2025 SVSU Student Showcase Program

April 25, 2025

Welcome | Malcolm Field Theatre

9am – 10am
Welcome Remarks by President George Grant Jr
Guest Speaker, Center for Excellence in Teaching and Learning (CETL) Director, Dr. Erik Trump

Oral Presentations | C 220

1 | 10:15am | On FYRE for Literacy: How SVSU Alumni Plan and Implement Literacy Instruction

As a teacher candidate, I am often warned of two areas most teachers struggle with: classroom management and writing instruction. The On FYRE (First-year Resilient Educators) for Literacy project explores the latter. Specifically, this project explores how recent graduates from SVSU's teacher preparation program approach literacy instruction. Through monthly "Community of Practice" meetings, teacher participants shared their experiences, struggles, and triumphs surrounding literacy instruction in their classrooms. In addition to receiving instructional feedback on teaching practices to support their own growth, as well as that of their students, teachers built a supportive community with other like-minded practitioners. As the undergraduate research assistant, I had the privilege of transcribing these monthly meetings and participating in discussions surrounding preliminary findings. Through this work, I have gained priceless insights into what the first year of teaching looks like and how SVSU has prepared for this challenging yet rewarding career.

Taylor Kipper and Mary Sopocy
Mentors: Dr. JoAnne West and Dr. Julie Brehmer
Teacher Education |Education
Research and Development

2 | 10:40am | Let's Get W.I.L.D.: Supporting Teachers through Writing and Instructional Leadership Coaching

The Writing and Instructional Leadership Development (W.I.L.D.) study examines how instructional coaching influences teachers' writing instruction. Led by Dr. JoAnne West, this research analyzes teacher coaching sessions, professional development, and classroom observations to explore how educators implement evidence-based writing strategies. As an undergraduate research assistant, my role has focused on transcribing recorded coaching sessions and identifying key themes in instructional practices. Through this experience, I have gained valuable insight into how coaching supports teachers' instructional choices, time management in classroom instruction, and writing pedagogy. Qualitative findings to date from this study emphasizes the importance of structured coaching in improving scaffolded writing instruction, strengthening classroom management during instruction, and fostering long-term professional growth. My presentation will provide an overview of the study's methodology, key takeaways, and my personal learning experiences, describing how coaching can shape

future educators and enhance student writing outcomes.

Mara Lutz
Faculty Mentor: Dr. JoAnne West
Teacher Education |Education |Undergraduate Research Program
Research and Development

3 | 11:05am | Understanding the Mechanism of Lipopolysaccharide (LPS) as Endotoxin

Lipopolysaccharides (LPS, also known as endotoxin), found in the outer membrane of Gram-negative bacteria, have been shown to induce septic shock when present in the bloodstream of animals including humans. The exact mechanism of this action is not known, although, in mouse models, evidence exists implicating the role of the complement system in inducing membrane attack complexes that result in cellular lysis (Griffiths, et. al.). This study also indicates that LPS down-regulates the expression of various genes involved in immune responses. Other researchers suggest membrane interactions in LPS-induced hemolysis (Brauckmann, et. al.). This proposed research aims to confirm that the conjugated LPS is interacting with the cell membrane of RBCs and causes lysis. It is visualized in the fluorescent microscope that the cell membrane of the RBCs are losing its integrity and reducing in numbers with respect to time. These findings can advance understanding of sepsis pathophysiology by characterizing non-immune pathways of endotoxin toxicity, potentially informing therapeutic strategies targeting membrane-stabilizing interventions.

Ashwin Mudaliyar, Nathan Siemen, Benjamin Rene, Jordan Nowicki, Alyssa Benit, Brendin Broeders
Mentor: Dr. James McEvoy
Nursing |Health and Human Services | Undergraduate Research
Research and Development

Oral Presentations | C 222

4 | 10:15am | Finding Kinship Through Adversity: An Examination of Queer Agency in Response to Oppressive Systems of Power

In a heterosexist, racist, and sexist world that limits their opportunities, pushes them to the fringes of society, and treats them like second-class citizens, LGBTQ+ individuals, particularly people of color, would come to find kinship by forging their own communities against an increasingly volatile political atmosphere. The ballroom scene is an African American and Latino LGBTQ+ subculture which focuses on elements of fashion, dance, and artistry, often mirroring many of the stereotypical values admired in society. Ballroom Culture gives these individuals the opportunity to reclaim agency by subverting elements of these societal expectations, allowing them to unapologetically express themselves during a time when the status quo barred them from achieving any meaningful socioeconomic mobility. By reducing standard societal expectations to nothing more than extravagant fashion categories, queer people of color put elements of the “American Dream” under a critical lens. This project examines Jafari Allen’s “There’s A Disco Ball Between Us: A Theory of Black Gay Life”, George Chauncey’s “Gay New York”, Marlon Bailey’s “Butch Queens Up in Pumps: Gender, Performance, and Ballroom Culture in Detroit”, and the documentary “Paris is Burning”, all of which highlight how restrictive policies, constant policing, and social inequality throughout the

late 19th and 20th century have influenced LGBTQ+ people of color.

Alexander Kolleth
Faculty Mentor: Dr. Kenneth Jolly
History | Arts and Behavioral Sciences | Black Studies Program
Research and Development

5 | 10:40am | An Exploration of the Association Between High Fructose Corn Syrup and Affective Disorders

Biomedical and pharmacological studies have explored the link between high fructose corn syrup and mood-related behaviors recently, with some evidence suggesting there may be a relationship between the ingredient and observed behaviors typically associated with bipolar disorder. Our study uses an online survey design with self-reported demographic, mood and disorder, family history, and dietary intake questionnaires to determine if there is support for whether this common ingredient in processed foods may be linked to subjective mood experiences. A separate analysis exclusively concerning SVSU students is conducted to determine whether the student population might benefit from health awareness initiatives.

Maia Clynick and Holly Schaub
Faculty Mentor: Dr. Joseph Weaver
Psychology | Arts and Behavioral Sciences | Undergraduate Research
Research and Development

Oral Presentations | C 223

6 | 10:15am | In the Eye of the Beholder: Does Confirmation Bias Influence Ratings of Writing Samples Perceived As AI or Student Generated?

Participant ratings of paragraphs labeled as AI-generated or undergraduate student-written differed based on author labeling. Participants also classified a paragraph as AI-generated or student-written. Justifications mentioned were creativity and commitment if student written, and word choice and grammar if AI-generated. Bias appeared in both faculty and student judgements of writing samples.

Julia Lange
Mentor: Dr. Marie Cassar
Psychology | Arts & Behavioral Sciences | Honors Program and Undergraduate Research
Research and Development

7 | 10:40am | Akofena/The Delightful Den

Our team worked closely with a young entrepreneur to help her refine her small business. She sells all natural soaps, candles and other products. As a team we helped her grow her social media, create her website, and organize her financials. From this she has been able to reach more customers and run a more efficient business.

Emma Taylor, Alexis Eddy, Ethan Brunner, Kaiser Henning
Faculty Mentor: Dr. Joseph Ofori Dankwa
Collaborators: VITITO Cohort 13 and Kids Rule Now
Accounting, Law and Finance | Business| Vitito Global Leadership Institute
Leadership

Oral Presentations | C 224

8 | 10:15am | Vitito Global Leadership Institute, Team Ese Ne Tekrema

Our Vitito team will be presenting on what we accomplished with our young entrepreneur this semester.

Madison Bourgeois, Mary Neiman, Sam Bartels, Anthony Bargardi
Faculty Mentor: Dr. Joseph Ofori Dankwa
Management & Marketing | Business | Vitito Global Leadership Institute
Leadership

9 | 10:40am | Global Leadership

How SVSU study abroad's have impacted education, perspective, and leadership.

Rhea Schultz
Faculty Mentor: Dr. Joseph Ofori Dankwa
Accounting, Law and Finance | Business| Vitito Global Leadership Institute
Travel/Cultural Experience

1 0 | 11:05am | Olivia's Jewelry

Ananse Ntentan, named after the Akan phrase for "The Spider's Web," represents the complexity and creativity of entrepreneurship. This semester, our team partnered with Olivia, a 15-year-old jewelry artist and owner of *Olivia's Jewelry*, to support the growth of her small business. Through a hands-on, interdisciplinary approach, we guided her in establishing an LLC, developing a targeted six-week social media strategy, refining brand identity, and implementing operational tools like bookkeeping and inventory systems. Our work culminated in a stronger, more scalable business model. This project exemplifies how collaborative, student-led initiatives can make a real-world impact on young entrepreneurs.

Team 3 Ananse Ntentan - Daniel Braun, Jade Rinas, Will Chislea
Faculty Mentor: Dr. Joseph Ofori Dankwa
Management & Marketing | Business| Vitito Global Leadership Institute
Leadership

Performance | Malcolm Field Theatre

1 1 | 10:15am | Musical Analysis Chamber Composition

Presenting chamber compositions for MUS 312, musical analysis. These compositions are based on methods used in 20th Century music including ideas like atonality, pitch sets, serialism, and many more. This is an overall summary of what has been learned over the last three courses, all the way back to Theory 1. Each piece was composed by a different member of the group.

Jordan Rose, Ruth Lehr, Alicia Coronado, Bailey Cottrell, Mikayla Fillinger
Faculty Mentor: Dr. Colin Wood
Music | Arts and Behavioral Sciences | Music 312 - Music Analysis course
Creative Endeavor

1 2 | 10:40am | Concert band conducting
Outlines progress through an independent study that allowed student to conduct the SVSU concert band in performance.
Victor MacDonald
Faculty Mentor: Dr. Norman Wika
Music | Arts and Behavioral Sciences | SVSU Concert Band
Creative Endeavor

Oral Presentations | C 222 | Electrical and Computer Engineering | 1PM – 4PM

Timeslot	Title/ Program	Presenter(s)
1-1:20PM	CARE – Cognitive Behavioral Assessment and Regulation of Emotion Using Neuroadaptive Humanoids	Aidan Karst, Andrew Kietzman, Ben Matuszak, Parker Krause
1:20-1:40PM	Microstrip Patch Antenna Design and Performance Study	Maurice Anderson, Eric Slabbert, Joseph McCray
1:40-2:10PM	Custom Pinball Machine	Christian Bruhnsen, James Grigg, Kevin Shaw, Dylan Doherty
2:10-2:240PM	Water Filtration System with IoT Monitoring for Remote Communities	Gabe Gransden, Flora Szklenar, Nicholas Beach
2:40PM-3:10PM	Variable Frequency Drive Documentation & Optimization	Kooper Ciszewski & Matt Kareus
3:10PM-3:40PM	Aquaponics – IoT Based Data Monitoring	Hayden Heyn, Jason Chapman, Justin Schweiger, Ryan Thiede

Poster Presentation | Curtiss Hall – Groening Commons

10:00am – 11:30am

1 | RFS: Community Service Project

We are a team of four students in the Roberts-Gilbertson Fellowship committed to meeting a documented community need. Drawing on data from the B.A.T.S. project at SVSU, we learned that women at the Mustard Seed shelter felt uncertain about professional skills like financial literacy and coping strategies. Partnering with two SVSU faculty, we created a holistic program combining Mind-Body Medicine on Wednesdays and Financial Literacy on Fridays. Through outside grant funding, we cover supplies, provide a $50 incentive for participants in Mind-Body sessions, and serve dinner every Friday. This initiative aligns with Mustard Seed's broader workforce development plans, including the upcoming New Leaf Deli, which will employ and support shelter residents. Our service project empowers women to build professional skills, manage stress, and gain confidence as they transition toward greater independence and future employment opportunities.

Natalia Porter, Danielle Woodard, Matthew Parasick, Vaughn Severance
Faculty Mentor: Dr. Julie Foss
Collaborators: Mustard Seed, Mohammad Adel, RFS
Social Work | Arts and Behavioral Sciences | Roberts Gilbertson Fellowship Program
Community Engagement

2 | Memory Board Service Project

As part of the Roberts-Gilbertson Fellowship Program, we partnered with Covenant Glen of Frankenmuth to create memory boards for residents with Alzheimer's. Collaborating with families, we crafted framed boards to bridge the communication gap between caregivers and residents. By showcasing memories and passions, these boards help caregivers better understand residents' needs, preferences, and behaviors, enabling more personalized care. Additionally, the boards serve as meaningful keepsakes for families after their loved one's passing, offering comfort and remembrance.

Anna Cannon, Colin Diehl, Shane Fulcher, Bella Hazen, Natalie Anderson
Faculty Mentors: Dr. Julie Foss, Dr. David Nichols, Dr. Jennifer McCullough
Communication | Arts and Behavioral Sciences | Roberts Gilbertson Fellowship Program
Community Engagement

3 | Leafy Companions: Understanding College Students' Love for Houseplants

The purpose of this research was to determine if houseplant ownership by college students satisfies the need for social connection through a seemingly nonsocial activity. Results indicate that students tie their emotional well-being to their houseplants and their plants help connect them to other people in their lives. Additionally, students who named their plants did so for personification purposes, which further suggests that houseplant ownership may fulfill a need for social connection.

Keri Maricle and Chalea Herron
Faculty Mentor: Dr. Joe Weaver
Psychology | Arts and Behavioral Sciences |Undergraduate Research Program

Research and Development

4 | Students Attitudes Towards AI

We surveyed current SVSU students about their uses, intentions, attitudes, hopes, and worries regarding AI tools. The results indicate that students tend to use AI, but they have varied experiences and concerns about AI. We explore themes and trends across these areas.

Chalea Herron, Paige Carstensen, Maia Clynick, Keri Maricle, Sarah Velasco, Gabriella Slabaugh
Faculty Mentor: Dr. Joe Weaver
Psychology | Arts and Behavioral Sciences
Research and Development

5 | The Irish Convention of 1917: A Liberal Solution for Ireland

In the early 20th century, Ireland was on the brink of Civil War. Catholic Nationalists sought a Home Rule government for Ireland, while Protestant Unionists sought to uphold the union between Ireland and Britain. Tensions were high, and civil conflict seemed inevitable. But in 1914, Europe descended into the most devastating war the world had ever seen. World War One shifted the attention of the world away from Ireland, but due to the Easter Rebellion in 1916 and the United States' entry into the war in 1917, the British government was forced to offer the Irish an opportunity to pursue a liberal resolution to their issues. This resulted in a representative body made up of Irish political leaders who attempted to form a government for Ireland in the Irish Convention of 1917.

Kaleb Whisman
Faculty Mentor: Dr. Jules Gehrke
History | Arts and Behavioral Sciences
Research and Development

6 | When Self-Esteem Backfires: The Impact of Job Search Envy and Resume Fraud on Interview Success

The main purpose of this research is to investigate whether an individual's self-esteem amplifies the negative effects of envy such as resume fraud in a job search context. Based on existing social comparison and envy theory, we propose an expanded model of the envy process. Using a three-wave field study with a sample of 222 South Korean job seekers, we show that high state self-esteem promotes the extent to which individuals who struggle in the job search process compared to their peers will feel envy and engage in resume fraud, which in turn leads to more positive interview outcomes.

Amelia Hoag and Abigail Walk (equal authorship)
Faculty Mentor: Dr. Jaewoo Kim
Management & Marketing | Business
Research Activity

7 | Econ Games

The 3CDC's impact on downtown Cincinnati had been widespread and impactful. As a competing team in the Econ games we were given 24 hours to analyze a large dataset

with information about concessions and parking from 3CDC locations. After the 24 hours we then presented this work to a panel of judges to compete to win.

Caleb Ciner, Michael Zanoni, Sara Haupt, Chayan Jain
Faculty Mentor: Dr. Kylie Jaber
Economics | Business
Creative Endeavor

8 | Effects of J-Band Exercise on the Rotator Cuff of Club Baseball Players

The purpose of this study was to collect performance data for club baseball players. This data will also serve as baseline for a performance enhancement and injury prevention (PEP) intervention study with this cohort. Baseball players are subject to rotator cuff wear and tear. •Strength training and conditioning of muscles of the rotator cuff are essential. •According to Escamilla et al. (2010) the most common methods to improve throwing velocity are performing weight training and use of resistance bands. •While there is an abundance of research on college baseball players, there is a lack of data on club baseball players.

Scott Harnden and Dawson Maxlow
Faculty Mentors: Dr. Gena Guerin and Dr. Merrick Lincoln
Kinesiology | Health and Human Services | Undergraduate Research
Research and Development

9 | RIR Scales in Clinical Practice: A Comprehensive SWOT Analysis

The intensity of resistance training (RT) is a key determinant of health and rehabilitation outcomes. Traditional methods like percentage-based loading (%1RM) and velocity-based training (VBT) face limitations in feasibility and individualization. The Repetitions in Reserve (RIR) scale, a subjective autoregulatory tool estimating proximity to muscular failure, offers a flexible alternative, though its clinical application remains underexplored. This analysis evaluates RIR's feasibility in rehabilitation using a SWOT framework. Strengths include its validity as an autoregulator of load and volume, adaptability across sessions, and reduced need for maximal testing. However, prediction accuracy decreases in high-repetition, low-intensity contexts, and methodological inconsistencies limit clinical clarity. Opportunities lie in digital tools, personalized programs, and greater patient autonomy. Threats include practitioner skepticism, the impact of pain and neuromuscular inefficiencies, and a lack of clinical trials. With further research and standardization, RIR could become a practical, patient-centered method for regulating RT intensity in rehabilitation settings.

Colin Diehl
Faculty Mentor: Dr. Merrick Lincoln
Kinesiology | Health and Human Services | Honors Program
Research and Development

10 | The effects of light availability on photosynthesis, growth, and establishment of the invasive shrub European buckthorn (Rhamnus cathartica) on the Saginaw Valley State University campus

A prominent invasive species in Michigan forests is European Buckthorn (Rhamnus cathartica), which occupies space in the understory and is successful along edges or other locations with

good lighting. Lighting and canopy cover were related to plant distribution and performance on the SVSU campus. There were trends for number of R. cathartica individuals per plot to increase with greater light availability. Photosynthetic light response curves were measured, indicating higher photosynthesis rates and stomatal conductance in R. cathartica plants in well-lit plots compared to heavily-shaded plots. Photosynthesis rates decreased during the transition to autumn, even with increased light availability as the canopy opened. Since lighting is of clear importance for the establishment of R. cathartica during an invasion, understanding the role of light and how it is used by R. cathartica might help in better understanding forest invasions in this and other systems.

Jeneva Tomaszewski
Faculty Mentor: Dr. Brian Maricle
Biology | Science, Engineering, & Technology | Undergraduate Research
Research and Development

11 | Mapping European Frogbit on the Shiawassee River State Game Area with UAV Imagery

European frogbit (Hydrocharis morsus-ranae) is a highly invasive wetland plant that looks like a miniature lily pad. When frogbit is not treated, it can quickly spread to form dense monocultures that choke off shallow channels and other open-water areas. Consequently, wetland managers are interested in tracking the spread of this plant to better prioritize their control efforts and evaluate the effectiveness of their control efforts (usually herbicide treatments or hand-pulling). Imagery from Unmanned Aerial Vehicles (UAVs) has the potential to detect frogbit in areas of wetlands that are not easily accessed on foot, leading to more effective treatment. Several large patches of frogbit on the Shiawassee River State Game Area were imaged in the summer of 2024. Using specialized remote sensing software and basic image classification techniques, these images are being processed to develop a mapping method for European frogbit.

Kailey Mize
Faculty Mentor: Dr. Rhett Mohler
Collaborator: Michigan DNR
Geography | Science, Engineering, & Technology | Undergraduate Research
Research and Development

12 | Analysis of Michigan Wetlands Using Remote Sensing Techniques on Landsat TM Imagery

This study was performed to analyze the accuracy and effectiveness of remote sensing techniques paired with methods from a published study to identify wetlands and monitor changes. The study focuses on three well identified wetlands in the Saginaw and Bay areas and tracks the overall changes to the region over a 5-decade period. In order to effectively analyze the areas of interest, satellite imagery was obtained from each decade, and the images were trimmed to show only the three wetlands. Once this was done, supervised classification was performed on each of the images to identify water and vegetation to determine the total area of each wetland. To assure the accuracy of this process, an accuracy assessment was performed on all of the classifications. Overall, this study shows the changes in wetlands overtime through remote sensing processes, which would ideally be more effective than other

methods.

Isabella Goulette
Faculty Mentor: Dr. Rhett Mohler
Geography | Science, Engineering, & Technology
Research and Development

13 | Phytoplankton Mapping in the Saginaw Bay

Phytoplankton mapping in the Saginaw Bay is limited even though the bay has known problems relating to eutrophication, which could lead to harmful algal blooms. This study uses Landsat imagery to allow an extended study period of more common methods of phytoplankton mapping from sensor like MERIS's cyanobacterial index.

Dustin Peter
Faculty Mentor: Dr. Rhett Mohler
Geography | Science, Engineering, & Technology
Research and Development

14 | Revitalization and Digitization of the Steve Taber's Insect Collection for Knowledge and Science (STICKS) at SVSU

The STICKS collection at Saginaw Valley State University houses thousands of insect specimens collected from mid-Michigan and other Midwestern states, dating back to the early 1970s. Among these specimens are new species and their holotypes, which are not found anywhere else in the world, identified for the first time by Dr. Steve Taber (†), former SVSU professor. This collection is a valuable resource for understanding regional biodiversity and supports both research and education. However, like many biological collections worldwide, curation [sorting, identification, labelling, databasing] and proper care for specimens are increasingly difficult due to limited funding and challenges associated with uncontrolled environments of storage facilities. This project aims to digitize the STICKs collection, creating an online archive that will make it accessible to students, external researchers, and the public.

Mars Gregory and Zoe Farrant
Faculty Mentors: Dr. Cal Borden and Dr. Jorge Paredes-Montero
Biology | Science, Engineering, & Technology
Research and Development

15 | Endosymbiont Metacommunities and Ecological Resilience in Native and Invasive Bemisia tabaci

Bemisia tabaci is a major agricultural pest and plant virus vector. The introduction of invasive “superbug” types B and Q into the Americas has led to widespread displacement of native B. tabaci through competitive exclusion and asymmetric mating. Yet in some regions, endemic populations persist and even thrive, suggesting underlying ecological or physiological resilience. Endosymbiotic bacteria may contribute to this resilience by enhancing host fitness and adaptation. This study investigates the diversity of endosymbiont communities in B. tabaci, with a focus on altitudinal gradients in Ecuador as a model system. Findings may help explain how microbial associations influence whitefly persistence and adaptation under invasion pressure—insights relevant to broader agroecosystems worldwide.

Ella Randolph, Maria Ibarra-Matamoros, Rebecca Fredenburg, Olivia Konsdorf
Faculty Mentor: Dr. Jorge Paredes-Montero
Biology | Science, Engineering, & Technology | Undergraduate Research
Research and Development

16 | An environmental DNA (eDNA) study of pollinator biodiversity along an urban-to-rural gradient

This research will investigate the influence of urbanization on pollinator biodiversity within the Saginaw Bay region. Environmental DNA (eDNA) analysis will be employed to assess four collection sites, representing varying urbanization levels along an Urban-to-Rural gradient (Natural, Rural, Urban-Rural, Suburban, and Urban environments), with an additional collection site in an undisturbed natural habitat. The top four flowering plant species will be identified at each site. A total of 120 samples will be collected. DNA will be from these samples using the CTAB lysis buffer and the chloroform-phenol separation method. Specific molecular markers will be used to validate and categorize pollinator communities. The significance of this research lies in understanding the potential ecological impact of urbanization on pollinator communities, considering their fundamental role in ecosystem health and food production. The project's results will contribute to informed conservation strategies and biodiversity management in the face of urban expansion.

Olivia Konsdorf
Faculty Mentor: Dr. Jorge Paredes-Montero
Biology | Science, Engineering, & Technology | Undergraduate Research
Research and Development

17 | Understanding the Mechanism of the Lipid A Component of Lipopolysaccharide (LPS)

Lipopolysaccharides (LPS), also known as endotoxin, are components of the outer membrane of Gram-negative bacteria. LPS consists of three domains: Lipid A, an oligosaccharide core, and the O antigen. Lipid A is the toxic center of LPS and is responsible for its endotoxic effects. The two phosphate groups and two acyloxyacyl moieties on the Lipid A are needed to trigger the endotoxin response in human cells (Raetz, et. al.). This proposed research aims to confirm that the Lipid A domain directly contributes to LPS-induced damage to human erythrocytes by compromising membrane integrity. It is hypothesized that erythrocytes incubated with LPS will exhibit significant cell loss over 24 hours compared to controls without LPS exposure. These findings could provide critical insights into the mechanisms of endotoxin-induced hemolysis and its broader implications for human health.

Jordan Nowicki, Brendin Broeders, Ian Schetter, Ember Poole, Elizabeth Bennett, Ashwin Mudaliyar
Faculty Mentor: Dr. James McEvoy
Biology | Science, Engineering, & Technology | Undergraduate Research
Research and Development

18 | Examining the Effects of Microplastic Size on the Phagocytic Pathway in a Model Eukaryote

Plastic waste is a growing environmental concern, in part because it mechanically breaks down

into smaller particles that subsequently can enter the food web. Plastic particles <5mm (microplastics) can accumulate in aquatic and other ecological niches, and have been discovered in a wide range of organisms, from aquatic biota to humans. At the cellular level, microplastics can be taken up by phagocytosis which involves enveloping the extracellular particles into membrane-bound vacuoles. For example, microplastics uptake has been demonstrated in mouse macrophages and the aquatic ciliate, Tetrahymena. Given that microplastics may accumulate in cells and tissues where their potential toxicity as a function of size is not yet known, I set out to determine how 1 micrometer (µm) versus 6 µm microplastics affect phagocytic events in Tetrahymena. My project has three specific objectives: 1. Given their small size, are 1 µm microplastics confined to vacuoles or are they found elsewhere in the cell where they might increase toxicity? 2. Does microplastic size affect vacuole morphology and if so, in what ways? 3. Is the rate of uptake of microplastics dependent on particle size? Data addressing each of these three questions will be presented and discussed.

Simona Stefanovska
Faculty Mentor: Dr. Sylvia Fromherz
Biology | Science, Engineering, & Technology | Undergraduate Research
Research and Development

19 | Small but Mighty: Cellular Uptake of Microplastics Depends on Particle Size

Eukaryotic cells such as human macrophages take up microscopic particles from the environment by a membrane invagination process known as phagocytosis. The main goal of my project is to investigate how microplastic particles of varying sizes affect uptake by phagocytosis in a model unicellular ciliate, Tetrahymena. Previous research in Dr. Fromherz' laboratory has suggested that only a fraction of cells can take up 6 micrometer (µm) microplastics. The cellular basis for this difference in uptake abilities is not yet known but is not due to differences in cell size or population age. I have tested the ability of Tetrahymena cells to phagocytose microplastics of varying sizes and find that the fraction of cells in the population that can take up microplastics decreases as particle size increases. My studies help provide insights into the cellular mechanisms that govern size-dependent phagocytosis in eukaryotic cells.

Darien Downing
Faculty Mentor: Dr. Sylvia Fromherz
Biology | Science, Engineering, & Technology | Undergraduate Research
Research and Development

20 | Comparative Analysis of Chloro and Methoxy Benzene Substituents on Antimicrobial Efficacy: A Cross Domain Study with Implications for Antimicrobial Design

This research investigates the differential antimicrobial efficacy of benzene derivatives with chloro versus methoxy substituents. Building on synthetic work from Oakland University's Chemistry Department, we systematically evaluated these compounds against organisms from bacterial, fungal, and eukaryotic domains using CLSI disk diffusion protocols. Results demonstrate that chloro-substituted compounds consistently exhibit superior antimicrobial activity across all tested domains with a clear dose-dependent relationship, while methoxy-

substituted analogs show no antimicrobial effects. These findings suggest the electron-withdrawing properties of the chloro group are crucial for antimicrobial activity. Our cross-domain approach reveals important structure-activity relationships that can guide the rational design of new antimicrobial agents, addressing the urgent global challenge of antimicrobial resistance. This work bridges synthetic organic chemistry with applied biochemical research, offering promising directions for antimicrobial development.

Ella Yantz
Faculty Mentor: Dr. Michael Coote
Chemistry| Science, Engineering, & Technology
Research and Development

21 | Synthesis, characterization, and electrochemical analysis of synthetic biomolecule models containing ruthenium interacting with hydroxamate and/or nitrosyl

Previous studies have examined the interactions between biological models and nitric oxide (NO), though there is still research to be done on molecules capable of generating NO within model biological systems. Thus, this research has worked to synthesize model heme units using d8-metal base, attaching a known NO-donating compound, hydroxamic acid, and studying interactions. Using electrochemical and spectroelectrochemical techniques, the redox behavior of the compound interactions will be analyzed. It is hypothesized that the synthetic heme-hydroxamate model will be redox active. Cyclic voltammetry will provide more data for the redox behavior, allowing an understanding of the ability of hydroxamate to donate NO when attached to the model biological ligand. This research therein provides insight into the potential side effects of pharmaceutical drugs containing NO-donors which may be currently unknown.

Alexis Glumm and Brendan LaForest
Faculty Mentor: Dr. Adam Warhausen
Chemistry | Science, Engineering, & Technology
Research and Development

22 | Optimization of Iron Oxide Nanoparticles for Magnetic and Electrical Characterization

Iron oxide nanoparticles (IONPs) exhibit superparamagnetic and dielectric properties, which make them crucial for applications such as magnetic separation, targeted drug delivery, cancer hyperthermia, and advanced memory storage. The objective of this project is to optimize the synthesis of IONPs for magnetic and electrical characterization. The goal is to synthesize stable, superparamagnetic IONPs with uniform particle distribution with reproducible results, ensuring accurate measurements of their response to magnetic fields. To achieve this, the study focused on three synthesis routes: hydrothermal, co-precipitation, and polyol methods, addressing challenges such as particle agglomeration and broad particle distribution. The synthesized IONPs were characterized using transmission electron microscopy (TEM) and radio frequency susceptibility using a colpitts oscillator, providing insight into their size and thermal properties. The study suggests that optimizing synthesis conditions is crucial for improving particle stability and expanding their potential applications.

Ashley Hoffman
Faculty Mentor: Dr. Kavi Senanayake

Chemistry | Science, Engineering, & Technology | Undergraduate Research
Research and Development

23 | Development of a Gas Chromatography-Mass Spectrometry Method for Quantitation of Chlorinated Volatile Organic Compounds

This study aims to investigate the uptake and metabolism of chlorinated volatile organic compounds (cVOCs) in plants. cVOCs frequently found at contaminated sites in Michigan include trichloroethylene, chlorobenzene, and dichlorobenzenes (DCB). Previous research has shown that cVOCs, including trichloroethylene and chlorobenzene, can be taken up by plants. Sunflowers, our chosen model organism, are known hyperaccumulators of various contaminants; however, cVOC uptake in sunflowers is less studied. Our current progress includes strides toward developing a quantitative chemical analysis method using gas chromatography-mass spectrometry (GC-MS). Preliminary results suggest that all three compounds and the internal standard can be qualitatively identified. The current GC method has resolved chlorobenzene and 1,4-DCB, our model DCB, from one another. Further research will investigate the retention of trichloroethylene. Once established, the GC-MS method will be used to evaluate extraction procedures, with the aim of applying the full extraction and analysis protocol to plants exposed to the cVOCs.

Zachary Green
Faculty Mentor: Dr. Andrew Paulson
Chemistry | Science, Engineering, & Technology | Undergraduate Research
Research and Development

24 | Aryl-C-Glycosides: A Potential Treatment for Diabetes Type II

Type II diabetes is a relatively common disease that affects over 11% of Americans [1]. The root cause is increased insulin resistance in cells, and results in an increased risk of stroke, kidney disease, nerve damage, and heart disease. Although nutrition and exercise may help manage diabetes, other forms of treatment can include insulin and other medications. Alternative medications seek to inhibit the Alpha-glucosidase (AG) enzyme and/or the sodium-glucose co-transporter 2 (SGLT-2) to regulate glucose levels. Another hypothesized medication is an aryl-C-glycoside, which may have the potential to demonstrate characteristics of AG and SGLT-2 inhibitors due to structural similarities. The current synthetic pathway our lab is pursuing utilizes a silyl enol ether intermediate that is coupled to a glycoside, which is then converted to an aryl-C-glycoside. Previous attempts to replicate a product in a silyl enol ether reaction, which is a key product in the whole synthesis, were either unsuccessful or produced limited quantities. However, modifications we made to the existing procedure proved successful in the creation of that key product. Purification of the product is through column chromatography, with identification using nuclear magnetic resonance spectroscopy (NMR). This presentation will walk through the modifications made and how they contributed to a successful synthesis

Jersey Schram and Ashton Papajesk
Faculty Mentor: Dr. Jennifer Chaytor
Chemistry | Science, Engineering, & Technology | Undergraduate Research
Research and Development

25 | Electromagnetic Material Properties: Stabilizing the Colpitts Oscillator for Measurement

The electromagnetic properties of materials can be difficult to measure. Self-oscillating circuits, like the Colpitts Oscillator, provide a technique of measurement that does not involve altering the material. The frequency produced by this circuit is determined by capacitive and inductive elements that feed into one another. By inserting a material into the inductor, any change in output frequency can be used to determine material properties. This project aims to improve frequency stability by reducing the noise level of the Colpitts Oscillator within 1Hz. The ideal signal occurs when the circuit produces a sinusoidal output with only the fundamental harmonic. As such, the circuit components were varied to determine the effect they have on output frequency and number of harmonics. It was determined that the tank capacitors (C1/C2) and the biasing resistors (R1/R2) should have a high ratio to reduce or suppress the number of harmonics and the amount of noise.

Trista Cleveland
Faculty Mentor: Dr. Matthew Vannette
Electrical & Computer Engineering | Science, Engineering, & Technology
Research and Development

26 | An experimental study of partial energy harvesting by solar cages for sustainability

The demand for energy is ever-increasing around the world whereas the sources are limited. The study focuses on renewable energy harvesting partially and the remaining energy in terms of illuminations intensity available for nature or food production. To this end, miniature solar cages have been modelled and built for the study. The initial study includes a custom made 3-panel solar cage where the geometric parameter of the structure was constant. In the next stage, a custom made 5-panel solar cage has been built where the structure is flexible in terms of height adjustment. The power generation by the cage and illumination intensity available inside the cage have been measured for wide weather variation and over several days. The quantitative outcomes show a large variation of illumination intensity inside the cages over a day. The remaining energy inside can be used as an indicator of sustainability of biological systems to thrive.

Zachary Franzel and Gabe Gransden
Faculty Mentors: Dr. Brian Maricle, Dr. Matthew Vannette, and Dr. Mohammad Khan
Electrical & Computer Engineering | Science, Engineering, & Technology | Undergraduate Research
Research and Development

27 | Water Filtration System for Remote Communities

This project focuses on developing a solar-powered water filtration system for remote communities with limited access to clean water. The system integrates advanced filtration methods with IoT-based monitoring for real-time data collection. The design is intended for scalability, ensuring effective deployment in regions like Ghana. The report details the methodology, including system design, cost analysis, and ethical considerations. Results indicate a cost-effective and energy-efficient solution for sustainable water purification.

Gabe Gransden, Nicholas Beach, Flora Szklenar

Faculty Mentors: Dr. Rajani Muraleedharan and Steve Wuobio
Collaborators: Molex Foundation Africa, Ghana Royal Seed Clinic
Electrical & Computer Engineering| Science, Engineering, & Technology |Undergraduate Research
Experiential Learning (Capstone - internship)

28 | Pinball Machine

The goal of was project is to design and create a unique pinball machine. From supplied parts the students designed, constructed, wired, and coded a functioning pinball machine for the client to professionally finish and utilize in their business

Christian Bruhnsen, Dylan Doherty, James Grigg, Kevin Shaw
Faculty Mentor: Dr. Rajani Muraleedharan and Steve Wuobio
Sponsor: Crazy Quarters Arcade
Electrical & Computer Engineering | Science, Engineering, & Technology
Experiential Learning (Capstone - internship)

29 | Cognitive-Behavioral Assessment and Regulation of Emotion using Neuroadaptive Humanoids

Using technology to improve autism spectrum disorder (ASD) therapy has opened new opportunities for enhancing communication and emotional engagement between children and therapeutic tools. To further improve the effectiveness of a NAO robot in ASD therapy and foster better interactions with children, new features can be implemented. Since robots currently lack the ability to reciprocate emotions, adding a screen that visually displays the robot's emotions, paired with a tone of voice that matches these emotions, can significantly improve its therapeutic impact. This combination would make the robot's responses more relatable and engaging, creating a more interactive and emotionally supportive experience for the children.

Andrew Kietzman, Parker Krause, Aidan Karst, Benjamin Matuszak
Faculty Mentor: Dr. Rajani Muraleedharan
Electrical & Computer Engineering | Science, Engineering, & Technology
Sponsor: Field-Spicer Fellowship Program
Experiential Learning (Capstone - internship)

30 | Aquaponics: IoT-Based Data Monitoring

The goal of this project is to create and implement a standalone aquaponics monitoring system. This system should be able to monitor water/air temperature, conductivity, pH level, and more. The system will be created using various sensors which gather data from the water tubs in the aquaponics system. Arduinos are used as the base, or nodes, for the sensors to connect to. Then, the Arduinos will use serial communication to send the data to the central hub, which is made from a Raspberry Pi microcontroller. The Raspberry Pi will allow for the data to be transmitted over the Wi-Fi. The data will be translated across a website for easy reading of the desired signals.

Ryan Thiede, Hayden Heyn, Jason Chapman, Justin Schweiger
Faculty Mentors: Dr. Rajani Muraleedharan, Dr. Holly Little and Steve Wuobio

Sponsor: Greenhouse Operations, SVSU SET
Experiential Learning (Capstone - internship)

31 | Variable Frequency Drive (VFD) Optimization & Documentation

DuPont currently lacks a formal process for assessing and maintaining installed VFDs. To address this, a collaboration was established to define the scope of deliverables, including data collection and documentation of existing VFDs, identification of business-critical units, recommendations for preventative maintenance and spare parts, development of conversion wiring diagrams, and return-on-investment analysis. The outcome will provide DuPont with a comprehensive and reliable VFD program, ensuring all necessary information is available for future maintenance and decision-making. Key milestones included completed data collection in December 2024, conducted review meetings in and created necessary documents in February and March 2025, and deliver documentation and recommendations in April 2025.

Matthew Kareus and Kooper Ciszewski
Faculty Mentors: Dr. Rajani Muraleedharan and Steve Wuobio
Sponsor: DuPont
Electrical & Computer Engineering | Science, Engineering, & Technology
Research and Development

32 | Tunable Coplanar Patch Antenna for Dual-Frequency Operation

An antenna is a critical and integral part of a communication system. The project proposes to design and develop a tunable coplanar patch antenna capable of operating at two distinct frequencies while achieving minimal signal reflection and optimized return loss. The antenna will be evaluated and characterized using a nano vector network analyzer (VNA), ensuring compatibility with modern, compact testing systems. A primary design objective is the minimization of return loss, which directly correlates to efficient power transfer and low signal reflections at the input port. Reducing return loss ensures the antenna radiates or receives maximum possible energy, improving overall system performance. The antenna must also maintain high compatibility with the dielectric substrate parameters—specifically, the dielectric constant, resonant frequencies, and substrate height. The antenna is intended for applications where space, efficiency, and frequency flexibility are critical—such as portable communication systems, embedded sensing platforms, and dual-band wireless technologies. By enabling tunability across two frequencies, the antenna will support multi-functional operation without the need for separate hardware components. This offers practical benefits such as reduced system complexity and improved form factor integration. Finally, the project intends to deliver a compact, precise, and versatile antenna solution for advanced testing and multi-band wireless applications.

Eric Slabbert, Maurice Anderson, Joseph McCray
Faculty Mentors: Dr. Mohammad Khan
Electrical & Computer Engineering | Science, Engineering, & Technology
Research and Development

33 | Grounded Electrode Effect on a Two-Stage EHD Gas Pump by Experiment

This study is an experimental investigation of fluid flow driven by a two-stage EHD (electrohydrodynamic) gas pump with 56 emitting electrodes and 1-inch-wide grounded electrode in four walls. The flow is induced by the gas pump which is charged at a combination of three different operating voltages (20 kV, 24 kV, and 28 kV). To achieve the maximum enhancement in gas pumping, emitting electrodes are flush mounted on the channel walls so that the induced flow produced directly disturbs the boundary layer thickness. This led to a higher velocity near the channel walls and resulted in an inverted parabolic velocity profile at the center of the channel, which is opposite to the fully developed velocity profile of a forced flow. Fluid velocities are measured at three cross-sections along the channel length and then integrated to obtain the volume flow rate. In addition to the volume flow rate produced, the performance of the pump is evaluated using an energy efficiency factor. The two-stage EHD gas pump, which can be produced and sustained air flow with a maximum volume flow rate is considered more efficient when it is operated with uneven applied voltages. The EHD technique has great potential for many engineering applications.

Matteo Capotosti, Andrew Herzog, Joseph Kraus
Faculty Mentor: A K M Monayem H. Mazumder
Mechanical Engineering | Science, Engineering, & Technology | Undergraduate Research Research and Development

Closing Remarks | Malcolm Field Theatre

11:45am – 12:00pm
Mentor Award Presented by SVSU Foundation Director, Drew Moomey
Student Award and Recognition