishments.

Enjoy the Fair!

Sincerely,

SWOSU Office of Sponsored Programs and URSAC

Contents

How to Recognize Successful PTA Program Candidates During the Admission Process: A Longitudinal Study of Admission and Completion Trends and Patterns

Drs. Sharon Lawrence, David Lawrence, & Brandy Chase

Abstract

The Physical Therapist Assistant Program at Southwestern Oklahoma State University has been in existence for over 20 years. Accreditation standards require 1 every program to record and report attrition rates, licensure exam pass rates, and employment rates. Very little research has been completed with respect to admission requirements and their impact on successful program completion. This study looks at which admission factors suggest successful completion of the PTA program, and contribute to a first-time licensure exam pass rate on the National Physical Therapist Assistant Exam.

Prevalence of Food Insecurity and Awareness and Use of on Campus Resources

Taylor Vaughan, Raygan Holder, & Toby Clampitt
Faculty Mentor: Dr. Anne Pate

Abstract

Food insecurity is an issue that has been studied at the national level, specifically through the U.S. Department of Agriculture (USDA) since 1995. Food security is defined in the 2020 USDA report as a "access by all people at all times to enough food for an active, healthy life". In 2019, the percentage of 1 U.S. households reporting food insecurity was 10.5% representing approximately 13.7 million households, which was a decline from previous highs of 14.9% in 2014 and 12.7% in 2015. (Coleman-Jensen 2020). Oklahoma reported an average of 14.7% (+1.84) of households as food insecure between 2017 and 2019, which was a decline from the 15.5% of households reporting food insecurity between 2013 and 2015 (Coleman-Jensen 2016).

One tool that may be used in the reduction of food insecurity among college student populations is the implementation of institutions such as food banks or pantries that do not carry the same cost of student meal plans or the limited eligibility of programs like supplemental nutrition assistance program (SNAP). In response to this need, the number of food pantries on higher education campuses grew from just one in 2007 to 700 by July of 2019 (Daugherty et al, 2019). Unfortunately, the negative stigma surrounding seeking help can be exacerbated by apprehension, anxiety, and discrimination (Daugherty et al, 2019).

The study was approved by the SWOSU IRB-PHS Committee. The electronic survey consisted of three components: seven demographic questions, seven food security status questions that reflect the USDA U.S. Household Food Security Survey Module, and six food pantry associated questions. The survey was distributed through Canvas to the student body and available from 3/22/22-3/31/2022 and administered by the SWOSU Assessment Center.

The survey is currently being conducted and the poster will reflect the characteristics of the respondents and the results of the analysis.

Detecting Variations in Microbial Concentrations in Oklahoma Lakes

Larry Cossey
Faculty Mentor: Dr. Regina McGrane

Abstract

The microbial composition of water can be the difference between life or death for many organisms. Microbes in lakes can reproduce and spread to other parts of the water cycle. Ice nucleating Pseudomonads are microbes that have been shown to be in all parts of the water cycle and 1 damage plants. These Pseudomonads conduct ice nucleation by inducing freezing of supercooled water molecules. Through evaporation and rainfall, Pseudomonads can disperse anywhere. When bacterial ice nucleation occurs around plant tissue, ice crystals form within the tissue and damages the plant. To examine microbial composition, two Oklahoma lakes: the urban lake--Lake Hefner and the rural lake--Crowder Lake, were examined. In each lake, water samples were collected from three specific locations in summer and winter months. Samples were inoculated on 10% tryptic soy agar to determine total bacterial load and King's B agar supplemented with 2 boric acid, cycloheximide, and cephalexin to isolate Pseudomonads. At Lake Hefner, the eastern shore had significantly larger bacterial concentration in both seasons compared to other locations. At Crowder Lake, the center of the lake had significantly lower bacterial concentration in both seasons compared to other locations. Seasonally, there was lower bacterial concentration in the winter at Lake Hefner compared to the summer, while Crowder Lake had similar bacterial concentration year-round. Lake Hefner had higher bacterial concentration compared to Crowder Lake. Pseudomonads isolated from both seasons and lakes were tested for ice nucleation activity by inoculating in super 3 cooled water and detecting ice formation. Twenty-two ice nucleators were detected at Crowder Lake and three ice nucleators were detected at Lake Hefner in the summer, and none were detected in the winter. The seasonal differences in the concentration of ice nucleating bacteria were surprising because other studies have shown that cooler environments select for increased ice nucleating bacteria.

Microbial Analysis of Regolith-grown Species on Mars

Saraya Hunt, Joseph Olonovich, Payden Farnsley, Emilee Adams, Kyla Langstraat, & Rachel Uhlig
Faculty Mentor: Dr. Lisa Castle

Abstract

As part of the on-going NASA-affiliated Plant Mars Challenge, SWOSU students are growing plants for ten weeks in simulated mars regolith. While an official challenge goal is to grow food plants with the greatest yield in 10 weeks, the SWOSU team is also investigating the interactions of plant diversity and soil microbe diversity and measuring nutritional content and microbial diversity as dependent variables. This poster describes the experimental design and rationale behind the project, as well as potential implications of the results.

Investigating potential circadian oscillations in Pseudomonas syringae

Megan Strotman
Faculty Mentor: Dr. Regina McGrane

Abstract

Pseudomonas syringae is a gram-negative plant pathogen that encodes a kaiC ortholog. KaiC has been proven to regulate circadian oscillations in cyanobacteria, which control transcriptional oscillations, cell division, and photosynthesis. We hypothesize that P. 1 syringae is capable of circadian oscillation and that kaiC contributes to regulation of stress response, biofilm development, motility, and plant colonization. To determine if P. syringae has circadian oscillations, the wild type strain or mutants lacking kaiC were spotted onto King's B agar media supplemented with coomassie blue, which binds proteins, or congo red, which binds exopolysaccharides. The plates were then exposed to day-night cycles (12 hours light, 12 hours dark) or dark conditions for seven days. Oscillations in protein and exopolysaccharide production were then observed due to varying intensity of either blue or red rings in the 2 colonies. While oscillations were detected, analysis of the plates indicated no significant differences in the number or pattern of the rings when comparing the mutants to the wild type or the plates exposed to day-night cycles to dark conditions. To determine if kaiC regulated P. syringae stress response, wild type or mutants lacking kaiC were exposed to day-night cycles or dark conditions as described above and inoculated in MinA media supplemented with glucose and varying concentrations of salt. Growth was then recorded by detecting absorbance every 30 minutes over a 48-hour period. Analysis revealed 3 significant differences in the growth of the wild type exposed to day-night cycles compared to samples kept in the dark; however, these differences were not observed in mutant strains. This suggests that kaiC may modulate the ability of P. syringae to combat stressful environments. Determining the function of kaiC in P. syringae may allow for development of techniques that target this ortholog and prevent P. syringae growth on crops.

did. The government sent economic help to big and small companies and main sources of work for medium/low class families. These workers had a minimum loss in their salary, but they could still have job and save all the time and effort that requires applying for new jobs, especially for workers older than 40 years old. In crisis times people must adapt a new “lifestyle”, trying to spend as less money as possible and keep having as many earnings as they can. On the other hand, the government needs the money back, so what I offer for that is increasing taxes for a year to those big companies to recover some of the money, while United States, at this point, is still trying to reactivate the trading situation with the European countries and the world. Also, now is a good opportunity for the country to have a global market and negotiate with many south American countries and Asian countries, leaving every kind of political differences on the side of the businesses.

How could the United States handle the social crisis better?

During the pandemic social affairs revive. As I told before, unemployment rate raised, generating economic issues for families, schools and companies. As everybody now, during the pandemic schools had to close their doors adapting to a completely new teaching method, the online classes. Were schools prepared to teach kids and teenagers by a computer? Was the country supporting all the students that come from low-income families? Well, Lancker stablishes that schools are not only a place to learn and educate kids, but schools are also a place for having at least one meal for low-income families (Lancker, 2020). On the other hand, developing more about how the government could help to the education of poor families, Lancker (2020) establishes that the 2.3% of kids in the country do not have access to gadgets or internet to take online classes (Lancker, 2020). How could the government help these families? As everybody know, covid times were not easy for the country and for the government as well having millionaire loses. However, I believe that in this country there are enough rich people to associate with the government and support these kids by giving them the access to a gadget and internet during the 3 pandemic. In these days when everything looks “normal” is easier for those kids attending to school in person and learn as every student, but as citizens we cannot forget that they lost almost an academic year because of the lack of government intervention for these families. These kids only needed access to internet during the on-line academic year. However, the gadget that the government could provide to the student will last for a long time, and student can learn with the future in their hands.

For many people, especially politicians, believe that this is not an issue and try to make the American population believe that the country is getting better. Honestly, this is not thew reality that the country is living right now.

Conclusion

I think the government was not available for the American citizen. The pandemic was a rough time for the entire society in economic and social manner. The government should be more active with the most needed people and keep supporting big economic engines of the country to keep growing the economy by trading and increasing the supply to keep low prices in the market.

Determination of the pKa's of glycine metal complexes by spectroscopic methods of analysis

Audra Crisp & Trevor Ellis
Faculty Mentor: Dr. Jon Henrikson

Abstract

The use of natural and unnatural amino acids has many applications, some of which include mutagenesis, drug design and delivery, and tissue engineering. However, there is a challenge in their efficient creation. One synthetic method relies on metal complexation of a glycine Schiff's Base to protect the amino and carboxyl groups of the glycine. While there have been a number of modifications of the ligand system employed by this method, recent alterations have included the incorporation of various electron withdrawing groups. These alterations are hypothesized to increase the acidity of the C-H bond on the α-carbon of the glycine, thus allowing for milder conditions thus increasing the generality and efficiency of the method. To test this hypothesis, a series of glycine metal complexes have been synthesized. Challenges in the method development process will be 1 discussed in detail. The results of the changes in pKa with the addition of electron withdrawing groups to the metal complexed Schiff's Base of glycine by spectroscopic methods will be presented.

Methods of Analysis for the Determination of Tannins in Tea - Instrumental Analysis Review

Audra Crsip, Rylee Parks, & Jimin Yeo
Faculty Mentor: Dr. Jon Henrikson

Abstract

Tannins have been explored for both their positive and negative effects on the biological systems. While being known for binding to iron in the blood, leading to iron deficiency anemia in humans, tannins also have shown antioxidant, cancer-fighting effects as well as cardiovascular benefits. The 1 goal of this project is to quantify the number of tannins in different categories of tea; for example, green, black, white, and oolong. Challenges in this project include finding a method that can account for the interference of other molecules in each sample, as well as a method that is easily reproducible and can be expanded to include other samples including coffee, wine, and grains.

Methods of Analysis for Contaminants in vaping Through Mass Spectrometry - Instrumental Analysis Review

Jonathan Ebel & Alex Linder
Faculty Mentor: Dr. Jon Henrikson

Abstract

Contaminants in vaping devices have led to many known issues. One of the more common outbreaks has been EVALI (E-cigarette or Vaping Use-Associated Lung Injury). Through the process of multiple tests, including but not limited to, non targeted, headspace, SPME, and Isotope dilution gas chromatography-tandem mass spectrometry it has been found that there are multiple substances that are unfit for human consumption. Additionally, isotope dilution gas chromatography-tandem mass spectrometry is a key method that is able to detect toxic ethylene glycol and diethylene glycol.

Modified tetraazamacrocycles as improved CXCR4 antagonists

Jonathan Ebel & Jordan Valenzuela
Faculty Mentor: Dr. Tim Hubin

Abstract

CXCR4 chemokine receptors are found on the surface of immune, and other, cells, and together with the specific natural ligand, stromal cell-derived factor-1α 1 (SDF-1α, also known as CXCL12), have been revealed to play a role in a number of disease states. Within the last ten years the CXCR4 and CCR5 co-receptors have been revealed as the entry route for HIV into cells, generating interest in a new therapeutic approach to treatment via fusion inhibitor drugs rather than the current preference for reverse transcriptase and protease inhibitors. CXCR4 expression has also been reported in at least 23 different cancers. CXCL12 stimulation of tumor growth, angiogenesis, and metastasis of breast cancer cells has been described. Target organs for breast metastases such as liver, lung, and bone have high levels of CXCL12, triggering the specific migration of breast tumor cells that express the CXCR4 receptor. Due to the wide-ranging 2 potential biomedical applications that might result, our aim is to develop new antagonists for the CXCR4 co-receptor. They are conformationally fixed macrocyclic compounds where the unrestrained equivalent is a known CXCR4 antagonist. The SWOSU-Hull collaboration has produced well over 50 metal complexes of bis-tetraazamacrocycle ligands for screening as CXCR4 antagonists. The bis-linked complexes are highly efficient antagonists, while single-macrocycle analogues are much less effective. Our objectives were to synthesize analogues of our most effective bis-tetraazamacrocycle metal complexes and to characterize their chemical and physical properties in preparation for determining their antagonism of CXCR4.

Removal of CEC from wastewater by heterogeneous recyclable oxidation catalysts: Dye bleaching by cross-bridged tetraazamacrocycle oxidation catalysts designed to be copolymerized

Leslie Garcia & Ashtyn McAdoo
Faculty Mentor: Dr. Tim Hubin

Abstract

We describe here synthetic strategies leading to polymerizable Cu, Fe, and Mn complexes of cross-bridged tetraazamacrocycles. Complexes of this type 1 are known, water stable, broad spectrum homogeneous oxidation catalysts that can use green oxidants, such as hydrogen peroxide and dioxygen, to modify a variety of organic functional groups. Contaminants of Emerging Concern (CEC) are typically anthropogenic organic compounds such as dyes, pesticides, pharmaceuticals, etc., which are becoming increasingly prevalent in wastewater and tend to escape current water purification efforts. In a viable wastewater purification scheme, such catalysts would need to be made heterogeneous so that they can be recycled and used to treat multiple aliquots of wastewater. We have developed monomeric analogues of the known cross-bridged tetraazamacrocycles which have polymerizable pendant arms, with a goal of copolymerization with known polymer types to produce heterogeneous recyclable oxidation catalysts. We present here our synthetic progress, as well as our initial dye bleaching results, in the catalyzed hydrogen peroxide decolorization of known wastewater 2 contaminants Methylene Blue Methyl Orange

Methods of Analysis for the Determination of Sugars Present in Fruit Juice - Instrumental Analysis Review

Tuyet Hoang & Houston Smith
Faculty Mentor: Dr. Jon Henrikson

Abstract

In these past years, the quantity of sugar contained in various products that we consumed daily has slowly become concerning due to its effects on public health. One of the main sources of sugar comes from fruits and fruit-related products like juices. Even though fruit juices are deemed “healthy” by the general public, the amount of sugar contained in fruit can be overwhelming especially when the fruits are closer to ripening. To precisely quantify the amount of sugar contained in fruit juices, many methods have been developed involving a variety of instrumentations, each with different advantages in at least one of the aspects such as reproducibility, accuracy, selectivity, amount of sample needed, simple sample preparation process, etc. In this research, we take a look at the quantifying process of sugar in fruit juices using NMR and HPLC-RI.

Removal of CEC from wastewater by heterogeneous recyclable oxidation catalysts: Dye bleaching by cross-bridged tetraazamacrocycle oxidation catalysts designed to be copolymerized

Tuyet Hoang & Elah Alcuitas
Faculty Mentor: Dr. Tim Hubin

Abstract

Cross-bridged tetraazamacrocycles have made important contributions as ligands 1 that strongly bind transition metal ions. This property is very useful when the metal complex is intended for use under harsh conditions. Application that have benefited from such complexes are as diverse as medical imaging and oxidation catalysis. Pendant arms can be added to the cross-bridged tetraazamacrocycle to allow conjugation to other biologically active compounds, or biomolecules such as proteins and nucleic acids themselves. The conjugated bioactive compound might perform various therapeutic activities, while the cross-bridged 2 tetraazamacrocycle metal complex attached serves as an imaging agent to help illuminate the biological effect of its conjugated partner. For catalytic purposes, these pendant amines can be conjugated to polymer beads to make the catalyst heterogeneous and recyclable. In this project, we are developing the synthesis of aromatic spaced primary amine pendant arm to the known ethylene cross-bridged tetraazamacrocycles. This functional group is well-known for its ability to be conjugated to biomolecules and polymers. Synthetic and characterization methods and results for these novel compounds 3 will be

Reactivity Profile of Ni(II) Complexed Glycine Equivalents

Justin Le
Faculty Mentor: Dr. Trevor Ellis

Abstract

Despite their relatively simple structure, α-amino acids have remained at the forefront of modern scientific research for generations. This in part can be attributed to their diverse application in pharmaceutical, agricultural, and food industries. However, notwithstanding their utility, the synthetic preparation of these materials remains challenging. Of the synthetic methodologies described for their preparation, the modification of metal stabilized imines of glycine remains popular. As a result a number of versions of these Ni(II) complexes have been described in which the physical characteristic of the materials can be controlled. However, few advances have been made toward modifying the pKa of the complexes. Therefore, a series of Ni(II) complexes of glycine with strategically placed electron withdrawing groups will be described. Additionally, the reactivity of these complexes will be compared.

Advancements of Autonomous Applications

Jessica Massey
Faculty Mentor: Dr. Jeremy Evert

Abstract

This material is based upon work supported by the National Aeronautics and Space Administration under Grant Agreement No. 80NSSC20M0114 issued through Oklahoma Space Grant Consortium. This research is in support of the Fire Dawgs competition team for this year's SpeedFest competition at Oklahoma State University. This NASA OK Space Grant Consortium funded competition team will compete in the Charlie Class, where an autonomous vehicle will navigate a course and put out a fire. 1 Robots and self-driving vehicles are useful, especially for hazardous jobs, such as firefighting. The use of high-tech sensing technology is a small part of how self-driving vehicles and robots can sense the world around it. Artificial intelligence or machine learning allows robotic machines to interact with the environment. More powerful sensors and computing allow robotic machines to perform more advanced tasks, allowing developers the ability to imprint human features and capabilities in them. Two examples of this include autos and manufacturing. Autonomous cars use this application for object avoidance and industrial robots use it to stop motion when a person gets too close for safety. Researching and programming sensors to make a remote-controlled vehicle drive autonomously, activate object avoidance, navigate environments, and detect distance from a fire. Industrial robots are collaborative robots that use sensors to share a workspace with humans.

The goal of this NASA mission is to support the pipeline related to research done at NASA and in the Aerospace Industry. At SWOSU, we are currently gathering data for use in machine learning applications. The data comes from the robotic vehicle used for the firefighting competition. We will use this data to examine machine learning tools. This will grow our understanding of how to make this process work and prepare our students for careers using machine learning in the aerospace industry.

The Effectiveness of Guided Math Instruction in a First Grade Classroom

Kelsi Hernandez
Faculty Mentor: Ms. Marla Pankratz

Abstract

This action research project will look at the effectiveness of guided math instruction in a first-grade classroom. The classroom consists of eighteen students from various backgrounds. The teacher will utilize district approved and mandated curriculum along with an online assessment and practice application to teach, remediate, and assess student knowledge. Along with variables of the curriculum and students the recent Covid-19 pandemic has played a role in student achievement with inconsistencies of in-person instruction in the students' last two instructional years. The teacher will group students according to ability and understanding of first-grade math concepts to work to close achievement gaps in the subject area of mathematics. This action research project will focus on the following: due to inconsistent instruction over the last two years during the pandemic, first grade students in a suburban public school district have 1 learning gaps in mathematical knowledge and need individualized support to meet grade level academic progress and growth goals in the area of math. Overall, guided math groups proves successful in remediating, teaching, and identifying students' comprehension and mastery of first-grade mathematical concepts. Guided math groups give students the opportunity to use manipulatives and work with the classroom teacher in a way that provides explicit and detailed instruction. The Imagine Math benchmark shows dramatic growth across the entire classroom, with each student scoring close to the 40% or much higher. The data from the exit tickets as well as the chapter tests does not give a clear view of whether guided math has a positive influence on student achievement or not, but it does provide a concise picture of which students need reteaching on particular mathematical concepts.

Tier 2 Early Literacy Interventions Utilizing Really Great Reading

Adrienne O'Connor
Faculty Mentor: Ms. Marla Pankratz

Abstract

The purpose of this study is to identify potential growth in tier 2 students receiving small group phonics and phonemic awareness intervention instruction. The study seeks to answer the research question, Will students who identify as tier 2 meet grade level expectations in phonemic awareness and phonics through small group instruction of Really Great Reading curriculum with the general classroom teacher? The goal is to analyze students' prior knowledge of phonics and phonemic awareness and determine whether or not additional intervention instruction with tier 2 students promotes knowledge amongst these skills. Overall, data from Istation displays growth for all students, identifying on tier two, with individual struggles across various skills. Students display eagerness for small group instruction and prefer small group versus whole group instruction. Istation proves to be skewed in certain areas regarding time and content. Teaching RGR curriculum in small groups to students allows educators to make connections with content mastery more successfully than the Istation assessment.

A Brief Literature Review for Machine Learning in Autonomous Robotic Navigation

Jake Biddy
Faculty Mentor: Dr. Jeremy Evert

Abstract

Machine learning is becoming very popular in many technological aspects worldwide, including robotic applications. One of the unique aspects of using machine learning in robotics is that it no longer requires the user to program every situation. The robotic application will be able to learn and adapt from its mistakes. In most situations, robotics using machine learning is designed to fulfill a task better than a human could, and with the machine learning aspect, it can function at the highest level of efficiency and quality. However, creating a machine learning program requires extensive coding and programming knowledge that can be difficult to learn for the user. Our main goal is to use Pixhawk autopilot systems, Arduino control boards, Raspberry Pi mini-computer, a GPS, and numerous other sensors and hardware to work together with machine learning to make an autonomous vehicle. Also, once the vehicle is running, we must find the maximum speed without outrunning the sensors. Therein lies the problem, which is making all the hardware work together with one another while using machine learning so that our vehicle can perform many feats, including obstacle collision avoidance, speed control, and heat recognition. We have worked extensively with the hardware and have concluded that for the robot to run, we must use the Pixhawk and Arduino boards, along with the GPS. However, the Raspberry Pi is an optional piece of hardware. In addition, after doing the necessary calculations, our car will be able to go at very high speeds without outrunning the sensors. In conclusion, we still have time to finish the robot, and many other pieces must fall into place to be a functioning and competitive robot. However, we have solved many software problems and can now begin using machine learning to gather the necessary data to analyze and understand more about the robot.

Authentic Coaching: Links between personality, philosophy, and organization in women's collegiate volleyball

Dr. Bo Pagliasotti

Abstract

While there is plenty of research on the separate concepts of coaching philosophy, program or team organization, and coaching personality, there is a gap in the research with regard to a connection between the three. The connection is called Authentic Coaching (AC). The purpose of this study was to examine the possible links between those three concepts and how they relate to successful teams and programs within the specific area of women's collegiate volleyball, and how successful coaches tend to create strong links between these areas. The study was performed following the qualitative method of inquiry using semi structured interviews which were recorded and then transcribed. Nine indepth interviews were performed of current and former highly successful coaches within the National Collegiate Athletic Association.

Mathematical Analysis of an SIR Disease Model With Non-Constant Transmission Rate

Emma Bollinger & Tayler Valdez
Faculty Mentors: Drs. Sunil Giri and Swarup Ghosh

Abstract

Mathematical modeling can be an extremely effective tool in our understanding of disease dynamics. Epidemiological models consist of differential equations made up of standard parameters that closely portray disease dynamics. In this talk, we will overview the governing parameters and mathematics modeling a measles-like disease. This model is unique because the transmission rate varies linearly with the size of the infectious class. After examining a simple SIR model, we will explore the use of linearization, Jacobian matrices, and characteristic eigenvalue equation analysis to obtain the threshold "reproduction number". We will then use this information to obtain the disease-free equilibrium and the endemic equilibrium, and we will show that the disease-free equilibrium is locally stable when the reproduction number 1 is less than one.

The Impact of Mindfulness Techniques as Conducted by Student Pharmacists on Well-being and “Being in the Now”

Caleb Bell, Neenu Thomas, Landon Santa-Pinter
Faculty Mentors: Drs. Sally Drinnon, Stephen Drinnon, & Lisa Appeddu

Abstract

Objectives: Student pharmacists experience stress, work overload, and negative feelings throughout the intensive Doctor of Pharmacy curriculum. There is a growing recognition both within the Southwestern Oklahoma State College of Pharmacy (SWOSU-COP) and nationally that there is a need for student pharmacists to learn techniques to manage pressure and improve mindfulness, which means " being in the now." Therefore, the objectives of this short-term study were to determine any changes in and associations between mindfulness and self-reported measures of well-being factors in student pharmacists.

Methods: Twenty students were recruited from the SWOSU-COP in April 2021. They attended an in-person meeting during which they were introduced to mindfulness techniques. Participants were encouraged to perform at least one mindfulness activity daily for a minimum of 5 to 10 minutes over the 20-day study. All surveys were administered via the Qualtrics® online survey platform, and all mindfulness activities took place off-campus. To facilitate practice, participants received daily texts of a suggested activity or link to a resource from the researchers. Participants conducted a mindfulness activity, followed by completing a validated survey of 15 questions, the Mindful Attention Awareness Scale (MAAS) on Days 1, 10 and 20. The MAAS tool is designed to assess a core characteristic of mindfulness, namely a receptive state of mind in which attention, informed by a sensitive awareness of what is occurring in the 2 present. In this study, MAAS was used as an indicator for “being in the now.” Participants rated their level of agreement on a Likert scale to questions evaluating the impact of their mindfulness practice on well-being factors which included stress, anxiety, feeling overwhelmed and feeling happier and more satisfied with life.

To score MAAS, a mean was calculated, with a higher score reflecting higher mindfulness. Changes in and correlations between the MAAS means and ratings of well-being were analyzed over Day 1, 10, and 20 via the Friedman and Spearman rank non-parametric tests, respectively, using JASP open-source statistics program (Version 0.12.2).

Results: Students included 13 females and 7 males from the first (n=13), second (n=2), and third (n=5) years of the program. Characteristics of mindfulness activities included an average length of practice of 8.9 and 9.4 minutes, and 6.6 and 6.7 out of 10 days of practice for Day 10 and Day 20, respectively. There was a tendency for mean mindfulness to increase ($p=0.137$) from Day 1 to Day 20 as measured by MAAS. Significant increases in level of agreement were found to the statements that mindfulness practice helped to reduce daily stress level ($p=0.038$) and reduce overall anxiety ($p=0.033$) over the course of the study. A positive trend was detected overtime in participant level of agreement to feeling less overwhelmed ($p=0.257$) and increased happiness and satisfaction with life ($p=0.223$).
MAAS scores were directly correlated with each other (p 0.05) with student perceptions of well-being. While no associations were detected on Day 1 for ratings of well-being, a significant positive correlation ($p=0.023$) was found on Day 10 between the perceived effects of mindfulness practice reducing daily stress level and reducing overall anxiety. On Day 20, all student ratings of well-being were directly correlated with each other ($p<0.13$).

Conclusions: Results indicate a tendency for improved mindfulness and benefits on student well-being from “being in the now.” The lack of correlation between MAAS and well-being factors suggest benefits of “being in the now” may be perceived differently among individuals. To complete this study, any relationships between MAAS scores and student perceptions of well-being with salivary measures of stress and empowerment will be investigated. Future 3 plans include expanding the availability and variety of mindfulness activities and involving more participants.

Self-Reported Utilization of Medical Cannabis in Rural and Urban Areas in Oklahoma

Lyly Van, Chloe Serre
Drs. Stephen Drinnon, Scott Long, & Lisa Appeddu

Abstract

Researchers at Southwestern Oklahoma State University College of Pharmacy recognize that medical cannabis (marijuana) is being used for a variety of treatment purposes that are not well-documented in Oklahoma. Therefore, a study is being conducted to better understand patients' common medical cannabis reasons (diagnosis) for use, route and dosing regimens, potential side effects, benefits of therapy, and background patient information. Student researchers are recruiting cannabis dispensaries in and around the cities of Weatherford, Oklahoma City, Shawnee, Tulsa, and Broken Arrow in Oklahoma. Personnel at medical cannabis dispensaries are encouraged to ask their customers to voluntarily complete an electronic survey on the Qualtrics® online platform. To date, 30 dispensaries have been contacted and eight surveys have been completed. Preliminary results will be presented. Final results will be compared with a previous study by Rose et al. (2020), which was conducted prior to COVID-19 in summer 2019 and only in the Weatherford, Oklahoma, area. Overall, this information will be utilized to help educators understand patients' needs and the current applications of medical marijuana and to help with training of student pharmacists in these areas.

The effect of female mate choice on offspring sex ratios in a freshwater amphipod species

Ryan Agyemang & Altherr (Joseph) Alcuitas
Faculty Mentor: Dr. Rickey Cothran

Abstract

This experiment highlights the effect of female mate choice on offspring sex ratios in a freshwater amphipod species. There are several determinants of sex ratios in nature all falling under two main categories being genetic or environmental. The expectation from theory is that the sexes will be produced in a 1:1 ratio. However, biased sex ratios are common in nature and can be the result of both genetic and environmental factors. We tested whether females bias the sex ratio of broods in favor of sons when mating with a high quality male. We collected mating pairs of amphipods (Hyalella sp.) from two pools in the same natural spring system. Half of the females were separated and repaired with their original mate—i.e. they were allowed to choose their mate. The other half of the females were separated and assigned a new male at random. Each pair was placed in their own 50-ml jar and placed in an environmental chamber. We are checking the pairs three times a week and recording offspring sex ratios. We predict that females with a choice in their mate will pick higher quality males and in turn produce more male biased broods and females assigned a mate at random will produce more of an even brood sex ratio. We also predict that the choice pairings will have less variation in offspring sex ratios as mates would be all of high quality. On the contrary, random pairings will have a much higher variation in offspring ratios as some males assigned will be higher quality and some males assigned will be poor quality.

Possible Solutions for Covid-19 Economic/Social Crisis

Mariano Racca
Fcaulty Mentor: Dr. Jieun Chang

Abstract

In November of 2019, the world was hit by a virus of easy transmission and with severe aftermath on people who acquired the virus. During the following months of 2020, the United States of America was forced to close its borders for between two and three months. This 1 decision was taken due to the fact of the irrepressible number of infections in the country. Closing borders means to stop every kind of communication between different states inside the country and with other countries. This decision triggered to different issues in the country's economy, affecting the employment in the country and the deterrent of trading. This pandemic also affected the country in the social aspect. The lockdown and the schools closure affected student's education and for poor families was the prohibition to keep learning as a common student. In this paper I will describe the solutions that the United States government could applied and how these solutions would support every citizen of the country.

Which things could United States to keep growing the economy during and after Covid?

In 2019 the country was going through an increase in the GDP (Gross Domestic Product) that is basically the economy of the country. According to Zhang (2021), due to the increase of trading since the last decade, the GDP experienced a constant raise year by year. Nevertheless, the biggest one occurred in 2019, with a 26% of increase in the economy. However, on March 11 th of 2020, Donald Trump, the president of United States, announced that he took the decision to close borders with Europe to control the virus spread (Wilner et al. 2020). After closing the borders for the international trading market, the country experienced an increase in unemployment because of the decision of many companies to reduce expenses and try to "survive" and keep the business alive during the pandemic. The growth in unemployment was of over the 10%. In 2019 the unemployment rate was of the 3.8%, while during the pandemic raised to the 15% (Us Bureau of Labor Statistics, 2021). Fay (2020) was critical saying that "employers made swift decisions that directly impacted collective bargaining agreements across the country in terms of working conditions, compensation, benefits, and workforce reductions" (Fay, 2020, p.1). Parolin (2020) explicitly stated that the 21% of the kids had at least one parent unemployed during the Covid-19 pandemic (Parolin, 2020). However, I think that the president at that time could manage this trouble in a different manner. My opinion is to copy what the most powerful countries in Europe 2

Lady Caroline and Setting in The Enchanted April: The Necessity of the Garden

Kimberly Lippencott
Faculty Mentor: Dr. Kelley Logan

Abstract

Elizabeth von Arnim wrote The Enchanted April in 1922, and in the novel's 100 years of print, very little critical attention has been given to the piece. Von Arnim's work has been looked down upon by many as a middlebrow, empty of serious social commentary. The title of the novel itself and the setting—an unbelievably pleasant Italian villa—only aid in the belief that von Armin's work is light fluff rather than true literature. In this essay, I will argue against this belief by examining Lady Caroline, a character from The Enchanted April, and her relation to the setting of the novel, particularly the garden where Lady Caroline spends most of her days. While all four of the female characters in the novel undergo a personal transformation, it is in the garden and because of the garden that Lady Caroline can have her transformation. Close study reveals that Elizabeth Von Arnim chose the garden as the setting for Enchanted April out of necessity, not because she was a middlebrow author who wanted to make a pleasing story for her audience, but because it is the only place where Lady Caroline could have her transformation. The other three women could have had the same personal growth in other locations, but because of Lady Caroline's beauty and her identity, the garden is the only place where she can feel part of 1 her surroundings and free to think and decide what kind of person she will be. This close examination of the character and setting are important because it allows readers to understand the depth and importance of von Arnim's work.

How Can You Save Oklahoma State Parks?

Avery Dirks
Faculty Mentor: Ms. Tee Kesnan

Abstract

A look into why Oklahoman State Parks are not thriving even with the growth in visitation in recent years.