



**TALKS | POSTERS
ART | MUSIC**

4 APRIL 2025

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MESSAGE FROM THE PRESIDENT



Dear Students, Faculty, Staff, Alumni, Trustees, and Guests,

It is my distinct pleasure to welcome you to the 2025 Guilford Undergraduate Symposium (GUS), a cherished annual event that highlights the diverse talents and extraordinary achievements of our students. Guilford's commitment to promoting academic excellence, fostering creativity, and nurturing a community of inquiry is beautifully showcased through the remarkable projects and presentations you will witness today.

GUS stands as a testament to our vibrant community and commitment to interdisciplinary exploration. Offering students across all majors the opportunity to present their research and creative works, this event

exemplifies the collaborative spirit and intellectual curiosity that define Guilford College. Whether through scientific inquiry, artistic innovation, or social advocacy, our students demonstrate the critical and creative thinking that prepares them to be changemakers in the world.

As you explore the Hege Academic Commons and other spaces on campus, I encourage you to engage deeply with the presentations. Behind every exhibit is a story of dedication, innovation, collaboration, mentorship, and personal growth. These are the moments where ideas take shape, lifelong skills are honed, and our values of excellence, community, and ethical leadership manifest in meaningful ways.

On behalf of the entire Guilford community, I extend my heartfelt gratitude to the faculty, staff, and volunteers who made this event possible. Your unwavering guidance and support ensure that our students can achieve their highest potential and share their knowledge with the wider community.

To our student presenters, congratulations on your accomplishments. GUS is more than a symposium; it is a celebration of your hard work, ingenuity, and vision. You make us proud, and your efforts inspire all of us.

Thank you, parents, families, friends, and guests, for joining us for this extraordinary day. You are an important part of the fabric of Guilford College, and your presence reinforces the sense of community that makes our College truly special.

Enjoy the symposium and the many discoveries it offers today!

Warm regards,

A handwritten signature in blue ink, reading "Jean P. Bordewich". The signature is fluid and cursive, with a long, sweeping underline.

Jean Parvin Bordewich, Acting President, Guilford College

MESSAGE FROM THE PROVOST

Dear Guilford College Community,

Welcome to the Guilford Undergraduate Symposium (GUS)!

GUS is a celebration of student scholarship and creativity, providing a platform for students to share their work with the broader community. Participants will give conference-style presentation, display visual art, take part in panel discussions, and deliver performances. These projects are the result of course work, independent research at Guilford, experiences abroad, conferences, and work at other institutions. Beyond highlighting individual achievements, GUS also demonstrates the amazing collaborative work within our community.



Held near the end of the spring academic term, GUS serves as a meaningful reflection on our students' achievements and provides an opportunity to recognize students' development and the influence of our collective educational experience. We invite you to join Guilford College students and faculty in celebrating their effort and supporting their successes. GUS showcases the remarkable achievements within our community.

We look forward to seeing you throughout the day!

Sincerely

A handwritten signature in black ink, consisting of a stylized 'K' followed by a horizontal line and a small flourish.

Dr. Kami Rowan, Interim Provost, Guilford College

WELCOME TO GUS 2025!

Welcome to the 17th Annual Guilford Undergraduate Symposium!

More than 100 Guilford students representing a wide variety of departments and programs will be presenting original research, exhibiting creative works, reciting original prose and poetry, demonstrating artwork, and leading panel discussions and group presentations throughout the day. This symposium is an exciting opportunity to highlight our collective academic achievements across all majors, programs, departments, divisions, and classifications.

We thank you for coming together in appreciation of cross-disciplinary scholarship. We hope that you have the opportunity to see as many of the presentations as possible to help us celebrate the diversity and depth of our students' interests. These interests, and this work, forms the bedrock that helps our students shape the future.

We wish to thank all of those who helped make GUS possible along the way, including Jean Parvin Bordewich, Kami Rowan, Mark Justad, Adam Pearman, Suzanne Bartels, Liz Wade, Gwen Erickson, Samantha Rummage-Massey, Robin Weavil, David Hildreth, and Brenda Swearingen.

GUS is a unique opportunity for students to present their work to a diverse group of students, faculty, and community members. Thank you to all of you who are attending for supporting our students in this vital endeavor!



PRESENTER INFORMATION



The Guilford Undergraduate Symposium (GUS) is a unique opportunity for students to present their work to a diverse group of students, faculty, and members of the community. Here are a few notes about presenting at GUS. If you have any questions, please don't hesitate to contact us at gus@guilford.edu. We hope that you will find you will find your experience rewarding!

Attendance: Tell your professors and your fellow students that you are presenting at GUS and encourage them to come. You are also welcome and encouraged to invite family members and friends to attend.

Dress code: Although there is no formal dress code, we encourage all presenters to wear professional attire. This means that nice jeans are fine while athletic wear is not. Please note, as well, that some session chairs may have more formal requirements.

Registration: Check in at the GUS registration table inside the main entrance of Hege Academic Commons prior to your session. This is where you will pick up your name tag and swag. The registration table will open at 8.30am.

Poster presentations: Please note the time of your poster session. You are expected to be present for that hour to answer any questions from your colleagues, your instructors, and community members. Be sure to arrive at least 10 minutes before your session begins.

Oral presentations: Have all of your materials ready to go, either on a USB drive or in your Google Drive or physically present (if you have physical props). Be sure to arrive at your assigned location at least 10 minutes before your session begins.

LOCATION INFORMATION

Leak Room, Duke Memorial Hall: Enter via the doors that face Hege Academic Commons and use the left-hand door only to get into the room.

Carnegie Room, Hege Academic Commons: From the main entrance to Hege Academic Commons, turn to the right and go through the wooden doors. This is the original Library location.

Collaboratory/Experimental Classroom, Hege Academic Commons: Located on the second floor of Hege Academic Commons, this is the “front” of the large collaborative space. Presenters will need their Guilford College credentials to log in to the room PC.

Collaboratory/Idea Incubator, Hege Academic Commons: Located on the second floor of Hege Academic Commons, this is the “back” of the large collaborative space. Presenters will need their Guilford College credentials to log in to the room PC.

Guilford College Art Gallery, Hege Academic Commons: From the main entrance of Hege Academic Commons, go straight down the hallway. The Art Gallery is on the right-hand side just before the Poster Hall.

Poster Hall: Located in the Commons Connection Zone, which is the large space in front of the CAPE offices, there are two sides. If your back is to the elevator, the right-hand side will be for artistic and other physical media presentations. The left-hand side will be used for poster presentations.

If you have any questions, please ask a member of the Library staff or a member of the GUS Committee.



GUS 2025 ORAL PRESENTATIONS

9.00am to 10.00am

Session 1: Poetics and legacies in different forms, Gwen Erickson, chair

Location: Carnegie Room, Hege Academic Commons

- Clara Fuehler, “Us Children: Collaborative Poetics in Sculpture” (Will Thomas, Art)
- Tamryn Herring, “The Legacys of the Pendragons: A Comparative Analysis of the Legendborn Cycle and Arthurian Lore” (Heather Hayton, English)

Session 2: Agency and architecture: Community-based solutions, Cathryn Bennett, chair

Location: Collaboratory/Experimental Classroom, Hege Academic Commons

- cairna, Ben Caine, Hannah Wilson, and Karrie Parrish, “Hostile Architecture Within the Greensboro Community of People Who Are Homeless” (Cathryn Bennett, JPS)
- Ellie Dieth, “Propagating Agency: How Community-Based Efforts Can Increase Climate Resilience and Non-Commercial Food Access” (Bronwyn Tucker, SFS)

Session 3: Invasion and predation on local birds, Christine Stracey, chair

Location: Collaboratory/Idea Incubator, Hege Academic Commons

- Nora Hayden, “The Effects of Native versus Invasive Species on Ground Nesting Birds” (Christine Stracey, Biology)
- Devon Burrell, “Post-Predation Parental Behavior of Northern Mockingbirds” (Christine Stracey, Biology)



10.15am to 11.15am

Session 4: Analyzing history and art, Gwen Erickson, chair

Location: Carnegie Room, Hege Academic Commons

- Brady Odell, “Switzerland: The Nationalist Paradox” (Phil Slaby, History)
- Farrah Wilde, “Guilford College Art Theses Online Repository” (Gwen Erickson, Guilford College Archives; Will Thomas, Art)



Session 5: H. Curt '56 and Patricia S. '57 Hege Award Winners, William Kelly, chair

Location: Leak Room, Duke Memorial Hall

- Hege Emerging Scholar Award: Brady Odell, “Switzerland: The Nationalist Paradox”
- Hege Emerging Scholar Award: Coleman Smith-Rakoff, “The Dreyfus Affair: Anatomy of a Scandal”
- Hege Research Award: Taylor Davis, “Exploring Synergistic Antibacterial Activity of Camphor Essential Oil”

Session 6: Using AI in socially conscious ways, Chafic Bou-Saba, chair

Location: Collaboratory/Experimental Classroom, Hege Academic Commons

- Mohammad Agha Mohammadi, Foy Lane, and Srija Roy, “An AI-Robotics-Driven Approach to Coastal Pollution Cleanup” (Chafic Bou-Saba, CTIS)
- Alex Núñez Palomares, Emma He, and Anya Li, “Cleaning Up Trash With AI Robotic Technology” (Chafic Bou-Saba, CTIS)
- Rogelio Pérez Montero, “Enhancing Food Bank Efficiency: A Web-Based Solution for Real-Time Inventory Management and Distribution Optimization” (Rob Whitnell, Chemistry)

Session 7: Interdisciplinary Applications in Environmental and Health Sciences, Holly Peterson, chair

Location: Collaboratory/Idea Incubator, Hege Academic Commons

- Taylor Davis, “Exploring Synergistic Antibacterial Activity of Camphor Essential Oil” (Owen Bussey, Biology; Michele Malotky, Biology)
- Cassandra Berry, “Circular Economy: Applications of Spend Coffee Grounds in Biocomposites” (Anne Glenn, Chemistry)
- Madelyn Briggs, “Urban Stream Health Assessment in Guilford College” (Saubhagya Silwal, Biology)

Session 8: Merging traditional and modern art forms, Rhiannon Kelly, chair

Location: Poster Hall, Hege Academic Commons

- August Hutchings, Luca Desear, Ayaam Ghimire, Samanyu Manjunath, Pranav Tripuraneni, and Efia Yeboah, “ECAR: Creating Community on Campus” (Rhiannon Kelly, PPS)
- Rolando Ortiz Parada, “Mono de Calenda” (Mark Dixon, Art)

11am to 12.30pm

Session 9: Photograph and digital darkroom exhibition, Alexandra Litaker, chair

Location: Carnegie Gallery, Hege Academic Commons

- Photography: Isis Aranda Cervantes, Ragan Bethea, Marlith Duran, James Huntley, Nadira King, Khuran Na, Assata Oakes, and Ella Williams
- Digital darkroom: Wilmer Acevedo Quezada, Faith Brennan, William Brown, William Greene, River Hull, Solana Kominsky, Jacie Livengood, William Oldham, Daniel Sasser, Sarah Sheets, Pranav Tripuraneni, and Evan Wong



11.30am to 12.30pm

Session 10: Guitar performance, Kami Rowan, chair

Location: Guilford College Art Gallery, Hege Academic Commons

- Lexi McGraw with Brandon Walker '23, "Guitar Duo: Sergio Assad's *Summer Garden Suite*" (Kami Rowan, Music)

Session 11: Practical considerations of AI and blockchain applications, Isaac Magaña, chair

Location: Collaboratory/Experimental Classroom, Hege Academic Commons

- Liam Greene, "AI Engery Consumption Prediction Model" (Chafic Bou-Saba, CTIS)
- Gahel Arango-Sosa, "Blockchain Based Payroll System: Secure and Transparent Salary Management" (Chafic Bou-Saba, CTIS)
- Carlos Ramírez Morales, "Internship Experience at the Guilford College ITS Helpdesk" (Isaac Magaña, CTIS)

Session 12: Poetry and prose readings from graduating seniors, Cynthia Nearman, chair

Location: Collaboratory/Idea Incubator, Hege Academic Commons

- Max Bender, Brandy Gray, and Abram Greene, "Poetry and Prose Readings from Graduating Creative Writing Students" (Cynthia Nearman and Shawn Delgado, English and Creative Writing)



1.00pm to 2.00pm

Session 13: Got Spanish? Student-made short films, Karen Spira, chair

Location: Collaboratory/Experimental Classroom, Hege Academic Commons

- Eva Doyle, Jaelle Garvin, and Hannah Hatfield, “Ser vs. estar” (Karen Spira, Spanish)
- Maeve Dunkerley, Maggie Christensen, Ashlyn Miller, and Zaria Porter, “La empleada ridícula” (Karen Spira, Spanish)
- Nishitha Daniel, Ally Hoffman, and Marnie Lasher, “Telenovela: Enfermedad de Ally” (Karen Spira, Spanish)
- Carlos Carrillo, Rafael Montiel Cruz, Efia Yeboah, and Grace Williams, “Good Bunny” (Karen Spira, Spanish)

Session 14: Access and intrusion: Trends in cybersecurity, Rob Whitnell, chair

Location: Collaboratory/Idea Incubator, Hege Academic Commons

- Liam Greene, “Identity Access Management at Guilford” (Rob Whitnell, CTIS)
- Gavin Dellinger, “Lazarus Group: A Technical Breakdown of North Korea’s Cyber Operations (Chafic Bou-Saba, CTIS)
- William Oldham, “Understanding Next Generation Firewalls: Palo Alto Networks Models and Capabilities” (Chafic Bou-Saba, CTIS)

Session 15: Pottery glazing and the intersection of art and chemistry, Charlie Tefft, chair

Location: Poster Hall, Hege Academic Commons

- Zakir Moore, Maddie Thaxton, Tessa Alton, Demetrio Candela-Habana, Therese Cote, Michael Cronan, Adrita Fuad, August Hutchins, Zoey Lesko, Kendal Lowe, Sam Muriel, Poomi Nguyen, Ty Pearson, Giselle Santander, Jaden Shively, George Wall, and Zoe Wang, “Exploring Pottery Glazes: The Intersection of Art & Chemistry” (Holly Peterson, ENVS; Charlie Tefft, Art)



2.15pm to 3.15pm

Session 15: Creating the 2025 *Greenleaf Review*, Cynthia Nearman, chair

Location: Leak Room, Duke Memorial Hall

- Charlie Miller, Max Bender, and Nova Hightower, “The Greenleaf Review: Making a Literary Magazine” (Cynthia Nearman, English and Creative Writing)

Session 16: Reflections on 2025 capstone projects, Chafic Bou-Saba, chair

Location: Collaboratory/Experimental Classroom, Hege Academic Commons

- Arthur Briscoe, “Capstone and Internship Presentation” (Rob Whitnell, CTIS; Craig Eilbacher, SPST; Mattheus Furlaneto, Strength and Conditioning Coach)
- Carlos Ramírez Morales, “Survivors End: A Capstone Game Development Journey” (Chafic Bou-Saba, CTIS)
- Mike Payne, “NoteShare: A Collaborative Information Sharing Engine” (Chafic Bou-Saba, CTIS)
- Sarah Sheets and Evan Wong, “Eco-Tank Robot” (Chafic Bou-Saba, CTIS)

Session 17: Assessing the “real” and the “artificial”, Will Thomas, chair

Location: Collaboratory/Idea Incubator, Hege Academic Commons

- Josephine Hemmer, “Fertile Ground: Our Mother” (Will Thomas and Charlie Tefft, Art)
- William Decareaux, “Artificial Surrealism” (Will Thomas, Art)



POSTER SESSIONS

All poster sessions are held on the first floor of Hege Academic Commons in the Commons Connections Zone (the area in front of the CAPE offices).

All presenters should arrive 10 minutes to their scheduled session to give themselves enough time to set up their posters and prepare their areas. If you need any accommodations, please talk to a GUS Committee member either before or during your scheduled time.

Attendees should come prepared for interaction. Engage with the presenters, ask questions, and be mindful of others' time. These sessions are designed for interactive discussions and quick information exchanges. Check the schedule and the abstracts to determine which ones you're most interested in. As you talk with our presenters, feel free to take notes.



2.15pm to 3.15pm

- Riley Barnes, “Determining the Luminescence of Electrochemiluminescent Self-Assembled Monolayers” (Rob Whitnell, Chemistry)
- Ashley Linden, “One-Step Polyaniline-Platinum Nanoparticles Grafting on Porous Gold for Self-Powered Glucose Monitoring” (Anne Glenn and Rob Whitnell, Chemistry)
- Maggie Mahanes, “Enhanced Gas Separation and Purification Using Lignin-Derived Nanoparticles in Mixed Matrix Membranes” (Anne Glenn, Chemistry; Norman Chui, Chemistry; Bernardo Castro Dominguez, Chemical Engineering; Eleni Sikou, Chemical Engineering)
- Ishaan Sinha, Ashritha Chinapaga, Landon Metzler, Ohm Patel, and Olivia Rudolph, “Usage of 3,4,9,10-perylenetetracarboxylic dianhydride (PTCDA) in volatile organic compound (VOC) detection” (Anne Glenn and Rob Whitnell, Chemistry)
- Ryan Sengupta, Chrisbel Alcántara, Vihaan Mitra, Foy Lane, and Evan Huemmer, “Synthesis of Novel Perylene Diimides with Aromatic Bay Substituents through Suzuki Coupling” (Anne Glenn and Rob Whitnell, Chemistry)

The Impact Of Education And Income Level On Food Insecurity
Elizabeth Kamila Gonzalez & David Holland
Guilford College

Background
Food insecurity can be defined as lacking “regular access to enough safe and nutritious food for normal growth and development and an active and healthy life.”¹ The University of Buffalo is conducting a study looking at the effectiveness of mobile produce markets, “Veggie Vans”, in underserved communities. Using data from this study we analyzed the correlation between education level and the use of government food assistance programs and whether income level correlates with time to prepare fruits and vegetables.

Methods
Study Sites
 • Identify 2 study sites
 • 1 control group
 • 1 experimental group
 • Must be designated food deserts
Recruitment
 Attend local events to discuss the project and recruit community members to participate in the study
Assessment
 • Phone Survey
 ◦ accessibility
 ◦ food choice
 ◦ barriers
 • In-person Survey
 ◦ biometrics
 ◦ via veggie meter
Follow Up
 Repeat phone and in-person assessment after 1 year

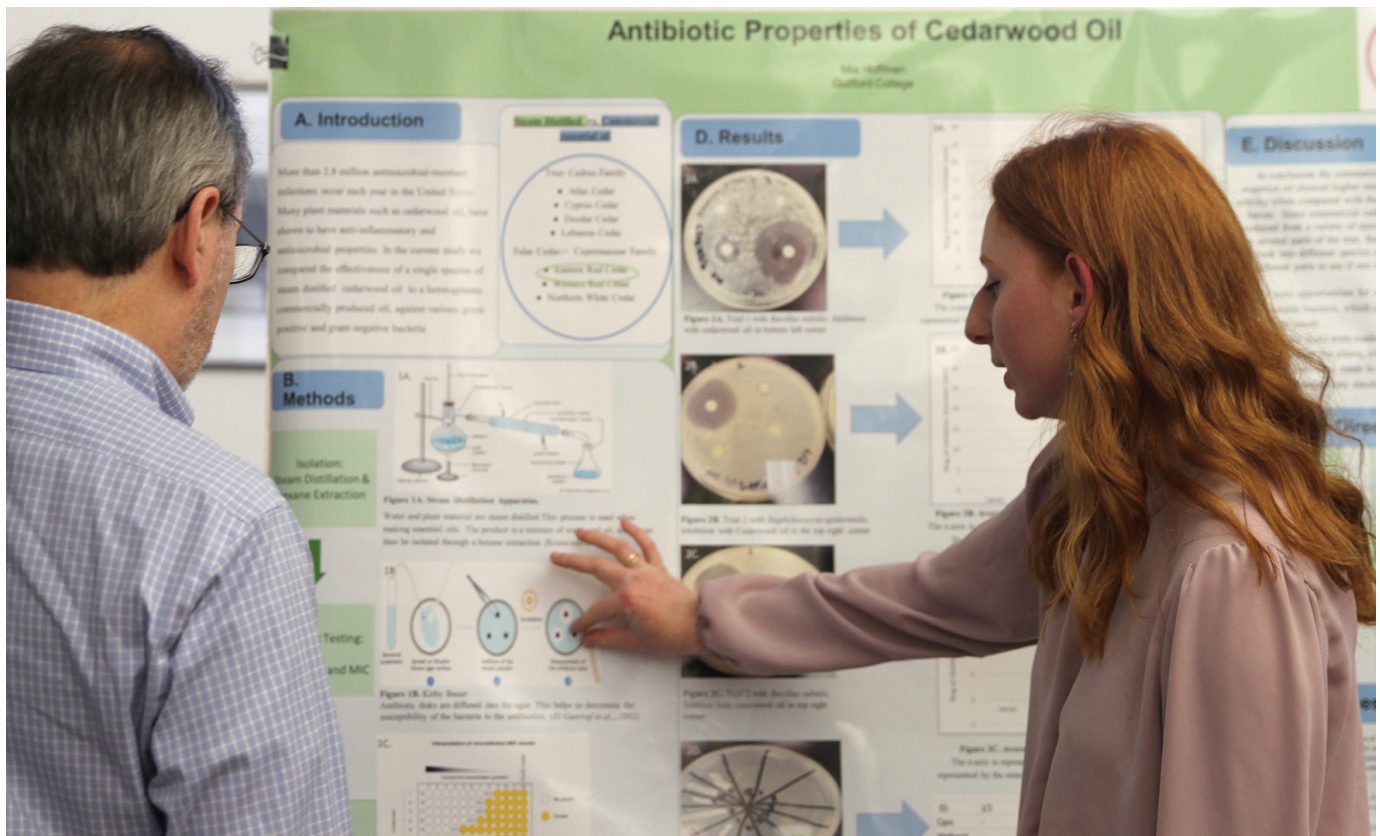
Results
Income and Feeling like one Has Time To Prepare F/V
 Figure 1: Income and Feeling like one Has Time to Prepare F/V. Participants who didn't feel like they had enough time to prepare F/V. Income Levels: 1 (Less than \$10,000 to \$19,999), 2 (\$20,000 to \$49,999), 3 (\$50,000 or more)
Education Level and Use of Government Food Assistance Programs
 Figure 2: Education Level and Use of Government Food Assistance Programs. Participants who didn't use Government Assistance. Education Levels: 1 (8th Grade or less), 2 (Some high school - High School graduate or GED), 3 (Trade or beauty school graduate), 4 (Some College), 5 (College graduate), 6 (More than college)

Discussion
 For Income Level and Time to prepare F/V we ran a Chi-test and our P-value was less than 0.05 indicating a significant statistical correlation between the two variables.
 For our education level and use of government assistance we ran a Chi-test and we got a P-value of over 0.05 indicating that there isn't a statistical significance between the two variables.

Future Directions
 Now that we have the results from our research we can come up with initiatives/interventions to address our findings

References
¹Food and Agriculture Organization of the United Nations, (2023)
²University at Buffalo (U/B) Veggie Van Study
³McKinsey & Company

Methods Cont.
 Question one:
 I explored the relationship between income level and the time participants had to prepare fruits and vegetables. I recorded participant responses on income level ranging from low, middle, to high (1-3), and whether or not they agreed or disagreed with if they had enough time to prepare fruits and vegetables in order to explore the relationship between the two.
 Question two:
 I am analyzing the correlation between education level and the use of government food assistance programs. Education level was recorded to group together “8th grade or less” and “less than high school”. Food assistance programs were also recorded to exclude Medicaid and social security disability benefits.



GUS 2025 PRESENTERS

Mohammed Agha Mohammadi, Foy Lane, and Srjia Roy

“An AI-Robotics Driven Approach to Coastal Pollution Cleanup”

Advisor: Chafic Bou-Saba, CTIS

Trash pollution in coastal environments poses a significant threat to marine life, coastal habitats, and human health. The accumulation of man-made debris contributes to soil contamination, habitat destruction, and the leaching of harmful chemicals into drinking water. To address these issues, our team is developing an autonomous robotic solution designed to monitor and clean beach shorelines efficiently and effectively. Our project aims to overcome existing challenges - such as limited human capacity, high monetary cost, and limited reach - by introducing an AI-powered robotic system capable of continuously detecting and collecting debris without disrupting marine life.

Our robot is equipped with artificial intelligence (AI) trained on images from an open-source database to identify and classify trash, including bottles, cigarettes, cans, and cardboard. A robotic arm will gently place collected items into a mesh bag to prevent harm to marine life. Additionally, the robot will possess communication capabilities to inform the operator about the locations and images of large debris that it cannot remove from the shoreline. If deployed at scale, this technology could revolutionize beach clean-up efforts by significantly expanding the reach of debris collection in a time- and cost-efficient manner. Furthermore, a larger version of the robot could cover greater distances and collect more debris in a shorter timeframe, making large-scale clean-up operations more feasible.

Gahel Arango-Sosa

“Blockchain Based Payroll System: Secure and Transparent Salary Management”

Advisor: Chafic Bou-Saba, CTIS

Location

The payroll process in many different businesses can at times be costly and unreliable due to human error, delaying or even messing up payments needed to keep a workplace functional. What this project sets out to do is to solve those issues before they even arise by getting rid of the traditional issue prone payroll services and replacing them with a blockchain based payroll service which takes care of all of the company’s payroll services under the management of an administrator.

The payroll service will be based in the Ethereum blockchain network and will use smart contracts written in Solidity to calculate and deliver payments to employees and other services. It has been developed and tested within the Hardhat Network allowing for experimentation until its full completion. Testnet coins will be used to simulate the payment transactions. Every transaction will be recorded in a recorded ledger allowing for maximum transparency. This offers a secure, decentralized, and efficient way for businesses to conduct their payroll services.



Riley Barnes

“Determining the Luminescence of Electrochemiluminescent Self-Assembled Monolayers”

Advisor: Rob Whitnell, Chemistry

Location

Two years ago, I was involved in a research project involving the synthesis and testing of electrochemiluminescent self-assembled monolayers. I was in charge of synthesizing the monolayer. However, my team ran into some time constraints and were unable to determine if our product behaved as we predicted. We deduced that the cause of product not behaving correctly was either that the monolayer was not properly cleaned up as we didn't have time to clean up our product due to time constraints, or that the monolayer didn't behave as predicted. This question has sat with me for two years and been an area of curiosity for me. I have continued this research to disprove one of my two hypothesis and write a definitive conclusion.

Max Bender, Brandy Gray, and Abram Greene

“Poetry and Prose Readings from Graduating Creative Writing Students”

Advisors: Cynthia Nearman and Shawn Delgado, English and Creative Writing

This will be a poetry and prose reading featuring Abram Greene, Max Bender, and Brandy Gray. Abram and Max will be reading poetry and Brandy will be reading fiction. All three of these students are graduating this semester and would like to showcase what they have learned over their years as a Guilford College student through their readings.

The pieces that these three seniors will be reading are those they have been working on in their senior thesis class. In the classes, Max and Abram had the opportunity to revise poems they have written in the past and work on new poems with Shawn Delgado. These poems will be composed into chapbooks written by both of the authors. Brandy had the opportunity to write a collection of short fiction with Cynthia Nearman.



**POETRY & PROSE
READINGS FROM
GRADUATING
CREATIVE
WRITING
STUDENTS**

Cassandra Berry

“Circular Economy: Applications of Spent Coffee Grounds in Biocomposites”

Advisor: Anne Glenn, Chemistry

This research examines applications of coffee by-products, in particular spent coffee grounds, in the production of biocomposites. The plastic industry produces increasingly alarming quantities of waste that is toxic to the environment, prompting researchers to explore methods to convert food and drink waste into products that can be utilized to create biocomposites, such as biofuel, bioplastics, and biopolymers. Ultimately, the objective of this work is to produce a biopolymer film that could potentially replace cling wrap. Extraction of spent coffee grounds was investigated in time efficiency, reproducibility, coffee oil yield, and financial expense. From the extracted coffee oil, analytical methods will be performed to determine the lipid profile. Film synthesis will be conducted with two methods, one with a cornstarch base and another with a cellulose and lignin mixture as the base. Produced films will be analyzed for durability, thickness, and water permeability.

Madelyn Briggs

“Urban Stream Health Assessment Study Project in Guilford College”

Advisor: Saubhagya Silwal, Biology

Urban Stream Syndrome (USS) represents a significant ecological challenge in developed areas, characterized by the degradation of stream ecosystems due to urbanization. The ecosystems that are becoming affected by the increase in impervious surface still remain critical ecological corridors within our cities as they are crucial to the health of our ecosystem and to be able to support the lives of macroinvertebrates, the ecosystem is also crucial to the lives of humans that inhabit the area. There are a number of complex interactions between urbanization intensity and stream ecosystem health across a gradient of urban development.

Throughout this thesis we investigate previously acquired data from a lab performed within Introduction to Biology: Ecology and Evolution. We analyzed data collected from streams at Guilford College and two branches of Buffalo Creek within Greensboro, North Carolina. Focusing on key parameters including pH, temperature, dissolved oxygen, turbidity, and flow rate. Our comparative analysis reveals significant variations in macroinvertebrate diversity and water quality metrics corresponding to different levels of urban impact. By examining these parameters over time, this study aims to determine whether the stream health at Guilford College is improving or degrading, and to identify potential causative agents of any observed degradation. Additionally, we evaluate Course-Based Undergraduate Research Experiences (CUREs) to enhance both student engagement with ecological research and improve the quality and accuracy of our stream assessment methodologies.

Arthur Briscoe

“Capstone and Internship Presentation”

Advisors: Rob Whitnell, CTIS; Craig Eilbacher, Sport Science; and Matteus Furlaneto, Strength and Conditioning Coach

This presentation will include a Capstone project from the CTIS field as well as an ITS Help desk internship presentation. Moreover, will lightly touch on an independent study based on athletic strength increase in student athletes after following a program over time.

Devon Burrell

“Post-Predation Parental Behavior of Northern Mockingbirds”

Advisor: Christine Stracey, Biology

Thanatology is an interdisciplinary field that classically studies death and dying behaviors in humans. However, this field of study can also be applied to animals. How does the death of a conspecific affect the behaviors of an individual? Do their behaviors change based on the relationship to a conspecific? Very little is known about the post-predation behaviors of parent birds, with most thanatology studies being conducted on apes, cetaceans, and proboscids.

Nest predation is a significant contributor to failed nests of Northern Mockingbirds (*Mimus polyglottos*), however, post-predation behaviors have not been documented. We are observing video footage of 31 mockingbird nests to document post-predation behaviors of parent birds. We are quantifying 1) the time to nest abandonment after a predation event based on nest stage (egg vs nestling) and the age of the nestling(s), 2) document the following behaviors exhibited by parent birds following a predation event; food being brought back to the nest, cleaning of the nest, brooding behaviors, and vocalization upon returning to the nest.

Our preliminary results indicate that there is a negative correlation, as nestling age increases, the time till abandonment decreases. We have also found many instances of all of the behaviors previously listed throughout the observed nests. Ultimately, we hope to begin to understand how non-human animals perceive and interpret death. To accomplish this, we must first document the behaviors surrounding death. After documenting these behaviors, we can build on these results to begin to identify the possible behavioral and cognitive reasons behind the behaviors exhibited by non-human animals surrounding death.

cairna, Ben Caine, Hannah Wilson, and Karrie Parrish

“Hostile Architecture within the Greensboro Community of People Who Are Homeless”

Advisor: Cathryn Bennett, JPS

This empirical research addresses homelessness and hostile architecture in Greensboro. Homelessness means living conditions without consistent access to indoor shelter, food, water, or basic human rights (e.g., Olivet et al., 2021); hostile architecture addresses policies/structures that restrict a person's capacity to interact with public spaces (Neighborhood Design Center, 2023). The literature demonstrates a gap in the relationship between hostile architecture and homelessness. Community-Based Participatory Action Research (CPAR) with The Interactive Resource Center (IRC) confirmed that hostile architecture negatively affects homeless people in Greensboro which must be overcome to eradicate homelessness as a whole. Scholars investigating homelessness (Olivet et al., 2021) address the vital role of community-based organizations that offer: temporary shelter (IRC) or long-term housing placement (Rollings and Bollo, 2021).

Preliminary analysis reveals dehumanization, food inaccessibility, and oppression. Our research demonstrates hostile architecture and restrictive policies negatively impact people experiencing homelessness, reinforcing exclusion and marginalization (Blasi & Stuart, 2008; Mitchell, 2003; Smith, 1996;). Findings highlight the broader dehumanization in anti-homeless policies, which prioritize social control and economic interests over human rights signaling the need to avoid punishment and instead center human rights, and people over profit.



Carlos Carrillo, Rafael Montiel Cruz, Efia Yeboah, and Grace Williams
 “Good Bunny”
 Advisor: Karen Spira, Spanish

In this video, 4 classmates work on a project for their Spanish class. Viewers will learn about how to use the preterite and imperfect.

GOOD BUNNY

Una lección del pretérito y el imperfecto.

Carlos Carrillo

Rafael Montiel Cruz

Efia Yeboah

Grace Williams

Nishitha Daniel, Ally Hoffman, and Marnie Lasher
“Telenovela: Enfermedad de Ally”
Advisor: Karen Spira, Spanish

Our informational grammar video explains the present subjunctive tense in noun clauses in Spanish and provides examples of how to use this grammar mode in an interactive format.



Taylor Davis
“Exploring Synergistic Antibacterial Activity of Camphor Essential Oil”
Advisors: Owen Bussey and Michele Malotky, Biology

Today, there is an urgent need for alternative antimicrobial agents due to the growing problem of antibiotic resistance. Recently, many conventional remedies have been used in combination with antibiotics, such as native plants. *Cinnamomum camphora* is a North Carolina native plant that has been increasingly used and has shown anti-inflammatory and antimicrobial properties. Although camphor, derived from the wood of the camphor tree, has inherent antibacterial qualities, its effectiveness can actually be increased by combining it with antibiotics.

In this study, the synergistic antibacterial activity of camphor essential oils was investigated against *Pseudomonas aeruginosa* and *Staphylococcus aureus*. The antibacterial properties of camphor essential oils in combination with different synergistic drugs are assessed in this study using qualitative and quantitative techniques, such as Kirby Bauer assays. Due to possible contamination of *S. aureus*, only *P. aeruginosa* was assessed further. Findings showed that combining low levels of antibiotics with camphor create synergistic bacterial inhibition against *P. aeruginosa*, suggesting a possibility for creating potent natural synthetic antimicrobial treatment combinations. These findings highlight the promise of camphor essential oils as a natural adjunct in antimicrobial therapy, advocating for further exploration into their mechanisms of action and broader applications in healthcare settings.

William Decareaux
“Artificial Surrealism”
Advisor: Will Thomas, Art

Generative artificial intelligence has become a bed of controversy, disdain, and fear. While many of these criticisms are well founded, there are also many other unique and artistic explorations of artificial intelligence image generators; some of which put me in conversation with art movements of the past. One of the core aspects of my work is juxtaposing my lived experiences with the experiences of the larger collective of the world.

This pursuit began with the observation that the internet was the peak of globalization. Globalization puts me in contact with people, ideas, and issues from all around the world. I used generative artificial intelligence when I realized that AI-generated images have a surrealist quality to them in the way that they appear dream-like, especially in the sense that upon first glance the images may look understandable but the longer you look the more inconsistencies appear. With this in mind, a revelation that AI-generated images were like the dreams of our collective virtual consciousness, dreams of globalization appeared. This connection grew when I thought about how these AI image generators work by using algorithms that collect any visual data they can find and then use this data to extrapolate new images.

This process is similar to how dreams in the human brain are formed as well, as our brains go through our visual cortex (the place responsible for processing visual information) and our memories to create new imagery in our dreams. Through this connection and further research of various pioneers of surrealism and the history of automatism. Through the practices of automatism, these practitioners believed they could connect directly to their subconscious and produce ideas, lines, and words that they would later develop into full artworks. In this manner, I think of my usages of AI generation in collaboration with my drawings and photos as a form of automatism but instead of connecting to my subconscious, I am aiming to collaborate with the virtual collective consciousness we all share.



Gavin Dellinger

“Lazarus Group: A Technical Breakdown of North Korea’s Cyber Operations”

Advisor: Chafic Bou-Saba, CTIS

The Lazarus Group is a North Korean state-sponsored advanced persistent threat (APT) that has been linked to many high-level cyber operations, ranging from financial theft to espionage. These campaigns demonstrate a sophisticated operation, using a wide range of tactics, techniques, and procedures (TTPs) to achieve their objectives. This presentation provides a comprehensive analysis of the group’s operational methods, with a focus on their attack lifecycle, toolsets, and tradecraft. Additionally, it will examine a case study of one of the group’s prominent operations, illustrating their techniques in action and the broader implications for the cybersecurity landscape.

Ellie Dieth

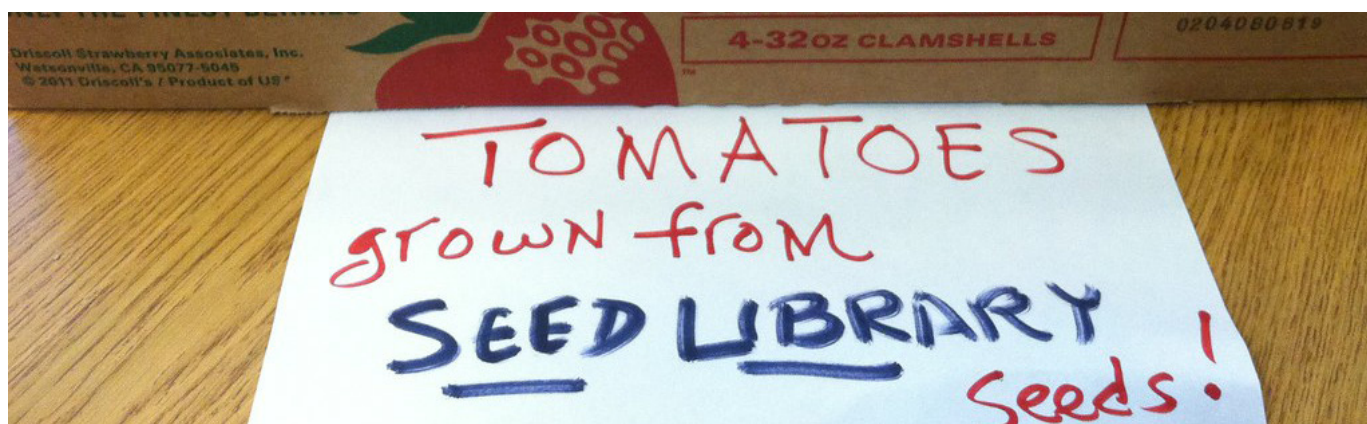
“Propagating Agency: How Community-Based Efforts Can Increase Climate Resilience and Non-Commercial Food Access”

Advisor: Bronwyn Tucker, SFS

The prevalence of seed patenting as a process among major agricultural corporations makes a small number of varieties the standard. While independent seed sellers with countless heirloom varieties exist, their catalogs can be more difficult for hobbyists to access. There is much written on the negative impact this has on small farmers, but hostile copyright enforcement also has consequences for non-commercial use.

As commercial practices result in fewer easily accessible seed varieties for the general public, the plants grown in homes and community gardens become more vulnerable. Issues like supply chain disruption and disease are unable to be mitigated by traditional differences in factors like source location and resistance. The effects of this will continue to be exacerbated by climate change as weather becomes more severe and infrastructure is tested.

There are several nongovernmental ways to combat the lack of diversity, including community seed libraries, open source varieties, and the exchange of knowledge and seeds across different geographic areas. Seed libraries in particular also reduce barriers to growing food at home: they function like a traditional library where seeds are checked out, a plant grows and produces seeds, and those seeds are “returned” to the library the following season. Similar programs have demonstrably increased food security in places like Malawi and Canada. Increasing both the prevalence of these services and knowledge about them will make the food system more secure.



Eva Doyle, Jaelle Garvin, and Hannah Hatfield

“Ser vs. estar”

Advisor: Karen Spira, Spanish

Our video presentation provides a visual and performance-based understanding of the difference between the Spanish verbs “Ser” and “Estar.” The video is conducted entirely in Spanish. Ser and Estar both be “to be” in English but have varying meanings in Spanish. Our creative approach involves a boxing match and interactive exercises to engage and teach the audience about how to properly use the verbs.



Maeve Dunkerley, Maggie Christensen, Ashlyn Miller, and Zaria Porter

“La empleada ridícula”

Advisor: Karen Spira, Spanish

This is a video that we have created for our Spanish 202 class. Our video focuses on the usage of the past perfect in the Spanish language in an office setting. The video is about a bad employee and the issues they create in the office.



Clara Fuehler
“Us Children: Collaborative Poetics in Sculpture”
Advisor: Will Thomas, Art

I am a sculpture student interested in the poetics of place-based collective art practice. My work is fueled by collaboration and made possible through the interrogation of material, environment, and fellow creatives.

“Fertile Ground: Us Children” seeks to extend the gallery space into the city using poetry as a nucleus, creating a portrait of embodied engagement through multidisciplinary exploration.

My contribution to this thesis exhibition requires audience engagement. At GUS, this will take the form of an overview of my thesis work to date, a collective reading of my poem, and intentional reflective period where audience members are invited to redact, respond, and edit the printed copies of the central poem I will provide. GUS will serve as a tool to access more participants of this project.

Those in attendance will be contributors to the archive displayed at the Senior Art Exhibition from 5-7 on April 11th in Founders Gallery.



Liam Greene

“Identity Access Management at Guilford”

Advisor: Rob Whitnell, CTIS

Identity Access Management (IAM) is an integral part of any organization needing to secure and restrict user data. I explore how Guilford College uses IAM to keep student data protected. This presentation talks about my experience working with the Guilford IT Infrastructure, why it is important to stay updated with IAM industry practices, and the different projects I worked on to improve the consistency and security of Guilford College’s Identity Access Management System.

Liam Greene

“AI Energy Consumption Prediction Model”

Advisor: Chafic Bou-Saba, CTIS

This presentation discusses my CTIS 440 capstone project, an AI Data Analytics model that outputs predictions based on trends and patterns in historical data. This is a culminating project that covers topics such as programming, data analytics, information design, and database management. The project takes an underutilized dataset from the NC Office of Budget and Management on the amount of occupied housing using a specific type of heating (i.e. underground gas, solar, coal, etc.) and creates predictions based on this dataset. The predictions are generated by Meta’s Prophet model that specializes in time series predictions. Once the predictions are generated, they are then formatted and displayed for the user to interact with and understand.

Nora Hayden

“The Effects of Native versus Invasive Species on Ground Nesting Birds”

Advisor: Christine Stracey, Biology

The foothills of Colorado are covered in invasive species of cheatgrass (*Bromus tectorum*). This study investigates the impact on ground nesting bird populations in that of invasive species vegetation and native vegetation in Boulder County, Colorado. Ground-nesting birds are critical to ecosystem health and biodiversity, yet their habitats are increasingly threatened by invasive plant species. Results indicate a significant differential, with ground-nesting birds being observed more frequently and successfully in native and rare species habitats. Our findings suggest that the structural and compositional differences between these vegetation types create unfavorable conditions for ground-nesting birds in cheatgrass-invaded landscapes. This research implicates cheatgrass as a problem and the need for conservation efforts focused on habitat restoration not only to support ground-nesting bird populations but also enhance ecosystem resilience and restoration to native lands.



Josephine Hemmer
“Fertile Ground: Our Mother”
Advisor: Will Thomas, Art

I found clay in a pit in my backyard that was a common play spot for my childhood, and we named it the Pit Hole. I found it was the perfect spot to harvest wild clay and went down with my mom and filled up buckets with almost 100 pounds of clay. I feel connected to the clay from the land and the filtering and production of the wild clay that turns the meaning of the piece to a story from the fired product beyond just buying boxed clay.

The pieces I am making revolve around a process called foot wedging which originated in Korea and Japan as the most logical way to wedge clay. Wedging is the process of homogenizing the clay and removing any air pockets. The product is a beautiful mandala-like creation that I have decided to make my final shape. Cutting the pieces create a framing to them and additions and display their functionality and handmade or rather foot made quality. This turns my presentation into the evolution of the clay process and the home it came from with the intense firing process a layer beyond presenting functional ware.



Tamryn Herring

“The Legacies of the Pendragons: A Comparative Analysis of The Legendborn Cycle and Arthurian Lore”

Advisor: Heather Hayton, English

The arrival of Tracy Deonn’s debut novel *Legendborn* (2020) follows a Black teenage girl, Bree Matthews, as she infiltrates the secret magical society she suspects of killing her mother. Between its compelling world-building and piercing exploration of grief, a single question echoes through the pages of this novel: Who gets to be a legend, and who decides what’s worth remembering?

The following thesis intends to identify why Black legacies are treated inferior to White ones even when they share a lineage. This will include a comparison of Deonn’s Legendborn Cycle series and Arthurian lore through the lens of critical race and postcolonial theories to explain why Bree’s gender and race prevent her and her legacy from being equally valued even though she is Arthur Pendragon’s direct descendant

Furthermore, the central texts will be investigated with the aim of understanding how race and gender influence each character’s role as king. These comparisons will be drawn with the intent of uncovering the costs of being a legend, and why the legacies of African American women are so deeply intertwined with misogyny and white supremacy.



August Hutchins, Luca Desear, Ayaam Ghimire, Samanyu Manjunath, Pranav Tripuraneni, and Efia Yeboah

“ECAR: Creating Community on Campus”

Advisor: Rhiannon Kelly, CPPSET

This semester ECAR has been hosting independent studies and internships for students who are interested in learning and getting more involved in the program. For the internship, there is an ECAR Program Assistant who is responsible for two community projects. There is also a book club centered around *American Refuge* by Diya Abdo. During these meetings, we analyze and discuss the different journeys of the many refugee families who have found refuge in housing through ECAR. We hope, by engaging in collective inquiry and discussion, to strip away misleading politics to reveal the tangible complexities of real human lives.

The final coloring book consists of 26 pages, each created by someone from the Guilford College and Greensboro community. Each page has a letter, fun fact, and coloring guide for the ECAR community and local partners to have and use as a resource.

For the ESOL tutoring kits, our goal is to create a supplemental guide for learning everyday English. We divided the kit into three main sections: flashcards, games, and books. With this, we can help strengthen the communication and comprehension skills of school-age children to help them adjust to education in the United States.



Maggie Mahanes

“Enhanced Gas Separation and Purification Using Lignin-Derived Nanoparticles in Mixed Matrix Membranes”

Advisor: Anne Glenn, Chemistry; Norman Chui, Chemistry (UNCG); Bernardo Castro-Dominguez, Chemical Engineering (Bath); and Eleni Sikou, Chemical Engineering (Bath)

Gas separation and purification are essential for carbon capture, biogas process, and producing high-quality gases for everyday use. While porous nanoparticles have high absorption capacities and gas selectivity; polymer membranes offer remarkable cost-effectiveness and energy efficiency. Consequently, the integration of nanoparticles into polymer membranes results in mixed matrix membranes (MMMs), which exhibit exceptional separation potential by combining adsorption and molecular sieving/size exclusion properties of both components. It was hypothesized that lignin, a biopolymer found in lignocellulose biomass waste, presents a valuable material for adsorption.

In this study, it was found that powdered polylactic acid (PLA), despite using different solvents, produced flaky specs of unusable polymer, whereas PLA in pellet form presented greater solubility challenges but was able to create membranes, albeit with imperfections. Cellulose acetate (CA) membranes were successfully synthesized using acetone and were subsequently used to create and test MMMs. This study suggests that the use of lignin-derived nanoparticles in MMMs not only enhances gas separation and purification processes but also offers a promising strategy to reduce waste sent to landfills and incineration, thereby contributing to environmental sustainability.



Ashley Linden

“One-Step Polyaniline-Platinum Nanoparticles Grafting on Porous Gold for Self-Powered Glucose Monitoring”

Advisor: Anne Glenn and Rob Whitnell, Chemistry

Bioelectronics, which integrates biological systems with electronic devices, holds immense potential for advancing medical diagnostics and therapies. Glucose fuel cells (GFCs) are emerging as a promising technology to provide sustainable and biocompatible power sources and can also enable self-powered glucose monitoring.

In this study, a non-enzymatic GFC on printed circuit board (PCB) is designed, where the nanocomposite electrode was fabricated using a rapid (less than one hour) one-step method involving the simultaneous electropolymerisation of polyaniline (PANI) and the in-situ formation and entrapment of Pt nanoparticles within the polymer matrix via chronopotentiometry onto a highly porous gold (hPG) surface. Physicochemical characterizations confirmed the preservation of the hPG porous structure post-PANI polymerisation, with an increased pore depth and uniform dispersion of Pt nanoparticles. The peak power was also maintained over three months of retesting.

These findings demonstrate a significant advancement in GFC technology for sensing and energy harvesting purposes; the high sensitivity towards glucose, along with the stable and high-performance power source for bioelectronic applications pave the way for practical and long-term use in medical diagnostics and therapies.

Charlie Miller, Max Bender, and Nova Hightower

“The *Greenleaf Review*: Making a Literary Magazine”

Advisor: Cynthia Nearman, English and Creative Writing

The *Greenleaf Review* is the Guilford College Student Run and Produced Literary Magazine. We received many different sorts of submissions this year, and hope to show off some of what our various contributors have put forth into the book this year, along with having some members of the staff up to talk about their experiences being apart of the organization. This should take the form of a collaborative panel that all are invited to sit in on, and ask questions if they would like.



Zakir Moore, Maddie Thaxton, Tessa Alton, Demetrio Candela-Habana, Therese Cote, Michael Cronan, Adrita Fuad, August Hutchins, Zoey Lesko, Kendal Lowe, Sam Muriel, Poomi Nguyen, Ty Pearson, Giselle Santander, Jaden Shively, George Wall, and Zoe Wang
“Exploring Pottery Glazes: The Intersection of Art and Chemistry”
Advisor: Hlly Peterson, ENVS; Charlie Tefft, Art

The Guilford College Spring 2025 Art and Science of Glaze class comprises a group of artists and scientists integrating scientific principles and artistic expression with respect to ceramic glazes to develop an understanding of how chemistry and art complement and strengthen each other to create beauty and deep understanding.

We’ve investigated the chemistry behind glazes, such as redox reactions, which play an important role in determining glaze colors during firing in the kiln. We’ve also analyzed the roles of key materials within a glaze, such as opacifiers, which affect glaze transparency and texture; glass formers, which determine the vitreous nature of a glaze; stabilizers, which control the fluidity of a glaze; and fluxes, which lower the melting temperature of a glaze. By investigating the chemical interactions between the different glaze materials, we can develop a deeper understanding of how each material affects the glaze’s color, texture, and durability and also predict the appearance of the glaze before it’s removed from the kiln.

Utilizing the scientific method, we have designed experiments that adjust the glaze recipe proportions of common glaze materials such as feldspars, silica, and alumina, as well as found materials, which are materials we have gathered from nature and our lives. We predict the appearance of the glaze using tools such as the unity molecular formula, which expresses the proportions of material oxides in molar ratios. The oxide ratios are then plotted on a Stull chart, which is a graph that predicts the appearance of a glaze based on the silica and alumina content with respect to the flux content.

Glazes undergo various scientific reactions, but can also respond differently depending on the object they are applied to and how they are applied. For instance, glaze can appear different on tall, narrow pieces compared to flat, wide ones, and will vary based on texture and the type of clay body used. Additionally, the method of application - whether painted, dipped, or sprayed - can significantly affect the final appearance. As a group, we will present test tiles and ceramic pots that feature various glazes, and recipes developed throughout the experiments we performed.



Alex Núñez Palomares, Emma He, and Anya Li
“Cleaning Up Trash With AI Robotic Technology”
Advisor: Chafic Bou-Saba, CTIS

Pollution in marine ecosystems poses a threat to aquatic life as organisms ingest plastic and harmful chemicals. Additionally, the presence of trash disrupts beach tourism and impacts local economies. In recent years, increasing amounts of waste have made their way into bodies of water, endangering ecosystems and posing a risk to public health. To combat the issue, our team is developing an AI-powered robot that autonomously collects and disposes of waste along coastlines in an efficient and effective manner.

Currently, nonprofit organizations and environmental groups lead a significant amount of clean-up efforts, relying heavily on volunteer labor. While these efforts are valuable, they are time-consuming, inefficient, and pose potential health risks, as volunteers may come into contact with contaminated materials. Furthermore, existing robotic waste collection technology is often bulky, difficult to transport, and lacks the ability to accurately detect and collect garbage.

The proposed solution is a compact, AI-driven robot designed to precisely navigate coastal areas while identifying and collecting various types of debris. Unlike current automated systems, which rely on movement through sand without distinguishing between objects, our robot uses advanced machine learning models for accurate detection. The system is designed to be low-cost, making it more accessible for widespread adoption.

Our research focuses on integrating deep learning models such as YOLOv5, PyTorch, and TensorFlow to enhance object detection accuracy. It also uses voice-controlled communication. The robot is equipped with two cameras and AI-powered vision to identify and sort small-scale trash by type.

Brady Odell
“Switzerland: The Nationalist Paradox”
Advisor: Phil Slaby, History

Switzerland is a country made up of a variety of different languages, cultures, and religious groups, yet over its 700 year history it has managed to develop a strong national identity. The concept of nationalism, on the other hand, arising from the French Revolution, relied on cultural or linguistic similarities to be the building blocks of a nation.

This presentation discusses how and when Switzerland went from a collection of allied states to one nation, all while preserving the cultural diversity of the Swiss people. It argues that the French occupation of Switzerland during the Napoleonic Wars and the French attempts to centralize Switzerland united the Swiss in opposition to French rule and in defense of their own traditions and values. The Swiss example seems, at first, to contradict the ideas at the heart of nationalism, and yet it displays how there is more than one path towards nationhood. In support of these claims I use multiple secondary sources focused on Swiss nationalism, Swiss history, and nationalism as a broader concept. I also reference primary sources such as the constitutions and treaties to illustrate the goals of the Swiss and their would be controllers. This topic tackles the ways in which nationalism develops, how people seek to exploit it, and how it can unite diverse groups in the interest of liberty and freedom.

William Oldham

“Understanding Next-Generation Firewalls: Palo Alto Networks Models and Capabilities”

Advisor: Chafic Bou-Saba, CTIS

Next-Generation Firewalls (NGFWs) are essential in modern cybersecurity, providing advanced threat prevention, deep visibility, and granular control over network traffic. This presentation focuses on educating attendees about NGFW technology, the latest and current models from Palo Alto Networks, and their practical applications in enterprise security.

We begin with an overview of NGFW fundamentals, explaining how these firewalls differ from traditional stateful firewalls by integrating deep packet inspection, intrusion prevention, and application-aware security policies. Next, we examine Palo Alto Networks’ firewall architecture, including hardware and virtualized solutions designed for on-premises, cloud, and hybrid environments.

Rolando Ortiz Parada

“Mono de Calenda”

Advisor: Mark Dixon, Art

A Mono de Calenda is a giant puppet that originates from Oaxaca, Mexico. It is used to dance at big celebrations, like weddings or important birthday parties. When the puppet is used, someone inside controls it and it is marched and danced around the dance floor. The dress and other accessories are based on the gala-type dress called Tehuana. The Tehuana originates from Tehuantepec, a city in the southeastern part of Oaxaca. The dress was invented when women started to gain financial independence, where they sold their products like handmade *rebozos* or clothes in the market. This dress is now used in a traditional dance called *Son Calenda* which features a group of women dancing in sync to symbolize their independence and elegance.

The maker is a student at Guilford College whose mother dances *Son Calenda*, and a father has made *maramotas* (another tool used to celebrate in parties). Growing up with these two parents has led him to want to make a Mono de Calenda since he was little until he was able to during a woodshop and sculpture class. He chose to follow the traditional method of making the dolls as they would in Oaxaca, with bamboo as the base, tying the bamboo together for stability and strength, and using chicken wire and *papier-mâché* to make the head of the doll.



Mike Payne

“NoteShare: A Collaborative Information Sharing Engine”

Advisor: Chafic Bou-Saba, CTIS

Demonstrating a system that has been constructed for sharing information across an organization.

Rogelio Pérez Montero

“Enhancing Food Bank Efficiency: A Web-Based Solution for Real-Time Inventory Management and Distribution Optimization”

Advisor: Rob Whitnell, CTIS

Food insecurity remains a pressing global challenge, affecting approximately 2.33 billion people worldwide. Despite advancements in food production, many individuals still lack consistent access to safe and nutritious food. Food banks serve as a critical resource in combating hunger, yet they often face operational inefficiencies that hinder their effectiveness. Challenges such as outdated inventory management systems, logistical hurdles, and slow response times contribute to food waste and unfulfilled demand. This thesis explores a web-based application designed to enhance food bank operations by enabling real-time inventory tracking and optimized resource distribution. Through systems analysis, this research aims to develop a solution that streamlines food bank processes and improves accuracy in inventory management. Ultimately, making food banks respond to food insecurity faster, more efficiently, and better equipped to meet the growing demands.

Carlos Ramírez Morales

“Survivors End: A Capstone Game Development Journey”

Advisor: Chafic Bou-Saba, CTIS

“Survivors End” is a 2D pixel art action game developed in Unity as part of my capstone project. The game features both single-player and multiplayer modes, utilizing Unity’s Netcode for GameObjects for peer-to-peer networking. Players must navigate a post-apocalyptic world, making combat choices that impact survival.

The development process involved designing core mechanics, implementing character abilities, and managing player interactions in a networked environment. Key technical challenges that were faced included multiplayer synchronization, character selection, and game state management. The UI development, sprite integration, and performance optimization were also crucial in ensuring a smooth gameplay experience.



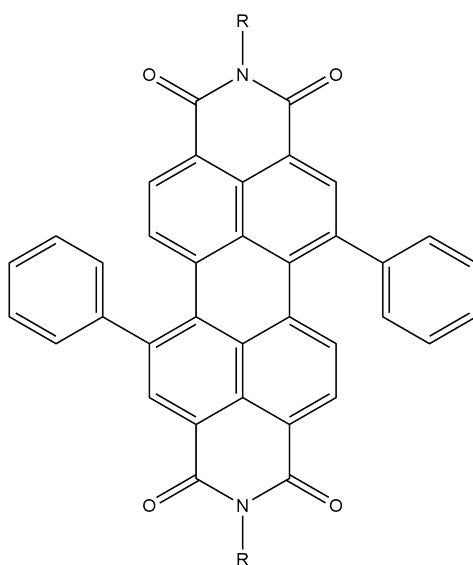
Carlos Ramírez Morales
“Internship Experience at ITS Helpdesk”
Advisor: Isaac Magaña, CTIS

This presentation will share my hands-on experience at the ITS Helpdesk and how I contributed to providing support for students and staff. I'll discuss my work in troubleshooting hardware and software issues, managing support tickets, and assisting with network and printing problems.

Ryan Sengupta, Chrisbel Alcantara, Vihaan Mitra, Foy Lane, and Evan Huemmer
“Synthesis of Novel Perylene Diimides with Aromatic Bay Substituents Through Suzuki Coupling”
Advisor: Anne Glenn and Rob Whitnell, Chemistry

Perylenetetracarboxylic dianhydride (PTCDA) is a commonly used synthetic precursor to a large class of dyes called perylene dyes. Perylene diimides (PDIs) are known to have a high ability to absorb light and accept electrons due to their large conjugated systems. Due to these properties, they are often used industrially as dyes and are studied for their uses in photovoltaic cells. Our research is focused on investigating the effects of varying imide and bay area substituents on the solubility and electrical properties of perylene diimides through computational methods and through synthesis. Computational methods can be used to estimate the molecular orbitals of a compound, such as a perylene diimide derivative, which can then be used to calculate the difference between the highest occupied molecular orbital and the lowest unoccupied molecular orbital, often abbreviated as the HOMO-LUMO gap. This value has an important effect on the range of light that a compound can absorb and estimating it can provide an insight into the properties of the compound, such as its electronic properties and light absorption spectrum. Perylene diimides can also be synthesized from PTCDA and amines at high temperatures in an anhydrous environment.

These PDIs can then be nitrated at the bay areas, which allows for the replacement of the nitro groups with an aromatic substituent through Suzuki coupling reactions. Synthesizing bay-substituted PDIs allows for empirical testing of electronic properties through visible light and fluorescence spectroscopy. We expect that aromatic bay substituents would decrease the HOMO-LUMO gap, leading to higher light absorption efficiency and a shift in the absorption spectrum towards lower energy wavelengths.

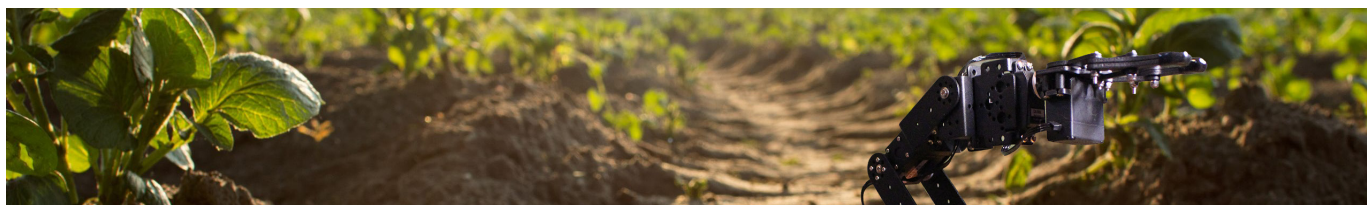


Double bay-substituted PDI with aromatic substituents

Sarah Sheets and Evan Wong
“Eco-Tank Robot”
Advisor: Chafic Bou-Saba, CTIS

Agriculture is an essential part of our economy. Through the use of robotics and networking, our eco-tank robot is designed to collect trash, rocks, and debris that can be harmful to livestock and nature. It will also provide the functionality of testing the humidity levels in soil, ensuring the best moisture levels for plant production. In addition, a multi-gas sensor, and several other sensors will also be included for detecting a wide range of gases such as toluene gas, hydrogen, nitrogen dioxide, carbon dioxide, ozone, carbon monoxide, and methane, in order to test the air quality. An air temperature and humidity sensor will also be installed, to give feedback on the current weather conditions.

With the use of a camera module attached to the tank chassis, we will be able to see what is in front of the robot, even from a distance. An ultrasonic sensor provides obstacle detection, including the future possibility for the robot to become fully autonomous. The eco-tank robot provides room for expansion and growth well into the future. As our world is constantly changing, it is important to be mindful and aware of the various forms of pollution that can be harmful to both animals and humans.



Ishaan Sinha, Ashritha Chinapaga, Landon Metzler, Ohm Patel, and Olivia Rudolph
“Usage of 3,4,9,10-perylenetetracarboxylic dianhydride (PTCDA) in Volatile Organic Compound (VOC) Detection”
Advisor: Anne Glenn and Rob Whitnell, Chemistry

VOC detection in the environment is important as it detects the quality of the air and helps keep both the environment and people safe. However, conventional sensors often struggle with achieving high sensitivity and selectivity. We specifically wanted to hone in on a way to better detect acetone, ethanol, methanol, and benzene.

The use of 3,4,9,10-perylenetetracarboxylic dianhydride (PTCDA) in volatile organic compound (VOC) detection presents a promising approach to advancing sensor technologies. PTCDA is a well-known organic semiconductor for solar panels; with excellent electron transport properties, high chemical stability, and strong surface functionalization capability, this makes it an ideal candidate for selective gas detection. In sensor applications, PTCDA is usually used as a sensing layer in chemiresistive or optical sensors. When VOC molecules interact with the surface of PTCDA, they change the material’s electrical properties, resistance and conductivity, which then can be measured to identify and quantify VOC. By using these properties, PTCDA-based sensors can be engineered to detect specific VOCs with high sensitivity. This would allow for improved sensor detection in industrial applications and allow for improved environment monitoring.

We plan to continue researching ways to optimize PTCDA and plan to expand the different types of VOC we use, and we are also working on molecularly altering the PTCDA and compare the effectiveness of it through UV-visible spectroscopy.

Farrah Wilde

“Guilford College Art Theses Online Repository”

Advisor: Gwen Erickson, Guilford College Archives; Will Thomas, Art

With the knowledge that there is no public repository specifically for senior theses created by BA and BFA students at Guilford College, I have designed a beta JSTOR Forum Project within the backend of the College’s online institutional repository which includes several different cataloging fields, including digital representations of the physical works, descriptions of medium, graduation year, and thesis exhibition titles. I believe the art field is overlooked at times or seen as less rewarding than other majors. The truth is that art is such a meaningful form of communication in which you are uniquely welcomed into the mind of the creator. It’s important the beautiful minds of this institution’s art students be recognized and made accessible to anyone. My hopes for this online archive are for it to continue long after my time here at Guilford, and for it to become a permanent showcase for all art thesis alumni.



CREDITS

Design and layout: William Kelly

All text, except abstracts, was written by William Kelly, Tierney Steelberg, Garrett Collins, and probably a couple more people over the years. We are grateful to all who read the final product in advance and noted any errors.

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Page 26: Barn swallows in a mud nest, from [Colorado Virtual Library](#)

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Page 37: Sarah Sheets and Evan Wong

Page 38: Farrah Wilde

Thank you to all who presented, attended, and volunteered!

We'll see you in 2026!