2025 Honors Research Symposium

November 21, 2025

1:15pm-2:00pm Check-in & Networking Event

2:00pm - 6:30 pm Speakers, Presentations, & Reception

The Dubois Center

Welcome to the 2025 Honors Research Symposium!

The Honors College, in collaboration with the Office of Undergraduate Research (OUR) hosts the Honors Research Symposium each Fall semester. This annual event is a unique opportunity for undergraduate honors students and OUR students to present the results of their inquiry or research to the UNC Charlotte community.

We encourage you to actively listen to the student presenters, learn, ask curious and insightful questions, and provide supportive feedback. Please enjoy this program to learn more about the poster, oral, roundtable, and virtual presentations.

Thank you for supporting the presenters!

Honors College
https://honorscollege.charlotte.edu/honors-research-symposium/

Office of Undergraduate Research (OUR)
https://our.charlotte.edu/

Virtual Platform
https://symposium.foragerone.com/2025-honors-symposium/

Event Schedule

1:15-2:00	**Check in** *(Lobby - 1st Floor)* **Networking Event** Research discussions with community partners and alumni *(Ideation Lab - 1st Floor)*
2:15-2:35	**Opening Remarks** Dr. Deborah S. K. Thomas *(Auditorium - 2nd floor)*
2:35-2:50	**Transition**
2:50-3:50	**Student presentations** - **Concurrent Session 1** *Oral Presentations (8th/9th floor), Posters (9th floor), Roundtables (11th floor)*
3:50-4:00	**Transition**
4:00-5:00	**Student presentations** - **Concurrent Session 2** *Oral Presentations (8th/9th floor), Posters (9th floor), Roundtables (11th floor)*
5:00-5:10	**Transition**
5:10-5:45	**Keynote Speaker** Dr. Susan Trammell *(Auditorium - 2nd floor)*
5:45-6:30	**Networking Reception** *(Atrium - 2nd floor)*

Guest Speakers ~ *Auditorium*

Opening Remarks (2:15 pm - 2:35 pm)

Dr. Deborah S.K. Thomas, Associate Vice Chancellor for Research and Professor of Geography at UNC Charlotte. In this role, she oversees operations and special initiatives for research and innovation across the university. Her research focuses on disasters and environmental health with more than 25 years of experience in the social science application of geographic information science & technology (GIS&T). She was a Fulbright Scholar to Middle East Technical University in Ankara, Turkey in 2005, and continues to work in global environmental health in Tanzania as part of a 15-year partnership with the School of Public Health at the Catholic University of Health and Allied Sciences in Mwanza, Tanzania.

Keynote Speaker (5:10 pm - 5:45 pm)

Dr. Susan Trammell, Professor in the Department of Physics and Optical Science at UNC Charlotte, will share her journey into the field of science, the importance of research, and the impact of her work. Dr. Trammell received her undergraduate degree in Physics with Highest Honors from the University of North Carolina at Chapel Hill and her MA and PhD in Astronomy/Astrophysics from the University of Texas at Austin. After completing her graduate work, she was awarded a Grainger Postdoctoral Research Fellowship in the Department of Physics at the University of Chicago. Most recently, Dr. Trammell has applied her expertise in spectroscopy and imaging to the field of biomedical imaging. Her research group is developing a new technique called light-assisted drying to create amorphous sugar matrices for the preservation of temperature sensitive biologics such as vaccines and protein-based therapeutics. Her group has also developed an intraoperative imaging modality, enhanced thermal imaging, for cancer margin delineation and monitoring blood perfusion during and after microsurgery.

Networking Event

1:15-2:00 pm ~ Ideation Lab

Attention Student Attendees & Presenters!

*After you check in, stop by the **Ideation Lab** (1st floor behind the information desk in the lobby), for the networking and tabling event!*

Ask the experts! *How will research help me in my future career? What can I do to get involved in research? How do I get funding for research or graduate school? How can I get published? What research did you conduct?*

Community Partners & Alumni
Doaha Awad ~ Class of 2021 & 2025, Biomedical Research
Jamie Beason ~ Class of 2008, Trane Technologies
Tamara Johnson ~ Director of urbanCore
Misty Morin ~ Class of 2019, Levine Scholars Program - Alumni Engagement and Communications Specialist

ETHEL Journal (OUR)
Eric Millard ~ ETHEL Faculty Director, Assistant Professor of Trumpet
Arnav Sareen ~ ETHEL Editor in Chief, Levine Scholars Program, Computer Science & Data Science
Ridthi Patel ~ ETHEL Podcast Director, Biology

HONR 2720: Competitive Scholarship Workshop
Andrew Keener ~ Assistant Director, Nationally Competitive Awards & Advising, Honors College

Undergraduate Research Conference (URC) at Charlotte
Mikayla King, Biology & Public Health
Shaina Bothra, Pre-Business Administration

A "**roundtable**" is an interactive type of conference presentation format where 1-3 presenters sit around a table (usually round, but rectangular works!) to discuss their projects with a small group of attendees. There may be one or more circles of chairs around the table for the attendees. Presenters share an overview of their inquiry project and actively engage with the audience through Q&A.

Session A - Room 1104
How Dangerous Can Procrastination Be?
Luke DeVries
Mentor: Cindy Gilson

Screens and Attention Spans
Taylor McHone
Mentor: Andrew Keener

Session B - Room 1102
Gifted But Not Equal: From Early Education to Honors Colleges
Morgan Funches
Mentor: Cindy Gilson

Mentorship Is Crucial: The Benefits of Structured Mentorship for Honors and Gifted Students Compared to Those Without
Khristian Woodard
Mentor: Cindy Gilson

Student Presentations
2:50-3:50 pm ~ Concurrent Session 1
Oral Presentations

Session A - Room 801

Emotional Interfaces: The Role of Memory, Emotion, and Perception in Web Design
Jhania Vitalis
Mentor: Marlon Mejias, Anita Blanchard

Emotional Overload on Social Media: Desensitivity as Related to the Palestine Occupation
Zoha Ali
Mentor: Andrew Keener

Digital Consumer Power: How Eco-Conscious Youth are Redefining Corporate Social Responsibility in the Fashion Industry
Jadyn Malawski
Mentor: Melinda Adnot, Valerie Reynolds, Mattew Metzgar

Session B - Room 804

The Identification of Twice-Exceptionality and Examining Barriers to Identification
Kai Norris
Mentor: Melinda Adnot, Cindy Gilson, Kristi Godfrey-Hurrell

Aren't You Supposed to be a Genius? Representations of Autism Spectrum Disorder in TV and Film and Effects on Audience Perceptions
Audrey King
Mentor: Mindy Adnot, Vaughn Schmutz, Sidney Beeman

The Effects of Latino Misrepresentation in Film on Audience's Perceptions of Real-World Latinos
Cristina Juarez
Mentor: Mindy Adnot, Paloma Fernandez Sanchez, Will Davis

Session C - Room 805

The Impact of Growth Mindset for Honors and Gifted Learners
Wallace Love
Mentor: Cindy Gilson

What are the Impacts of Growing Up in Academically Gifted Programs? How do Accelerated Learning Programs Affect Motivation, Psychological Well Being and Creativity?
Zion Long
Mentor: Melinda Adnot, Cindy Gilson, Michael Matthews

Understanding the Variability of Total Response Techniques (TRTs): A Qualitative Study of Teachers' Perceptions of Their Practice
Livie Apple
Mentor: Hilary Dack, Mindy Adnot, Holly Johnson

Session D- Room 806

Developing a Global MITgcm Framework for Modeling Microplastic Transport
Sam Phillips
Mentor: Roger Tipton

A Reconstruction Journey: Life After a Natural Disaster
Laisa Mena Rivera
Mentor: Shen-En Chen, Tina Shull, Melinda Adnot

Geospatial Deep Learning Algorithm Utilizing High Human Activity Zones to Predict Malaria Transmission in Southern Africa
Natasha Kroll
Mentor: Yao Li

Session E - Room 905

Borders, Hybridity, and Third Space: How Ahmet Kaya's Exile Shapes Kurdish Advocacy in "Siz Yanmayın (Sürgün)"
Zara Ozer
Mentor: Rowney, Meneses

Doors of Light and Shadow: Spatial Liminality and Migration in Mohsin Hamid's *Exit West*
Amna Noyal
Mentor: Matthew Rowney

Re-evaluation Authorship in the Work of Alfonso Reyes
Genesis Dominguez, Cat Beck
Mentor: Donald Cross

Student Presentations
2:50-3:50 pm ~ Concurrent Session 1
Poster Presentations

Poster Session A, Room 901

Osteobiography and the Ethical Dilemmas of Skeletal Collections
Mayah Clark
Mentor: Sara Juengst

Integration of a Coaxial Nozzle and Fiber Feeding System for Multi-Component Direct Ink Writing (DIW) Printing
Neal Zalomek
Mentor: Erina Joyee

Designing and Programming Autonomous Fly4Future Drones through ROS2
Sujjay Karthikeyan
Mentor: Ran Zhang

Easing the Burden on Gifted/Honors Educators through Artificial Intelligence
Shanthi Pillai
Mentor: Cindy Gilson

Poster Session A, Room 901

Aging in the Correctional System: Challenges and Policy Solutions
Jada Clark
Mentor: Megan Smith

How Can Artificial Intelligence (AI) and Gifted Pedagogy Be Used to Personalize Learning for Honors Students
Pearl Patel
Mentor: Cindy Gilson

Influence of Undergraduate Education on Nursing Students' Knowledge, Attitudes, and Perceptions of Older Adults
Sean Nguyen
Mentor: Lufei Young, Jyotsana Parajuli, Susan Lynch

Synoptic Analysis of Heatwaves in the Charlotte Metropolitan Region
Victor Avila
Mentor: Matthew Eastin

Improving Health Outcomes for Black Women in Mecklenburg County
Saniya Young
Mentor: Nicole Peterson

Modeling Moretti: Architectural Analysis of Fascist Italy
Jordan Harrelson
Mentor: Jeffrey Balmer

Mapping Strengths: Addressing Maternal Health Disparities In Eight North Carolina Counties
Salina Khadka
Mentor: Allissa Desloge, Alicia Dahl

Path Planning of Autonomous Robots in Uncertain Environments
Gilberto Feliu
Mentor: Dipankar Maity

Poster Session A, Room 901

School Choice Policy and Students with Disabilities
Alyssa Fowler
Mentor: Jason Giersch

How Does the Structure and Prioritization of Gifted and Honors Education Differ in Developed and Developing Countries Around the World?
Isabella Mariani
Mentor: Cindy Gilson

Visualizing Congress: A Hands-On Approach to Learning Data Structures
Eric Fackelman
Mentor: Kalpathi Subramanian, Erik Saule

Poster Session B, Room 904

Gust Alleviation on Aircraft Wings
Nazim Sait
Mentor: Arun Babu

From Pixels to Prognosis: Using Deep Learning to Explore Placenta Pathology
Nithyashree Prabakaran
Mentor: Farah Deeba

Exploring the Effect of Interfaces upon Thermal and Ionic Transport in Superlattice Perovskites Using Atomistic Simulations
Nizam Sait
Mentor: Xiang Chen

How May Perfectionism Lead Gifted and Honors Students to Fail, and How May this be Prevented?
Jeevan Liu
Mentor: Cindy Gilson

Poster Session B, Room 904

Rewiring Through Trauma: Familial Abuse, Neural Development, and Psychiatric Outcomes in Adolescence
Abby Malembi
Mentor: Erika Montanaro

Student Food Security: An All-Encompassing Resource for UNC Charlotte Students
Rebecca Tirko
Mentor: Jessica DeMarco, Alicia Dahl

"They Just Don't Understand" Exploring the Barriers to Effective Communication of Mental Health Issues Among Children of Displaced Families
Say Paw
Mentor: Alicia Dahl, Jessamyn Moxie

Childhood Trauma and Cognitive Function: Role of Optimism and Psychotropic Medication
Divya Agarwal
Mentor: Jeanette Bennett

Poster Session C, Room 906

How Does a Parent's Perception of Giftedness Affect Their Student's Placement in Both Honors and Gifted Programs?
Nathan Hobgood
Mentor: Cindy Gilson

SEM Characterization of Crushed Battery Electrode Surfaces
Bruno Salvi, Jake Kaupang
Mentor: Anthony Bombik

Poster Session C, Room 906

Evaluating the impacts of Bakers Mountain on the Structure and Strength of Storm Cells

Josiah Allen

Mentor: Matthew Eastin

Robot Path Planning Using Screw Linear Interpolation

Sean Devlin

Mentor: Srinivas Akella

The Habitat Preferences of Juvenile Northern Dusky Salamanders Along an Urban Gradient

Emma Miller

Mentor: Sara Gagné

Perfectionism within Honors and Gifted Students

Liv Bailey

Mentor: Cindy Gilson

Advancing the Labor Force Participation of Charlotte's Latino Mothers and Fathers: Examining Intersecting Employment & Child Care Sector Opportunities and Barriers

Daniela Rivera

Mentor: Stephanie Potochnick

Bridging the Gap: Training Correctional Officers to Support Aging Inmates

Kyler Osby

Mentor: Megan Smith

Student Presentations
4:00-5:00 pm ~ Concurrent Session 2
Roundtables

Session A - Room 1104

Political Economy of Policing
Akshara Sisodiya, Sarah Nti, Mariana Guzman
Mentor: Martin Shuster

Session B - Room 1102

AI Data Centers & Environmental Racism
Emsley Jackson
Mentor: Andrew Keener

Reality Television and the Effect of Restrictive Requirements
Kaylen Massey
Mentor: Andrew Keener

Session F - Room 801

Indigenous Inspirations: The Role of Alcohol and Western Notions of Indigeneity in Japanese Colonialism and Ainu Life in Hokkaido, 1869-1899
Foster Duckworth
Mentor: Maren Ehlers, Carol Higham, Steven Sabol

Lengua nicaragüense: **Deterrence of audience as a rhetorical technique**
Jeffrey Wang
Mentor: Ashli Stokes

Forming the Great Smoky Mountains National Park: Long-Term Economic and Social Impacts
Hunter Ball
Mentor: Mindy Adnot, Ashli Stokes, Mark Wilson

Session G - Room 804

Evaluating Social Isolation and Loneliness in the Charlotte Community with Love in Action Project Inc
Jahdoi Russell, Asya Crisp
Mentor: Tawanda Robbins

Shaping Families & Identities: Parenting Through the Lens of Race and Culture
Kennedy Frink
Mentor: Mindy Adnot, Kendra Jason, Victoria Rankin

How Do Early Gendered Messages in the Household and Broader Society Shape Women's Financial Literacy and Investment Behaviors Later in Life?
Gabriella Osorio, Malimi Fernando
Mentor: Jennifer Ames Stuart, Melinda Adnot, Stephanie Bradley, Gene Lai

Session H - Room 805

Solar-Powered Self-Sustainable UAV Communication Networks with Fixed-Wing UAVs
Mohammad Hasan
Mentor: Ran Zhang

Counting Symmetries: Criteria for Cyclic Groups
Patrick Ireland
Mentor: Evan Houston

Analysis and testing of a curve-fitting algorithm by a step function
Nour Al Deen El Hatto
Mentor: Sebastien Bossu

Session I - Room 806

Global Health Lessons from the Blue Zones
Amaya Clark
Mentor: Mindy Adnot, Tracy Bonoffski, and Shankari Somayaji

Does Chronic Stress From Adverse Childhood Experiences Influence the Risk of Developing Obesity in Adulthood?
Abby LaPolla
Mentor: Mindy Adnot, Tracy Bonoffski, Daheia Barr-Anderson

Role of Religious Morality in U.S. Democratic Governance
John Hand
Mentor: Mark Sanders, Stephen Cheyney, Melinda Adnot

Session J - Room 905

Cultural Capital and On-Time College Enrollment
Luis Tejada
Mentor: Vaughn Schmutz

The Impact of Redlining on Black Wealth
Morgan Hatcher
Mentor: Mindy Adnot, Chris Cameron, Kendra Jason

A Musical Time Capsule: How Music Triggers Nostalgia, Emotion, and Memory
Shykera Spencer
Mentor: Mindy Adnot, Dylan Savage, Kathleen Burke

Session D - Room 901

How Might AI Assess Academic Potential, Personalize Instruction, and Track Growth in Honors and Gifted Education
Neal Zalomek
Mentor: Cindy Gilson

A Novel, Modular, Gaging System for Teaching Geometric Dimensioning and Tolerancing
Zoette Francis
Mentor: Jaime Berez

Utilization of Lipid Anchor Analogue Probes to Study Bacterial Glycan Assembly
Morgan Barnette
Mentor: Jerry Troutman

TickBusters: Investigating tick-borne diseases in North Carolina
Wynn Oo
Mentor: Rafael Felipe Da Costa Vieira

Session D - Room 901

Investigation & Analysis of Workforce Development Programs in Rural Southeast America
Jordan Dunn
Mentor: Mentors: Cody M. Cocchi & Clarence Anthony, Jr.,

Investigation & Analysis of Workforce Development Programs in Rural Southeast America - The Economic Impact of "Brain Drain"
Lena Ayesh
Mentor: Sarah Powell, Cody Cocchi

Classical Computing Approaches to Solving Polyomino Sliding Puzzles
Batman Whiteside
Mentor: Mahmoud Dinar, Aileen Benedict, Li Yang

Examining employment & child care sector opportunities and barriers of Latino Parents
Yerang Cho
Mentor: Stephanie Potochnick

From Hunan to Taipei: Deconstructing General Tso's Chicken as Culinary Translation
Isaac Lainez
Mentor: Ashli Stokes

Intelligent Robot-Assisted Finishing System for Post-Processing of Metal Additive Manufactured Components
Patrick Guinan
Mentor: Jose Martins Do Outeiro, Ahmed Razin

An Observational Study of Physical Accessibility Issues at Three Campuses in the UNC System
Sneha Sannanarappar
Mentor: Alicia Dahl

Session D - Room 901

Gifted and Honors Students' Academic Success: Motivation and Underachievement
Alison Vang
Mentor: Cindy Gilson

Wearable Flexible Sensor for Performance Management
Shrushti Gandas
Mentor: Roger Tipton

Women Printers and Religious Domestic Publishing in Early Modern France and Europe
Abeer Saleem Naznin
Mentor: Amanda Pipkin

Inhibition of Oncogenic KRAS Decreases Vesicular Stomatitis Virus Replication in Pancreatic Ductal Adenocarcinoma
Irakli Mataradze
Mentor: Valery Grdzelishvili

Session E- Room 904

Examining Signal-Text Contrastive Alignment for mmWave-based Zero-shot Human Activity Recognition
Andrew Morgan
Mentor: Hongfei Xue, Pu Wang, Minwoo Lee

Stream Restoration and Genetic Connectivity of Dragonflies in Charlotte-Mecklenburg
Avery Taylor
Mentor: Sandra Clinton

Retrofitting Polymer 3D Printers for Fabrication of Ceramic Components
Mary Elizabeth Zifchak
Mentor: Lynnora Grant

Session E- Room 904

Strains to Strength: A Workshop Series on Workforce Emergency Preparedness in Health Systems
Eunice Okyere
Mentor: Alicia Dahl, George Shaw, Robert Fox, Faith Neale

Honors vs. Gifted Students: Personality Impact on Learning Preferences
Aryan Hira
Mentor: Cindy Gilson

Pho: Why it Can be Considered a Global Dish/Recipe
H-Muer Kpa
Mentor: Ashli Quesinberry Stokes

CFD analysis of Steady and Transient Analysis of NACA 0012 Airfoil using STARCCM+
Haryshwa Bipin
Mentor: Arun Vishnu Suresh Babu

Session F - Room 906

Macroinvertebrate Abundance and Diversity in Toby Creek, a Restored Urban Stream
Devin Estep
Mentor: Sandra Clinton

Locked Out Potential: Identifying and Remedying the Causes of the Underrepresentation of Hispanic Students in Gifted and Honors Education
Bruno Salvi
Mentor: Cindy Gilson

Session F - Room 906

2e in Gifted and Honors
Evan Santaniello
Mentor: Cindy Gilson

Decisions in Family Planning and Contraception With a Focus on Educating College Students
Lelana Truong
Mentor: Alicia Dahl, Lorenzo Hopper

Removing "Forever Chemicals" (PFAS) from Drinking Water by Filtration
Rokia Sissoko
Mentor: Mei Sun

Enhancing Classroom Speech Transcription with AI: Evaluating Large Language Models in the getOTR Project
Ritvik Manem
Mentor: Shawnee Wakeman

Simplifying Causal Extraction and Inference in Computational Social Science using Agentic AI Frameworks
Abhinav Biju
Mentor: Siddharth Krishnan

Revising for a Reason: Impacts from First Draft to Final
Haley Essen
Mentor: Madelyn Colonnese

Healing on Wheels – Analyzing the Impact of Delivering Care Through Mobile Health Units for Underserved Populations
Savannah Alexander
Mentor: Angela Lamb, Laura Magennis

Student Online Only Presentations

Virtual Platform

https://symposium.foragerone.com/2025-honors-symposium/

Barriers for Twice-Exceptional Students in Honors and Gifted Education
Siennah Greenawalt
Mentor: Cindy Gilson

Understanding the History of Planned Communities and the Impact of Post Hurricane Helene in Swannanoa
Kaylie Vong
Mentor: Emily Makas

2e in Gifted and Honors
Evan Santaniello
Mentor: Cindy Gilson

The fields of gifted and honors education provide important information on how to identify and aid students who both struggle and thrive in their academics. Interesting research intersecting gifted and honors fields is how being twice exceptional affects students academically. The literature indicates that twice exceptional students are often underidentified, are not properly supported by teachers in the classroom, and could benefit from different education styles. This project is important because these students are hindered by the education system due to a lack of awareness of their struggles and the ways to solve them. The anticipated results will bring further clarity to the field of 2e students in gifted and honors programs, so that they can enhance their academic experience. My inquiry question is "How does being twice exceptional affect honors and gifted students in an academic setting. To answer my inquiry question, I identified experts in the field, looked at some of their publications, synthesized research reports, and reviewed videos and book chapters from reputable sources. These sources were identified as credible by using the CRAAP method. This project is still in progress; however, I anticipate that the answer to my inquiry question will likely be professional training for all educators and differentiated learning to cater to both the skills and needs of twice exceptional students, which will greatly aid in their education. In conclusion, the results of this project will be especially useful for educators at all levels who are undertrained on how to handle a 2e (twice exceptional) student. As a result, this will help the 2e students themselves as they will be able to find better support to fit their unique needs in the classroom.

A Musical Time Capsule: How Music Triggers Nostalgia, Emotion, and Memory
Shykera Spencer
Mentor: Dr. Mindy Adnot, Dr. Dylan Savage, and Professor Kathleen Burke

Music is deeply embedded in everyday life, influencing emotions, memory, and identity across diverse social and cultural contexts. Despite its constant presence, from films and social events to personal moments, its psychological impact is often overlooked. This research explores how music shapes emotional responses and perceptions by examining four interconnected factors: sociocultural influences, musical elements, contextual factors, and autobiographical memory. Through an extensive literature review and six-session seminar series, this project examines how music can evoke powerful emotions, retrieve memories, especially from childhood and adolescence, and support overall emotional well-being. Seminar participants engaged in open discussions, shared listening, and personal reflections to explore the psychological and cultural explanations for why certain musical pieces resonate so deeply and how they become "time capsules" to moments in one's life. Findings from psychology, sociology, neuroscience, and musicology disciplines assert that music preserves emotionally charged memories and continues to influence self-understanding and resilience over time. Drawing from both theoretical perspectives and lived experiences, the findings reveal that music strengthens emotional regulation, memory recall, and social connection. It also serves as a natural form of emotional processing, fostering comfort, healing, and personal growth through connection to meaningful past experiences. Recognizing this connection offers meaningful applications in education, therapy, and everyday practices by showing how engagement with music can promote emotional health and a stronger sense of identity across the lifespan.

A Novel, Modular, Gaging System for Teaching Geometric Dimensioning and Tolerancing
Zoette Francis
Mentor: Jaime Berez

Geometric dimensioning and tolerancing (GD&T) is a system of symbols and definitions essential for designing and manufacturing accurate engineering components. Conventional engineering curricula often fall short of preparing students for the level of GD&T proficiency expected by employers. This is largely due to a lack of time, insufficient instructor training, and limited instructional tools. This project aims to bridge this gap through the design of a modular gaging system that demonstrates core concepts of GD&T that are typically challenging to visualize. The gaging system consists of a baseplate with a grid of threaded holes and interchangeable 3D printed components. Utilizing 3D printing allows for the rapid manufacturing of components that need to vary in size and function to adapt to individual workpieces. This work-in-progress is intended to provide a classroom tool that instructors value as being practical, inexpensive, and easy to replicate. Initial results will be shared via limited case studies designed to test ease of use while providing insight into the impact on student comprehension of GD&T concepts.

A Reconstruction Journey: Life After a Natural Disaster
Laisa Mena Rivera
Mentor: Dr. Shen-En Chen, Dr. Tina Shull, Dr. Mindy Adnot

Natural disasters, including wildfires, earthquakes, hurricanes, tornadoes, tsunamis, etc., can cause widespread devastation and destruction of infrastructure, impacting the livelihoods of people and communities. Annually, natural disasters cost the United States billions of dollars in financial losses. With climate change causing the intensity and frequency of these disasters to increase in recent years, effective reconstruction and recovery have become more critical than ever, especially in the matter of reducing human suffering during disasters. This literature review examines factors affecting resilience and recovery from both infrastructure and community
perspectives. The resilience curve, which tracks the functional performance of systems over time following a disaster, is a useful approach to quantify recovery efforts and duration. In this study, it will be used to illustrate and analyze the key parameters that influence resilience by mapping how recovery interventions change the curve's trajectory. This literature review also explores
various reconstruction approaches and frameworks, such as top-down, bottom-up, holistic approaches, Disaster Life Cycle, the Build Back Better, the Sendai Framework, etc. The common parameters that affect resilience will be identified. To help readers better appreciate these frameworks, the resilience curve for the Lansing private bridge reconstruction project will be constructed and presented. Using the resilience curve, factors that contribute positively or negatively are readily demonstrated. The goal of this study is to show that the resilience curve is an effective tool that can be used during disaster recovery.

Advancing the Labor Force Participation of Charlotte's Latino Mothers and Fathers: Examining Intersecting Employment & Child Care Sector Opportunities and Barriers
Daniela Rivera
Mentor: Stephanie Potochnick

Latino immigrant families are an integral part of the Charlotte community, yet many face barriers to economic opportunity. Latina mothers, in particular, are less likely to participate in the labor force than other mothers, while Latino fathers often work long hours in low-wage jobs that limit family time and increase financial stress. Accessing reliable childcare is also difficult, especially for parents with non-standard work hours. This study examines how employment and childcare systems shape the experiences of Latino immigrant parents in Charlotte, with the goal of identifying opportunities for change. Using a community-based, mixed-methods approach, the research team analyzed survey data and conducted focus groups and interviews with Latino parents to better understand their employment and caregiving experiences. As a student researcher, I transcribed and translated interviews with Latino parents and am currently coding them to identify common themes using the qualitative software NVivo. These findings will be used to create accessible fact sheets with recommendations for organizations that support Latino families. This research is important because it amplifies the voices of an underrepresented population and aims to improve services that support their well-being, financial stability, and upward mobility.

Aging in the Correctional System: Challenges and Policy Solutions
Jada Clark
Mentor: Dr. Megan Smith

Aging inmates in correctional facilities face growing injustices, including long wait times for healthcare, disciplinary actions due to physical limitations, and denial of assistive devices like walkers over security concerns. These current structures and policies in place make adequate care for aging individuals nearly impossible. This research focuses on one key barrier to adequate care: the moral distress experienced by correctional nurses and staff. Moral distress occurs when individuals understand their professional responsibilities but lack the resources, support, or authority to fulfill them. This study aims to identify specific areas where healthcare staff feel most limited in providing humane treatment that is aligned with their ethical oath. By identifying these areas we are able to see where correctional staff feel unsupported, overburdened, or burnt out and develop a targeted training program to provide content to all correctional staff with a deeper understanding of moral distress, its origins, and strategies for addressing it. Through a thorough literature review and examining case studies on moral distress of healthcare workers in the carceral system, we explore how revising triage protocols and expanding prescribing rights can alleviate moral distress. Alleviating moral distress allows correctional nurses to be correctly equipped to address the needs of the elderly inmates, and therefore potentially lower the amount of taxpayer dollars that are invested into carceral elderly health care; which in turn can be allocated to other sectors inside the carceral system. By incorporating a dedicated module on moral distress into staff training, we seek to improve internal workplace relationships and dynamics and ultimately enhance the quality of care for elderly inmates where policy reform can not be as immediate. Continued research in this area can generate further solutions, ultimately improving both staff experience and elderly inmate care.

AI data centers & Environmental racism
Emsley Jackson
Mentor: Dr. Andrew Keener

This adapted News and Views presentation connects the dots between the growing use of Artificial Intelligence, increased reliance and construction on AI data centers, targeted placement of these centers, and the grave impacts on their communities.

An Observational Study of Physical Accessibility Issues at Three Campuses in the UNC System
Sneha Sannanarappar
Mentor: Alicia Dahl

Background: Access to academic settings remains a difficult challenge to overcome. College students, especially those with physical disabilities, have to deal with obstacles such as inoperable door buttons, steep terrain, and broken paths. The lack of an established infrastructure for better serving the mobility of some students affects the experiences of the student body related to academics and everyday living. The Americans with Disabilities Act (ADA) established the guidelines intended to improve accessibility in institutions. Nevertheless, many campuses in the University of North Carolina (UNC) system present their own unique problems of accessibility.

Methods: This study was conducted in two phases. Phase 1 of the study involved a targeted literature review intended to identify and analyze patterns of physical accessibility barriers to higher education, with particular emphasis placed on the UNC System. Phase 2 of the study, I collected photographs of entrance surfaces, pathway locations, signs, and other related accessible infrastructure at each campus.

Results: Findings from Phase 1 of this study revealed consistent patterns in the literature that college campuses with auto-centric designs, as well as fragmented pedestrian areas create substantial movement barriers for students with physical disabilities. The Phase 2 audit found that while UNC Charlotte and UNC Greensboro both have developed accessibility maps, they were incomplete in their reflection of actual environmental conditions. Overall, the results of these studies indicated that the campus accessibility maps did not fully represent active on-campus accessibility conditions.

Discussion: The initial data indicated that there must be a constructive need for campus-wide, proactive maintenance of accessibility features to implement universal design principles to reverse elusive access problems (Hamraie, 2017). Recommendations will bring attention needed to immediate repairs to inoperative service features (such as neglected door buttons) as well as long-term upgrading to infrastructural inequalities (like identifying features and irregularity of scheduled accessibility audits).

Analysis and testing of a curve-fitting algorithm by a step function
Nour Al Deen El Hatto
Mentor: Sebastien Bossu

Breaking a curve into a simpler structure that preserves its key properties is a standard way to cut computational cost while maintaining accuracy. This practice spans many areas of applied mathematics, including wavelet analysis. For example, the Haar wavelet can approximate a curve with flat segments, but the segment positions lie on a fixed grid and do not adapt to the data, which limits quality. This study examines a piecewise-constant approximation to the target function which is optimal in a least-squares sense. The core algorithm, implemented in C++ by Dr. Bossu prior to this semester, is based on linear algebra and classical first-order optimization foundations, and produces optimal step functions quickly. In this study, we aim to assess the performance of the algorithm across a diverse selection of functions and parameters settings by measuring accuracy and speed, specifically using coefficient of determination (R2) and average runtime in milliseconds, in both low and high dimensions. Tests show promising results with the algorithm producing near-exact matches to the baseline while requiring only a fraction of the computation time. These findings indicate that adaptive step placement is an efficient alternative to fixed-grid schemes, with implications for real-time signal processing and scalable numerical analysis where speed and accuracy are both required.

Aren't You Supposed to be a Genius? Representations of Autism Spectrum Disorder in TV and Film and Effects on Audience Perceptions
Audrey King
Mentor: Dr. Mindy Adnot, Dr. Vaughn Schmutz, Sidney Beeman

Representation of historically marginalized groups in entertainment media has proven to have substantial influence on the way individuals within these groups are viewed and treated in the real world. Autism Spectrum Disorder (ASD) is a neurodevelopmental disability with many portrayals in entertainment that both scholars and autistic advocates criticize for failing to showcase the diversity and nuance of the autism spectrum. ASD is characterized by traits such as obsessive/restricted interests, self-stimulatory repetitive behaviors, atypical reactions to sensory experiences, and differences in social communication. This research project seeks to answer the following question: How have representations of Autism Spectrum Disorder in TV/film impacted both autistic and non-autistic individuals' perceptions of ASD? The scholarly research analyzed in a literature review indicates that a majority of representations of autism in TV and film exacerbate common stereotypes of autistic people and fail to erase negative stigma surrounding the disorder. Autistic people are commonly represented on screen as savants, plot devices, and sources of comedic relief. The information found through the literature review was used to conduct seminars for first-year UNC Charlotte honors program students. Through discussion of our own perspectives, we have discovered that autistic representation rarely aids in understanding how ASD can present in real people. I recommend for future autistic representation to include a variety of experiences of individuals across the autism spectrum, and for autistic actors and crew members to be involved a majority of the time.

Barriers for Twice-Exceptional Students in Honors and Gifted Education
Siennah Greenawalt
Mentor: Dr. Cindy Gilson

The fields of gifted and honors education focus on identifying, supporting, and challenging academically exceptional students. What barriers may exist for twice exceptional students in being identified as honors versus gifted? An unexplored intersecting barrier in these fields is the misidentification and underidentification of honors and gifted students with disabilities, who are called twice exceptional or dual exceptional. The literature indicates barriers may exist due to poor identification methods, the interconnectedness of behaviors between gifted and disabled, and the lack of education on the topic, especially for educators. This project is important because it aims to explore the barriers faced by dual exceptional students in both honors and gifted education. The anticipated results of this project will be an important contribution to the fields of gifted and honors education because it will educate policymakers and teachers about the obstacles twice/dual exceptional students face. To answer my inquiry question, I will be synthesizing research in both gifted education and honors education. This project is still in progress; however, I anticipate that the answer to my inquiry question will likely be that honors students have significantly fewer barriers to entry than gifted students due to the self-selection process as opposed to the extensive and often biased testing for admittance to gifted programs. In conclusion, the results of this project will be especially useful for the twice exceptional community and how identification methods can be improved for gifted programs.

Borders, Hybridity, and Third Space: How Ahmet Kaya's Exile Shapes Kurdish Advocacy in "Siz Yanmayın (Sürgün)"
Zara Ozer
Mentor: Dr. Rowney, Dr. Meneses

Following his advocacy for Kurdish civil rights during a music awards ceremony in 1999, Kurdish-Turkish folk singer Ahmet Kaya self-exiled himself to France. Two years later, the protest album, *Hoşçakalın Gözüm* (*Farewell, My Dear*), was released a year after his death. This thesis will examine a close analysis on the first song in Kaya's *Hoşçakalın Gözüm*, "Siz Yanmayın (Sürgün)" ("Don't You Burn (Exile)"), and how it invites listeners to an interface of cultural discourse. The paper will inspect how political and historical contexts, as well as Kaya's identity, shape "Don't You Burn (Exile)." Through the intersectional analysis of "Don't You Burn (Exile)" this thesis aims to develop a theoretical framework influenced by Homi Bhabha's concept of hybridity in *The Location of a Culture* and Keri E. Iyal Smith's expansion on Bhabha's hybridity in *Hybrid Identities: Theoretical Examinations.* The significance of instrumental features in the song will be analyzed through Edward Said's work regarding the relationship between local and global identities in *Reflections on Exile* in this study's framework. Furthermore, Diler Ozer's article "Music, Protest, and Social Inclusivity: The Case of Ahmet Kaya as a Deviant Example of Protest Music in Turkey," will provide a case study of the musical hybridity that Kaya prefers to employ in his discography. By examining the exile's attempts to recreate a sense of belonging, this thesis concludes that in Kaya's development of an environment of rehumanization for himself establishes his song as protest music that advocates for the humanization of Kurds living in Turkiye.

Bridging the Gap: Training Correctional Officers to Support Aging Inmates
Kyler Osby
Mentor: Megan Smith

The aging population of inmates within prisons has seen a dramatic increase resulting in a shift in demographics presenting unique challenges for correctional officers and facilities. As they are not equipped with the proper funding, infrastructure, staffing, or training which has resulted in inadequate health care and high turnover rates. Additionally, this inadequacy has created a gap between the physical, cognitive, and medical needs of older inmates and the care they can access. As the primary point of contact, correctional officers are often the first to recognize health and behavioral changes and unmet needs. They also serve as the main bridge between inmates and medical staff. Their understanding of safety, compassion, and care is essential to humane and effective correctional practice. This issue extends beyond the prison system, it affects public health, state budgets, staff safety, and broader questions of justice and human rights. To address the research question *"What institutional or operational barriers hinder the delivery of quality care to older inmates, and how can correctional officers be trained to address them?".* A comparative review of officer-nurse relationships, budgeting and resource allocation, dementia and cognitive decline, geriatric release policies, and relevant pilot studies at the state, national, and international levels was conducted. This methodology provided insight into how both institutional and operational barriers can be addressed and which training strategies could improve care for aging inmates. Implement training modules targeted towards recognizing signs of cognitive decline and mental distress, proper medical emergency response, fostering effective communication between officers and healthcare staff, and promoting an empathic and ethical environment for aging inmates will promote quality care to aging inmates.

CFD analysis of Steady and Transient Analysis of NACA 0012 Airfoil using STARCCM+
Haryshwa Bipin
Mentor: Arun Vishnu Suresh Babu

Airplane wings and helicopter blades encounter atmospheric gusts which can pose danger to the aircraft and its passengers. Can we adjust a flap or tab on a wing to negate the effect of a gust? If so how should we move them? This research explores the effect of the gusts on the wing: how the air flow around the wing is affected due to the gust and how the sudden forces generated with the aim of developing strategies to counteracting the gust effects using computational fluid dynamics .

Counting Symmetries: Criteria for Cyclic Groups
Patrick Ireland
Mentor: Evan Houston

Groups are a type of algebraic structure prevalent in many fields of mathematics. One major problem in group theory involves figuring out how many groups there are of a given size. This project explores when there is only one group of a given size and when a group must be "cyclic".

Childhood Trauma and Cognitive Function: Role of Optimism and Psychotropic Medication

Divya Agarwal
Mentor: Dr. Jeanette Bennett

Many adults struggle with memory, focus, or decision-making as they get older, but not everyone experiences these issues the same way. This study examines how childhood trauma, such as abuse or neglect, may affect cognitive function, including a person's ability to think clearly, concentrate, and remember information later in life. The experience of childhood trauma can make it harder to do well in school or work and may even increase the risk of mental health issues like depression or PTSD.

Still, some individuals appear to maintain strong cognitive abilities despite early-life challenges. One possible explanation is their mindset, particularly their level of optimism. Optimism, or the general expectation that good things will happen, has been shown to help people manage stress and recover from hardship. This study explores whether having a positive outlook might help protect cognitive function in adults who have experienced childhood trauma.

Another key focus of this research is the use of medications, such as antidepressants and anti-anxiety drugs, commonly prescribed for psychological conditions. While these medications can effectively relieve symptoms like sadness, anxiety, or sleep problems, they may also influence thinking abilities, sometimes improving them, other times making them worse. This study examines how these medications interact with both childhood trauma and optimism to impact a person's overall cognitive function.

To explore these questions, the study draws on data from the Midlife in the United States (MIDUS) study, a large national survey that has followed thousands of adults across the country over several decades. This rich dataset allows researchers to examine how much childhood trauma individuals experienced, how optimistic they tend to be, whether they use certain psychotropic medications, and how they perform on a range of cognitive tests.

The goal of this research is to identify factors that support or hinder brain health in adults with a history of childhood trauma. By uncovering these patterns, the findings hope to guide doctors, psychologists, and mental health professionals in developing more effective, personalized treatments and support strategies. Ultimately, this study seeks to advance mental health care by emphasizing the protective role of optimism and the importance of how medications are used to treat primary issues and may have unexpected effects on cognitive functioning.

Classical Computing Approaches to Solving Polyomino Sliding Puzzles

Batman Whiteside
Mentor: Dr. Mahmoud Dinar, Dr. Aileen Benedict, Dr. Li Yang

Polyomino structures are manifold geometries comprised of equally sized squares that are altogether connected adjacently. These structures have vast potential in mechanical and structural designs have seen minimal development due to their costly computation. We propose several algorithms that reduce the computation of designing of polyominoes and their transition states from one to another. A simple implementation of eliminating duplicate lag one states decreased the memory load for mechanically significant state transitions by 15.3%, %8.3, and %2.4 for 4x4, 5x5, 6x6 spaces, respectively. An additional algorithm that prioritizes square movement towards the center of mass difference between two mechanically significant polyomino structures decreases memory load by 25%, 14.3%, and %4.5 for 4x4, 5x5, 6x6 spaces, respectively. These memory load reductions are significant enough to allow further experimentation for polyomino structural design. Metamorphic mechanical structures with load-bearing conditions can be developed with these memory-efficient algorithms to deploy adaptive, load-bearing structures.

Cultural Capital and On-Time College Enrollment
Luis Tejada
Mentor: Vaughn Schmutz, Anne-Kathrin Kronberg, Victoria Rankin

Cultural capital, first introduced by French sociologist Pierre Bourdieu (1997), refers to the non-economic resources including cultural knowledge, skills, and behaviors that are valued by institutions such as schools and can be used to generate material advantages in society. Scholars debate whether cultural capital reinforces existing inequalities (cultural reproduction) or provides opportunities for economic mobility (cultural mobility). While much of this research has been based on socioeconomic status, these traditional theories overlook the impacts of race on the value and access of cultural capital. Contemporary theories have identified this gap and challenge traditional colorblind approaches. Using data from the Education Longitudinal Study of 2002, this study examines how different forms of cultural capital predict on-time college enrollment across racial and socioeconomic groups. Results from binomial logistic regression show that sports participation, extracurricular participation, and receiving college entrance information from parents and counselors help increase the likelihood of enrolling in college on time, whereas frequent parental homework help decreases it. The effects of cultural capital differ across racial groups, suggesting that race mediates which forms are institutionally rewarded. These findings highlight the need for a more racially conscious and multidimensional understanding of cultural capital in shaping educational outcomes.

Decisions in Family Planning and Contraception With a Focus on Educating College Students
Lelana Truong
Mentor: Alicia Dahl and Lorenzo Hopper

Background: Roughly 46% of pregnancies are unplanned among 15-19 year olds in the United States. North Carolina requires students grade 7-9 to receive sex education, but the curriculum is not consistent throughout the state. Advocates report that the education is unreliable, varied, and advocates for abstinence. This creates a gap in sexual education for the youth in North Carolina that leaves them unprepared for college. This two-phased project focuses on understanding the current knowledge of students at UNC Charlotte concerning family planning and access to contraceptives. Methods: In phase one, a literature review was conducted in Spring 2025. Databases searched included the UNC Charlotte Atkins Library Database, Pub Med, the National Library of Medicine, and Google Scholar. Key terms and abbreviations used in the search included: "women", "family planning", "in the United States", "social determinants", "IVF", "policies", "fertility", "abortion", "unplanned pregnancies", "reproductive health", "education", "contraception". In phase two, an informational lecture will be provided to students on campus in October 2025. The session will cover: defining family planning, why it is important to college students, and promoting positive attitudes towards contraception use. This phase will include a zine-making activity with the goal of 40 students attending the session. Results: Based on the results of my literature review, the informational lecture will focus on family planning, the importance of contraception use, and college student relevancy. The literature review identified three key issues such as lack of access to contraception and high school sex education. Results of workshop evaluations are forth coming and will be shared at research symposium. Conclusions: By increasing awareness through peer to peer education, students can be more informed about decisions in family planning and contraception use.

Designing and Programming Autonomous Fly4Future Drones through ROS2
Sujjay Karthikeyan
Mentor: Ran Zhang

The proliferation of Unmanned Aerial Vehicles (UAVs) in applications like logistics, inspection, and surveillance has created a critical need for robust and scalable autonomous systems. This project addresses this need by presenting the design and implementation of an autonomous control system for the Fly4Future drone network using the Robot Operating System 2 (ROS2). The primary objective was to develop a modular software architecture capable of autonomous navigation for three drones following a predetermined path. The system integrates an Arduino, LiDAR Sensor, and IMU for perception and localization. It also features 3D Printed Drone parts to enhance safety and durability of key internal components. Based on the preexisting MRS ROS environment, the architecture leverages the real-time capabilities and distributed nature of ROS2 to ensure reliable communication between nodes. The system's performance was validated through a series of simulations in Gazebo and real-world flight tests. This work provides a complete blueprint for programming modern autonomous aerial systems and showcases the effectiveness of ROS2 for developing complex robotic applications.

Developing a Global MITgcm Framework for Modeling Microplastic Transport
Sam Phillips
Mentor: Roger Tipton

Microplastic pollution is a growing global issue, yet its large-scale transport mechanisms remain difficult to observe directly. This project uses the MIT General Circulation Model (MITgcm) to simulate global ocean circulation and establish a foundation for modeling microplastic movement. A global microplastic sampling dataset from 2015 is used to visualize and qualitatively compare simulated transport patterns with observed concentrations. Current work focuses on verifying model stability, refining tracer parameterization, and identifying large-scale accumulation zones. These global simulations establish a computational and methodological framework that will support future high-resolution studies of microplastic and PFAS transport in the Arctic Ocean.

Digital Consumer Power: How Eco-Conscious Youth are Redefining Corporate Social Responsibility in the Fashion Industry
Jadyn Malawski
Mentor: Melinda Adnot, Valerie Reynolds, Mattew Metzgar

Fast fashion's environmental and ethical costs have sparked a shift toward sustainability in the fashion industry, led by eco-conscious youth. This literature review explores how young consumers use digital platforms to challenge corporate social responsibility (CSR), exposing greenwashing and demanding transparency. Synthesizing research on consumer behavior, influencer culture, and sustainability, it highlights how youth-driven digital activism is reshaping brand accountability and co-creating a more ethical fashion future.

Does Chronic Stress From Adverse Childhood Experiences Influence the Risk of Developing Obesity in Adulthood?
Abby LaPolla
Mentor: Mindy Adnot, Tracy Bonoffski, Daheia Barr-Anderson

This project most closely aligns with the public health, psychology, and exercise science disciplines. This project is important because in the United States alone, nearly 68% of adults are considered overweight or obese. One often overlooked factor contributing to this issue is the impact of traumatic experiences during childhood. There is a common misconception that obesity is solely influenced by eating too much. Past and recent research suggest that mental health has become more and more of a contributor to obesity. This paper examines what is known about the associations with Adverse Childhood Experiences (ACEs), obesity, and obesity-related health problems, using multiple cross-sectional studies and surveys. We will navigate the etiological chain connecting ACEs, childhood stress, adulthood stress, and excess weight gain. Focusing on "whole person health" – all aspects of a person's health – helps us gain a better understanding. Evidence of exposure to Adverse Childhood Experiences leading to obesity has become more and more confirmed in modern day research. Overall, this topic is crucial for healthcare practitioners to understand, as it plays a vital role in both the prevention and treatment of obesity.

Doors of Light and Shadow: Spatial Liminality and Migration in Mohsin Hamid's *Exit West*
Amna Noyal
Mentor: Matthew Rowney

This thesis examines spatial liminality as well as temporal compression in Mohsin Hamid's novel Exit West (2017), and the analysis reveals that these narrative techniques do reframe migration as a transformative process, altering identity formation fundamentally. Hamid orients focus toward its psychological and emotional aspects instead of the physical adventure of migration via the metaphor of magical doors. This analysis draws mainly upon theoretical frameworks involving Homi Bhabha's concept of the "third space" and Avtar Brah's "diaspora space", augmented by Michel Foucault's heterotopias and Doreen Massey's relational space theories. It examines how protagonists Saeed and Nadia traverse transitional environments amid constraints and evolving prospects for identity. This thesis contends that their very different reactions to equivalent experiences (Saeed pursues discipline via religious observance and yearning for his homeland, while Nadia welcomes the unknown and potential opportunities) depict how individual mentality, character background, and gender regulate migration's metamorphic consequences. Hamid crafts a story by condensing migration's temporal experience and increasing its geographic scope, while the story confronts dualistic perspectives of this compression, implying identity resides in a continuous condition of evolving instead of static cultural classifications in a progressively transient world. The bond between Saeed and Nadia transformed, disintegrated, and once again rekindled, functioning as a model of this relationship. Relocation addresses not just personal identities but furthermore communal affiliations, fundamentally implying that "we are all migrants through time," (Hamid 209) existing in continuous negotiation between past and future, here and elsewhere.

Easing the Burden on Gifted/Honors Educators through Artificial Intelligence
Shanthi Pillai
Mentor: Dr. Cindy Gilson

The fields of gifted and honors education are often very similar and contain a lot of overlapping pedagogical practices. An engrossing, intersecting debate in these fields is the use of Artificial Intelligence in the classroom. The literature indicates that AI, when integrated thoughtfully into gifted or honors pedagogy, can enhance content differentiation, deepen feedback quality, and aid in teacher workload reduction. This project is important because students will have an enriching learning process without diminishing the central role of a teacher. The anticipated results of this project will be an important contribution to the fields of gifted and honors education because it provides many insights on incorporating enrichment activities that will meet advanced student needs and pedagogy practices. Thus, I aim to answer the following: "How can Artificial Intelligence ease the burden on teachers when it comes to teaching gifted and honors students?" To answer my inquiry question, I examined and synthesized various sources of literature containing material on AI's impact on gifted classrooms, policies regarding AI implementation, and gifted/honors pedagogical/andragogical practices. The most important results that emerged from this project are that AI is crucial to the future success of gifted/honors students and will save teachers lots of time but requires a lot of information that will take time and consensus to implement. In conclusion, the results of this project will be especially useful for gifted and honors educators to provide quality, personalized instruction for each student.

Emotional Interfaces: The Role of Memory, Emotion, and Perception in Web Design
Jhania Vitalis
Mentor: Dr. Marlon Mejias, Dr. Anita Blanchard

Web and app design isn't just about aesthetics (looking nice); it's about people's memory of previous interactions, how they feel, think, and act when they use digital spaces. While understanding this, the literature review serves as an investigation into the psychological and cognitive principles that govern user interaction, in hopes of understanding how effective web and application design requires more than aesthetics to encompass how users feel, think, and act in digital spaces. Whether someone is shopping online, using a fitness app, or browsing a website, they rely on past experiences and mental shortcuts, known as mental models, to figure out how to use what's in front of them. Because of this, the core methodology involves exploring the Human-Centered Design (HCD) framework through a synthesis of perspectives found in scholarly articles. It examines how crucial elements like typography, color contrast, and layout directly affect user comfort, frustration, and overall utility while investigating why designers must consider what people need, expect, and feel when using a website or app. Ultimately, by prioritizing these cognitive and emotional factors, designers can move beyond mere usability to create meaningful, enjoyable, and highly intuitive digital products, contributing a new perspective on design efficacy across various platforms. This work discovers a new outlook on design by synthesizing psychological principles, cognitive science, and human-centered design research into a framework for understanding intuitive and emotionally effective interfaces. By connecting psychology and human-centered design, two fields that are rarely examined together, it advances our understanding of how design shapes user cognition and behavior.

Emotional Overload on Social Media: Desensitivity as Related to the Palestine Occupation
Zoha Ali
Mentor: Andrew Keener

Information overload is a concept that has been acknowledged and explored when evaluating social media and news platforms. Information overload is defined as an individual experiencing a feeling of anxiety or a feeling of misunderstanding/comprehension due to the volume of information being provided. The same concept can be applied to to emotional behavior: the emotional roller coaster that scrolling can induce actually can make the viewer feel desensitized to the content they are actually seeing, unable to fully understand the content of the media before scrolling away. Images and content from the Palestine occupation will be used as they have been circulating for two years on every social platform and have been placed in between protein recipes and skincare reviews, numbing the images of their meaning.

Enhancing Classroom Speech Transcription with AI: Evaluating Large Language Models in the getOTR Project
Ritvik Manem
Mentor: Shawnee Wakeman

The *getOTR* (Opportunities to Respond) project investigates how artificial intelligence (AI) and large language models (LLMs) can enhance the accuracy and scalability of classroom speech transcription. This study evaluates multiple versions of OpenAI's Whisper model to determine how effectively they capture teacher and student dialogue in authentic classroom settings. By aligning AI-generated transcripts with human-coded data, the research assesses model performance across key dimensions such as word accuracy, handling of overlapping speech, and detection of instructional moments. It also explores consistency and contextual understanding to evaluate how these models interpret pedagogical interactions, including teacher prompts and student responses. The findings aim to inform researchers and educators about the capabilities and limitations of current transcription technologies, advancing efforts to make classroom data analysis more accessible, efficient, and AI-driven.

Evaluating Social Isolation and Loneliness in the Charlotte Community with Love in Action Project Inc
Jahdoi Russell, Asya Crisp
Mentor: Tawanda Robbins

The growing issues of social isolation and loneliness have been observed to lead to a decline in social connectedness and health in communities. Previous studies show evidence of this problem, leading us to examine the negative effects it has on the Charlotte community. By developing a sustainable Loneliness Week to foster human connection in the City of Charlotte, we aim to promote awareness, reduce stigma, and implement community-based interventions. We are in partnership with Love in Action Project Inc., a local Charlotte nonprofit organization designed to combat social isolation and loneliness through art, community belonging, and policy advocacy. Over the course of the semester, we have engaged with scholarly literature and constructed strategies to progress in our research. Literature reviews demonstrate themes of health risks, age-based stigmas, and proposed initiatives. The continuum of our research will include gaining a deeper understanding of the problem and launching the first loneliness week in Charlotte.

Evaluating Dragonfly Diversity Across the UNC Charlotte Campus
Avery Taylor
Mentor: Sandra Clinton

Urban freshwater ecosystems face unique challenges including erosion, loss of biodiversity, and changes in water quality. Habitat fragmentation reduces genetic diversity and connectivity of many organisms including macroinvertebrates, which are an important component of stream food webs. Given this influence on the ecosystem, the species abundance and diversity of macroinvertebrates are used to monitor overall stream health. Our project focused on assessing dragonfly genetic connectivity in Charlotte-Mecklenburg County as a model for aquatic insect dispersal in urban ecosystems. We specifically selected restored sites because they are blank templates for recolonization. We predict increasing genetic diversity with increasing site age due to increase in metapopulation mixing. We collected dragonfly nymphs from 10 restored streams across Charlotte, NC. Each dragonfly was identified to the lowest taxonomic level possible using a standard dichotomous key. DNA was extracted from each individual using a standardized kit and the COI region was isolated and amplified using PCR with generic primers. We confirmed the PCR was successful using gel electrophoresis. In our next steps, the PCR products will be cleaned using exo-sapIT and sent out for Sanger sequencing. Using SNPs, we are able to determine what local populations of dragonfly are colonizing restored sites and we are able to identify potential genetic bottlenecks. Understanding their diversity and distribution in restored urban streams is important not only to their role as water quality indicators and components of the stream food web, but also has environmental and recreational implications, as adult dragonflies serve as a natural pest manager by feeding on mosquitoes and other flies which impact outdoor human activities.

EVALUATING THE IMPACTS OF BAKERS MOUNTAIN ON THE STRUCTURE AND STRENGTH OF STORM CELLS
Josiah Allen
Mentor: Matthew Eastin

Baker's Mountain is a small, isolated, topographic feature (542 meters above sea level and 177-268 meters above its surroundings) in western Catawba County, North Carolina. The unique presence of this mountain presents an opportunity to observe how thunderstorms are affected when passing over an individual topographic peak. First, four thunderstorms that passed over or near the mountain and experienced visible changes in structure based on weather radar observations were identified. Second, the GR2-Analyst software and NOAA's Weather Climate Toolkit were used to conduct a more detailed temporal analysis of base radar reflectivity and radial velocity, storm tops, echo tops, and vertically integrated liquid from both the Greenville-Spartanburg (GSP) and Charlotte (CLT) radar stations during a 1-hour time window inclusive of before, during, and after each storm cell passed over the mountain. Third, upper air conditions, soundings, and the RAP numerical model were analyzed, and it was found that overall synoptic and mesoscale environmental conditions supported convective storm development for each case (with case 2 also being the result of a surface cold front). The time series of radar-based storm parameters showed an inverse relationship between maximum storm top reflectivity and height, with local maximums for both parameters coinciding with the storm approaching and cresting the mountain, indicating an increase in updraft intensity as the storm started moving over the mountain. No discernable temporal patterns were noticed for maximum base reflectivity and height with respect to passage over the mountain. Analysis of base radial velocity showed the presence of lee-side vortices as each storm crested the mountain; however, the lee vortices did not intensify or exhibit any notable interaction with storm updrafts. Overall, there is a lack of understanding as to how both isolated and large-scale topography affects the strength and evolution of thunderstorms, and studying these interactions helps improve both our knowledge of various atmospheric phenomena and our ability to forecast the weather.

Examining Signal-Text Contrastive Alignment for mmWave-based Zero-shot Human Activity Recognition
Andrew Morgan
Mentor: Hongfei Xue, Pu Wang, Minwoo Lee

Human activity recognition (HAR) is the study of intelligent systems that can understand and identify human activities. Recent HAR research has taken advantage of advances in deep learning to robustly learn and classify many complex activities; it has also seen a rise in the use of mmWave radar signals for activity classification, noted among IoT sensing technologies for their non-invasiveness and ubiquity. However, despite the ubiquity of mmWave, the collection of large amounts of mmWave signal training data often required for deep learning is impractical and laborious. To alleviate this, recent work has proposed the use of synthetic mmWave signal data generated from large labeled datasets of motion capture footage of human activities, such as BABEL (Punnakkal, et al.). In particular, mmCLIP (Cao, et al.), inspired by OpenAI's landmark CLIP model (Radford, et al.), proposed contrastively aligning synthetic mmWave signals and LLM-generated descriptions of text activity labels into a shared embedding space such that unseen signals can be easily associated with an activity label at inference, enabling zero-shot HAR. While mmCLIP demonstrates the potential of such an approach, it only incorporates a single instance-level contrastive loss between signal and text embeddings, which possibly leads to suboptimal contrastive alignment and zero-shot performance. Recent works such as MGCA (Wang, et al.) have proposed alternative multimodal contrastive objectives that allow models to learn more robustly aligned embeddings with little additional cost. We investigate alternative training objectives for boosting contrastive learning, and apply them to mmCLIP for zero-shot HAR. We also investigate use of the Muon gradient descent optimizer to more quickly pretrain and finetune our model while maintaining performance.

Exploring the Effect of Interfaces upon Ionic Transport in Superlattice Perovskites Using Atomistic Simulations
Nizam Sait
Mentor: Xiang Chen

Optoelectronics are everywhere today, with devices such as smartphones, LEDs, solar cells, and more. These optoelectronics work by using semiconductors to convert electricity into light, or vice versa, light into electricity. The most common and industry standard material used in semiconductors today is silicon. However, due to society's heavy reliance upon optoelectronics, the industry is always looking for more efficient, affordable, and sustainable alternatives. Metal halide perovskites (MHPs) have emerged as one of those promising alternatives due to their high efficiency and low manufacturing cost. Despite this, further optimizing their design is challenging due to the dynamic interplay between their structural complexity, phonon scattering, and transport mechanisms. Research on various materials has shown that stacking layers of different materials, called a superlattice, can improve ionic transport mechanisms in the material. More specifically, the boundaries between the layers, otherwise known as interfaces, tend to play a role in these enhancements. Therefore, in this research project, superlattice configurations of perovskite materials were created using atomistic molecular dynamics simulations in order to analyze the effect of different interfaces upon ionic transport mechanisms, and to investigate how different interface types may lead to collective or non-linear behavior, as the resulting properties may not scale linearly with the number of layers. The resulting insights could contribute to the design of improved, more efficient perovskite based optoelectronics.

Forming the Great Smoky Mountains National Park: Long-Term Socioeconomic Impacts
Hunter Ball
Mentor: Dr. Mindy Adnot, Dr. Ashli Stokes, Dr. Mark Wilson

The Great Smoky Mountains National Park is the United States' most visited National Park, attracting over twelve million visitors each year. The Park's popularity has created a substantial tourism economy that continues to shape the local economies and community lifestyles in the surrounding Appalachian region. This literature review investigates the extractive industries that preceded the Park's development, local and national advocacy leading to the Park's formation, the communities immediately impacted by its formation, and the lasting economic and cultural consequences of the formation process, including the rise in tourism. Drawing from historical accounts, economic data, and sociocultural research, this review examines the Great Smoky Mountains region's shift from the extractive logging industry to a service-driven economy centered on recreation, hospitality, and cultural tourism. Although the National Park established land preservation and economic opportunities, they came at the expense of displaced communities and the loss of revenue from logging companies in the region. This review identifies the long-term economic impacts of this shift in local economies, including issues of poverty, economic mobility, and educational attainment. By examining the underexplored connection between the Park's formation and modern-day socioeconomic issues, this review highlights how national preservation efforts can both empower and challenge local communities, providing education about more equitable and sustainable approaches to regional development.

From Hunan to Taipei: The Authenticity of General Tso's Chicken
Isaac Lainez
Mentor: Ashli Stokes

General Tso's chicken entered U.S. gastronomy during a period when "authentic" Chinese food was highly sought after. Created in Taiwan in the 1950s by Chef Peng Chang-kuei, the dish drew from traditional Hunan techniques and flavors while adapting to the American palate. This paper analyzes the journey of General Tso's chicken from Hunan to Taiwan through rhetorical criticism. The specific rhetorical lens to be used will be "authenticity." Authenticity is a simple word with complex definitions and this paper fully explores these complex definitions in aims to determine food can be viewed as authentic or inauthentic. By comparing Peng Chang-kuei's original recipe and an adapted recipe, this paper explores how authenticity is shaped by the individual, location, and adaptations. While the dish may initially appear inauthentic for tailoring Hunan flavors to American tastes, recognizing its role in bridging the Sino-American palate reveals General Tso's chicken as a unique culinary creation, one that encapsulates Hunanese influences while conveying broader political and cultural meanings.

From Pixels to Prognosis: Using Deep Learning to Explore Placenta Pathology
Nithyashree Prabakaran
Mentor: Farah Deeba

The placenta is a complex organ vital to a healthy pregnancy, and its microscopic structure holds key insights into maternal and fetal well-being. Placenta's architecture provides in analyzing critical insights into pathological processes including preeclampsia. While histopathology is the gold standard for placental examination, it can be a subjective and labor-intensive process. Deep learning presents an opportunity to automate and help standardize this analysis. This project leverages the HAPPY deep learning pipeline, a 3-stage tool designed for hierarchical analysis of placental histology, and adapts it to our unique dataset of whole slide images. Placentas were collected from a group of 46 participants including healthy pregnancies and 26 placentas from pregnancies affected by preeclampsia. Each participant contributed 2 whole slide pathology images. Our current work concentrates on the pipeline's cell classification stage, which is fundamental to understanding the cellular composition of the tissue. Our methodology involved training and validating the classification model on our dataset to establish a baseline of performance. This will provide a benchmark for future improvements and help us ensure a more generalizable model that will improve pregnancy outcomes for the mother and child.

Geospatial Deep Learning Algorithm Utilizing High Human Activity Zones to Predict Malaria Transmission in Southern Africa
Natasha Kroll
Mentor: Yao Li

Malaria remains a significant global health challenge, with an estimated 249 million cases and 608,000 deaths in 2022 alone. Its impact on communities, economies, and healthcare systems is especially pronounced in resource-limited settings. As public health officials strive to reduce and ultimately eliminate malaria, detailed, localized data on the factors driving infection risk is vital for targeted resource allocation and effective control strategies. However, conventional surveillance methods often lack the spatial resolution needed to accurately highlight high-risk areas. To address this gap, this research proposes an integrated geospatial deep learning framework—combining remote sensing, deep learning, and geospatial analytics—to identify areas of high Malaria Transmission using human activity zones in two districts of Zambia.

To train our model, we collected data from two Zambian districts and surrounding cities with high human activity: Ndola and Lusaka. This dataset includes WorldCover 2022 for land use classification, WorldPop for population distribution, Microsoft Building Footprint data for mapping human settlements, Facebook Activity Data for frequency of human movement, and Open Street Map for points of interest. Our methodology integrates ArcGIS Pro for spatial processing, foundation deep learning models in Python, Google Earth Engine for large-scale satellite data analysis, and Kepler.gl for interactive visualization.

For this project, we propose generating a human activity map across two Zambian districts, which is an essential step toward understanding malaria transmission. These maps serve as a foundation to train our deep learning algorithm to detect areas of high Malaria Transmission in high-trafficked areas. The proposed framework can also be adapted for other vector-borne diseases, including dengue and Zika.

Gifted and Honors Students' Academic Success: Motivation and Underachievement
Alison Vang
Mentor: Dr. Cindy Gilson

The fields of gifted and honors education have been deeply interconnected in many ways that center on the academic success and learning of students. A captivating debate that intersects both fields is on motivation and underachievement. The literature indicates that gifted and honors students are more academically motivated when they have access to personalized learning, strengthened instructor relationships, and having appropriate support services. This project is significant to the deeper understandings of both fields, by addressing motivation and underachievement concerns and finding solutions to best support students. My inquiry question is "In what ways do motivation and underachievement impact the academic success of gifted and honors students?" To answer this question, I have synthesized literature from sources such as systematic reviews on underachievement in gifted students, research reports on motivation and teaching styles, videos by well-known experts in gifted education, and book chapters on motivation in honors and gifted students. This project is still in progress; however, I anticipate that implementing personalized learning styles, emphasizing strong instructor to student relationships, and providing appropriate student support services will be the most functional in improving the academic success of gifted and honors students. In conclusion, the results of this project will be beneficial to the growth and development of gifted and honors students, as well as for instructors and parents in both fields.

Gifted But Not Equal: From Early Education to Honors Colleges
Morgan Funches
Mentor: Cindy Gilson

Educational inequities continue to influence how students experience advanced learning opportunities from grade school to college. One major concern is whether schools in lower-income areas provide equitable access to gifted programs as compared to higher-income schools, and how these disparities shape honors opportunities at the college level. This project is important because it connects K-12 gifted education inequities with long-term outcomes for students attending Predominately White Institutions (PWIs) and Historically Black Colleges and Universities (HBCUs). My inquiry question is: *To what extent do schools in lower-income areas provide equitable gifted programs compared to higher-income areas, and how does this inequity carry over into honors opportunities in different types of colleges (PWI vs HBCU)?* To address this question, I reviewed scholarly articles, policy reports, and multimedia sources that discussed the identification of gifted students, socioeconomic and racial disparities, and college-level experiences of honors students. This project is still in progress, however, I expect to find that inequitable access to gifted programs in K-12 education contributes to the long-term differences in access to honors programs, academic confidence, opportunity, and support in higher education. In conclusion, the findings of this project may benefit educators, policymakers, and higher education professionals who seek to create fairer systems that identify and holistically nurture gifted/honors potential across all communities.

Global Health Lessons from the Blue Zones
Amaya Clark
Mentor: Mindy Adnot, Tracy Bonoffski, and Shankari Somayaji

This project explores the role of physical activity and nutrition in promoting exceptional longevity within the Blue Zones, including five global regions (Sardinia, Italy; Okinawa, Japan; Nicoya, Costa Rica; Icaria, Greece; and Loma Linda, California) identified by Dan Buettner where centenarians are disproportionately common. Drawing on Buettner's "Power 9" principles, the analysis focuses on natural movement, mindful eating, and plant-based diets. Residents incorporate low-to-moderate intensity physical activities, such as walking and daily labor, and routines, which research links to reduced risks of cardiovascular disease, dementia, and disability. Nutritional habits emphasize whole grains, vegetables, fruits, legumes, and limited meat, correlating with lower chronic disease and enhanced immune function. Despite advances in life expectancy, disparities persist across ethnic and socioeconomic groups, underscoring the interplay of genetics, environment, and lifestyle. The review identifies research gaps in optimal exercise intensity and duration, advocating for broader applications to promote healthy aging globally. Complementing the review, this honors capstone proposal details a six-session seminar series for freshmen, "Exploring the Blue Zones: Understanding the Importance of Nutrition and Longevity on a Global Scale," incorporating readings, discussions, media, and activities to foster critical thinking and wellness awareness.

Gust alleviation on aircraft wings
Nazim Sait
Mentor: Arun Babu

Gusts of wind pose significant challenges to aircraft safety and performance, influencing stability during flight. Reducing the negative aerodynamic effects of gusts is crucial for improving passenger safety, comfort, and aircraft reliability. To analyze such complex flow behavior, Computational Fluid Dynamics (CFD) serves as a powerful tool for studying the interaction between gusts and aircraft wings. This research addresses that limitation by incorporating gust effects into CFD simulations through a custom-developed unsteady flow model. The study not only examines how gusts alter aerodynamic performance, but also explores methods to reduce their adverse impacts.

Healing on Wheels - Delivering Care Through Mobile Health Units
Savannah Alexander
Mentor: Dr. Laura Magennis, Dr. Angela Lamb

Many individuals in underserved populations continue to face challenges in accessing health care across the United States. Mobile Health Units (MHUs) help provide direct care to patients and are a fundamental resource in communities where it is lacking. This project addresses the following question: In underserved communities in Charlotte, NC, how does the implementation and accessibility of a mobile health unit compare to services provided through traditional care settings in terms of improving and reducing health disparities? An evaluation framework, incorporating both quantitative and qualitative data, was used to assess various factors, including services provided and their utilization, as well as metrics related to the patient population, with a focus on social determinants of health. We can conclude from the data provided by the MHU that many patients receiving care are experiencing numerous social determinants of health that are detrimental to their overall health and well-being. Not only do these metrics reflect the physical challenges that patients in underserved areas experience, but they also represent the mental battle being fought and the safety concerns that accompany it. Overall, these metrics represent the types of patients that the MHU serves and the kinds of care being provided, such as referring patients to providers, linking them to mental health counselors, and providing education about the importance of receiving healthcare. The care provided by the MHU highlights the various barriers and gaps in healthcare, aiding in the movement toward health equity for all.

Honors vs. Gifted Students: Personality Impact on Learning Preferences
Aryan Hira
Mentor: Dr. Cindy Gilson

The fields of gifted and honors education explore how high-ability students think and develop. An important topic in these fields is how the personality traits of gifted and honors students impact their learning preferences and habits. The literature indicates that many gifted students often show high levels of creativity and are self-driven through their emotions. The literature also indicates that both gifted and honors students are impacted by perfectionism. This project is important because it shows how, although both groups share similar personality traits, such as perfectionism, they impact their learning preferences in different ways. The results of this project will contribute to the fields of gifted and honors education by showing how the different personality traits shape whether gifted and honors students prefer interest-based or goal-oriented learning. The purpose of this project is to show how the personalities of gifted and honors students influence their learning preferences and habits. To address this question, I analyzed peer-reviewed articles, research reports, educational videos, and book chapters, all from experts in the field. The most important results that emerged from this project are that gifted students prefer self-driven learning that is influenced by their creativity and drive to challenge themselves, while honors students prefer structured instructions and clear guidelines. In conclusion, the results of this project will be especially useful for educators and parents who seek to meet the academic and emotional needs of these high-ability learners.

How Can Artificial Intelligence (AI) and Gifted Pedagogy Be Used to Personalize Learning for Honors Students
Pearl Patel
Mentor: Dr. Cindy Gilson

Experts in gifted and honors education are increasingly exploring how artificial intelligence(AI) and gifted pedagogy can work together to personalize learning for advanced students in higher education. Gifted pedagogy emphasizes autonomy, complexity and depth while AI offers adaptive tools that respond to individual learning preferences, pacing, and interests. The intersection of the two gives a promising opportunity to meet diverse academic needs of honors students, who often require enrichment and challenge beyond traditional classrooms. The literature suggests that AI can support personalized learning, feedback and differentiated instruction. Meanwhile, gifted strategies such as problem-based learning and scaffolding assignments promotes engagement and critical thinking. This project is important because it emphasizes how various gifted pedagogies and emerging technology can help enhance honors education. My inquiry question: "How can artificial intelligence (AI) and gifted pedagogy be used to personalize learning for honors students?". To explore this, I reviewed scholarly articles, book chapters, videos, and practitioner reports focused on AI in education, and gifted teaching strategies. This project is still in progress, however, I anticipate that the most effective approaches will combine AI tools that offer choice and real time feedback with gifted strategies that encourage creativity and independence. In conclusion, the results of these projects will be especially useful for honors instructors, curriculum designers and educators seeking to create more personalized and meaningful learning experiences for advanced students.

How Dangerous Can Procrastination Be?
Luke DeVries
Mentor: Dr. Cindy M. Gilson

Honors and gifted education are characterized by their distinctive philosophies on learning practices for high-achieving students. These philosophies help educators navigate many intersecting challenges, one of which is students that deal with procrastination and perfectionistic tendencies. Existing literature suggests the negative effects of procrastination are linked to underachievement, struggles with well-being, and higher risks of negative perfectionistic tendencies in high-achieving students. This mini-inquiry project focuses on understanding the implications of procrastination for gifted and honors students, and supporting factors that can help alleviate this challenge. The anticipated results will help the identification of habitual procrastination in gifted and honors students while also contributing to the knowledge of support methods that can lead to a greater chance for high achieving students to reach their full potential. My inquiry question is, "What ways does procrastination limit the ability for gifted students to be identified and honors students to apply themselves?" To answer this question, I analyzed the most agreed upon definitions, study results, connections, and support methods from a variety of sources focused on gifted or honors students. This project is still in progress, but I anticipate that the answer to my inquiry will be that procrastination does arise as an inhibitor of identification and academic performance in these high achieving students where extra support could lessen this challenge. These results will be helpful for students who may believe they are struggling with habitual procrastination and for educators and parents to support their students in achieving at their highest potential.

How Do Early Gendered Messages in the Household and Broader Society Shape Women's Financial Literacy and Investment Behaviors Later in Life?
Gabriella Osorio, Malimi Fernando
Mentor: Melinda Adnot, Jennifer Stuart, Stephanie Bradley, Gene Lai

There is a financial gender gap, specifically in investing, that can be traced back to differences in financial literacy and the effects of early socialization. Early socialization refers to household and societal messages that shape children's beliefs, confidence, and behavior. The purpose of this research is to draw an inescapable connection between early socialization and investment behaviors later in life. There is a lack of research in this specialization that this literature review hopes to bring to light. The inquiry question 'How Do Early Gendered Messages in the Household and Broader Society Shape Women's Financial Literacy and Investment Behaviors Later in Life,' guided the study. The research first examines early socialization, specifically through the development of internalized sexism through subtle influences such as parental roles, societal norms, linguistic structures, and exposure to benevolent sexism. It then explores gender differences in adults' financial attitudes, literacy, and behavior, connecting these two areas through the potential influence of internalized sexism on confidence and self-competency. The reviewed studies suggest that early gendered messages and unequal exposure to financial education contribute to women's lower investment participation compared to men, as well as their confidence and risk tolerance in investing, reinforcing the financial gender gap observed in adulthood. The implications of this research are to raise awareness among women regarding the biases that they experienced in childhood that may impact their financial stability and independence in adulthood.

How Does a Parent's Perception of Giftedness Affect Their Student's Placement in Both Honors and Gifted Programs?
Nathan Hobgood
Mentor: Dr. Cindy Gilson

Gifted and honors education is expanding as researchers and educators try to understand how talents and abilities are identified and supported in different student groups. One important area of research is how parents' views of giftedness affect student placement in honors and gifted programs. Studies show that parents' beliefs can strongly shape a child's identity. Misunderstandings about giftedness, especially for twice-exceptional students and neurodivergent students, can lead to some students being left out. Cultural and socioeconomic factors often shape parents' advocacy and understanding of gifted education. This topic is important because learning how parents' perceptions affect educational opportunities can help make identification more fair and improve communication and cooperation between families and schools. The main question of this research review is "How does a parent's perception of giftedness affect their student's placement in both honors and gifted programs?" The results of this review could help gifted and honors educators by showing the need for more awareness, training, and communication among parents and educators to ensure fair access to advanced academic programs. To answer this question, I read studies, theories, book chapters, and peer-reviewed articles from cultures both in the US and abroad on how parents' attitudes affect gifted education and student placement. It is expected that students whose parents have accurate and supportive ideas about giftedness are more likely to be placed in the right gifted and honors settings, either through referral or screening. In summary, the findings from this project should help educators, administrators, and policymakers who want to create more inclusive and collaborative approaches to gifted and honors education.

How May Perfectionism Lead Gifted and Honors Students to Fail, and How May this be Prevented?
Jeevan Liu
Mentor: Dr. Cindy M. Gilson

Gifted and honors education undoubtedly house the world's brightest minds, however, due to these expectations of greatness, both gifted and honors students may suffer from specific difficulties. Perfectionism is one such difficulty, prevalent in gifted and honors students, capable of driving exceptional students to ruin. Previous works have speculated correlations between healthy and unhealthy forms of perfectionism with gifted/honors students, how it adapts over time, and preventative measures to mitigate maladaptive perfectionism. Formally addressing unhealthy perfectionism by using the most effective mitigation techniques is vital for improving the rates of gifted and honors students' success; most research on unhealthy perfectionism only includes some potential prevention techniques. Specifically, this project will ask "How may perfectionism lead gifted and honors students to fail, and how may this be prevented?" To address this, I will be synthesizing current literature on perfectionism itself, how it may be helpful or harmful, as well as preventative measures in the latter case. Although still in progress, I believe that only specific types of perfectionism are dangerous, which can be addressed through a variety of techniques that solve underlying problems of expectations and failure. Overall, the results of this research will greatly benefit gifted and honors students who suffer from fearing failure or disappointment, by ensuring that their path to academic achievement is not hindered by debilitating perfectionism.

How Might AI Assess Academic Potential, Personalize Instruction, and Track Growth in Honors and Gifted Education
Neal Zalomek
Mentor: Cindy Gilson

Advanced technologies, including AI, are playing a growing role in improving student outcomes in honors and gifted learning. A discussion that is ongoing throughout the education field is how AI should be ethically implemented and utilized to enhance teaching and learning. AI is particularly relevant for personalized learning, as it benefits honors and gifted students by enabling them to be challenged and engaged in their learning. This project is important because tools like Khanmigo and ChatGPT are being developed for learning and implemented in classrooms worldwide. The results of this project will be a significant contribution to the fields of gifted and honors education, as AI can be implemented to enhance learning outcomes for honors and gifted students within this framework. My inquiry question is "How might AI-driven approaches measure academic potential, tailor instruction to individual strengths, and monitor growth in honors and gifted education programs?". To answer my inquiry question, I conducted a literary analysis of the current state of AI being used in the classroom, and I will recommend how AI can be implemented in an honors and gifted classroom environment. This project is still in progress; however, I anticipate that the answer to my inquiry question will likely be that AI will unlock personalized learning at scale for all students, which was previously unachievable. In conclusion, the results of this project will be particularly useful for showing the effectiveness of implementing AI to enhance learning in honors and gifted classrooms through research and examples.

Improving Health Outcomes for Black Women in Mecklenburg County
Saniya Young
Mentor: Nicole Peterson

Women have been experiencing unfair treatment in healthcare for years, and most of the healthcare disparities affect Black women. This study examines the challenges faced by Black women in healthcare and explores ways to enhance health outcomes for Black women in Mecklenburg County. We partnered with the Women's Healthy Equity Institute (WHEI) and interviewed its leadership team. The WHEI is an organization that focuses on uplifting, empowering, and opening opportunities for all women. The interviews were recorded, transcribed, and encoded using NVivo. Through these interviews, we gained insight into the culture and concerns of the community, the challenges Black women face in healthcare, and their experiences with healthcare providers and facilities. By studying Black women's experiences and feelings surrounding healthcare, we can find ways to minimize health disparities for all women. Recommendations include improving self-advocacy, health literacy, and public health policies.

Indigenous Inspirations: The Role of Alcohol and Western Notions of Indigeneity in Japanese Colonialism and Ainu Life in Hokkaido, 1869-1899
Foster Duckworth
Mentor: Dr. Maren Ehlers, Dr. Carol Higham, Dr. Steven Sabol

This thesis analyzes the ways in which nineteenth-century American notions of indigeneity contributed to the construction of the Ainu image in the eyes of American members of the Kaitakushi and other Western visitors to Hokkaido, the northernmost island in the Japanese archipelago. While scholars have researched the influence of American foreign advisors on Hokkaido's educational, agricultural, and industrial development in depth, the field has yet to investigate their influence on the formation of stereotyped images of the indigenous Ainu population residing on the island. The significance of the trade and consumption of alcohol among the Ainu population in constructing this image also remains an unexplored facet of the colonial dynamic in Hokkaido. This thesis uses comparisons between white Americans' experiences with Native American tribes and the Ainu to examine the role of alcohol in the Ainu-Japanese relationship in colonial Hokkaido from 1868 to 1899, by linking Western perceptions of that role to American stereotypes, such as the "whiskey Indian." Personal writings by American Kaitakushi employees and other Western figures reveal that they developed images of the Ainu that were informed by pre-existing Native American stereotypes, their personal religious and moral beliefs, and the histories of relationships between indigenous peoples and their colonizers. Unlike in the United States, where alcoholism was seen as one of the worst aspects of civilized life and signified an acceptance of white vice, American advisors associated Ainu dependency on alcohol with established colonial control by the Japanese and thus, as a gateway to smoother assimilation.

Influence of Undergraduate Education on Nursing Students' Knowledge, Attitudes, and Perceptions of Older Adults
Sean Nguyen
Mentor: Lufei Young, Jyotsana Parajuli, Susan Lynch

Understanding prelicensure nursing students' knowledge, attitudes, and perceptions (KAP) of aging is critical, as these beliefs directly influence the quality of care delivered to the rapidly growing older adult population. This project assessed KAP toward older adults among prelicensure nursing students at different stages of program progression in a school of nursing at a large public university in the southeastern United States. A 15-item survey, adapted from validated instruments, was administered to 84 students and benchmarked against Subject Matter Expert (SME) responses. Absolute deviation scores from SME standards were calculated and analyzed using ANOVA. Students demonstrated strong recognition of physical aging changes (e.g., sensory decline, reduced strength); however, misconceptions persisted. Nearly half (45.2%) believed cognitive impairment is a normal part of aging, and only 48.9% correctly identified depression prevalence. Alignment with SME responses improved significantly in mid-program students (mean deviation = 10.8) compared with earlier cohorts (13.2, p = 0.019), reflecting short-term benefit of aging-focused content. Yet, this improvement regressed by the final semester (12.0), indicating limited sustainability. The greatest deviations involved cognition, social isolation, irritability, and communication difficulty. These findings suggest that while targeted gerontological education can temporarily strengthen student KAP, without longitudinal reinforcement such gains diminish before graduation. Nursing curricula and practice environments should incorporate repeated exposure, structured clinical debriefings, and interprofessional learning to sustain accurate and empathetic perspectives on aging. Broader adoption across nursing programs and extension into post-licensure education may help close persistent gaps in gerontological preparation.

Inhibition of Oncogenic KRAS Decreases Vesicular Stomatitis Virus Replication in Pancreatic Ductal Adenocarcinoma.
Irakli Mataradze
Mentor: Valery Grdzelishvili

Pancreatic ductal adenocarcinoma (PDAC) is among the deadliest cancers, with a 5-year survival rate under 13%. Oncolytic virotherapy (OV) aims to exploit tumor-selective weaknesses in antiviral defense; in this study we used vesicular stomatitis virus (VSV) as the model OV. Because 90% of PDACs harbor oncogenic KRAS, we examined how KRAS–MEK signaling shapes OV susceptibility. Across PDAC cell lines with different baseline antiviral state, pharmacologic inhibition of KRAS or of MEK led to lower VSV replication and coincided with a stronger antiviral state, including higher interferon-stimulated gene expression and STAT pathway activation. These observations show that reducing KRAS–MEK activity is associated with reduced OV fitness and enhanced antiviral signaling in PDAC models; whether increased KRAS activity is sufficient to produce the opposite effect remains to be determined. Ongoing work is testing whether this shift reflects improved early detection and cytokine release or downstream amplification through JAK–STAT signaling. Together, the data suggest that KRAS may act as a positive host factor for OV replication in PDAC and that KRAS/MEK status and intrinsic antiviral tone should be considered when planning timing and combinations of oncolytic virotherapy.

Integration of a Coaxial Nozzle and Fiber Feeding System for Multi-Component Direct Ink Writing (DIW) Printing
Neal Zalomek
Mentor: Dr. Joyee

Direct Ink Writing (DIW) has emerged as a promising additive manufacturing approach for producing flexible, high-resolution structures suitable for wearable devices. This study investigates the compatibility of a conductive silver-coated nylon thread with a silicone rubber matrix to establish the foundation for coaxial fiber-integrated printing aimed at biomedical wearables. Silicone rubber was used as the base ink, while the conductive thread was embedded to impart sensing capability. Mechanical testing of the silicone–thread composite demonstrated an elongation at break of 700%, a tensile strength of 4.6 MPa, and a Young's modulus of 1.2 MPa, confirming its high elasticity and softness for wearable applications. Cyclic tensile tests further showed stable performance over repeated loading–unloading cycles, indicating durability under conditions relevant to body motion. Initial testing also revealed that to achieve higher stretchability and improved strain-sensing performance, the sensor must be designed with a greater surface-area-to-volume ratio. Electrical characterization showed that the embedded fiber maintained conductivity under elongation, with resistance changes proportional to applied strain (a strain sensitivity of 2 Ω/mm), enabling bio-signal detection. To explore future implementation, coaxial nozzle prototypes were fabricated and evaluated under varying deposition conditions used in DIW (layer height, bed temperature, and dispensing speed) to evaluate process feasibility. The results demonstrate strong material compatibility between the conductive fiber and flexible substrate, highlighting the potential of DIW-based coaxial deposition for developing next-generation wearable biosensing devices.

Intelligent Robot-Assisted Finishing System for Post-Processing of Metal Additive Manufactured Components
Patrick Guinan
Mentor: Jose Martins Do Outeiro, Ahmed Razin

Abrasive finishing is often used to reduce surface roughness of metal additive manufactured (MAM) parts but it often results in high processing time and diminished dimensional accuracy. The purpose of this project was to study the efficacy of an intelligent Robot-Assisted Abrasive Finishing (IRAFS) system by inducing control over the movement of parts in the media using a UR30 robotic arm which is otherwise absent in conventional abrasive systems. This study also focuses on precisely controlling the contact between the part and the abrasive media, to investigate if it affects the dimensional accuracy during the process. Experiments were conducted using several different media geometries as well as different tool paths to investigate their effects as well. The two toolpaths involved were axial rotation along the axis of the part and planetary rotation around the axis of the vibratory finisher inside the media. Results of these experiments reveal a reduction in process time for planetary rotation as well as angle-cut media compared to the axial rotation and prismatic triangled media. The finishing process also resulted in an increased edge radius when subjected to different finishing strategies compared to conventional methods. Further research optimizing process parameters of the IRAFS has the potential for integrating this system to mass scale MAM processes streamlining the manufacture of complex metal parts.

Investigation & Analysis of Workforce Development Programs in Rural Southeast America
Jordan Dunn
Mentor: Mentors: Cody M. Cocchi & Clarence Anthony, Jr.,

This exploratory qualitative study examines the accessibility and effectiveness of workforce development programs for adults without traditional credentials in rural communities across Alabama, Mississippi, South Carolina, and Georgia. Data collected will be utilized by the Partnership for Innovation to better establish relevant partnerships in targeted regions. Analyzing sources; including policy reports, program evaluations, and dissertations; this study reveals significant disparities in program access and outcomes between rural and urban populations. Findings indicate that integrated models combining GED instruction with occupational training, such as Mississippi's MIBEST program, produce stronger employment and wage outcomes than standalone academic programs. However, rural learners face persistent barriers including transportation challenges, limited industry access, insufficient employer participation in apprenticeships, standardized testing barriers, and financial constraints from rising costs. States have implemented promising strategies; such as South Carolina's bridge programs and Alabama's apprenticeship tax credits; geographic concentration of technical colleges in urban centers and uneven institutional investment limit accessibility in rural areas. The review identifies critical gaps in quantitative outcome data and calls for the expansion of offered services, increased acknowledgment of non-traditional credentials for adult learners, and targeted investment in specialized industry training to ensure equitable access to well-paying opportunities spanning multiple industries.

Investigation & Analysis of Workforce Development Programs in Rural Southeast America - The Economic Impact of "Brain Drain"
Lena Ayesh
Mentor: Sarah Powell, Cody Cocchi

This exploratory qualitative study examines the accessibility and effectiveness of workforce development programs across Alabama, Mississippi, South Carolina, and Georgia. Data and findings will be utilized by the Partnership for Innovation to better establish relevant partnerships in targeted regions. Generalized research is conducted in tandem, with divisions into workplace development programs and the economic impact of brain drain. This research is focused on the latter to fill in research gaps of development programs in rural Southeast America.

Analyzing publicly available data such as official State policy reports, private sector publications, and dissertations, this study reveals significant disparities in program access and outcomes between rural and urban populations. Brain drain, the out-migration of educated and skilled individuals, has become a persistent challenge for several southeastern states, including Alabama, South Carolina, Georgia, and Mississippi. In Alabama, studies show a significant loss of college-educated residents, particularly from rural areas, as they seek better opportunities elsewhere. Local initiatives aim to retain young professionals by fostering entrepreneurship and creating networks that connect talent with local professional opportunities.

Across the four states within this study, findings indicate that the common drivers of brain drain include limited local opportunities, rural-urban disparities, and the lure of higher-paying jobs elsewhere. Efforts to retain talent focus on job creation, educational investment, and community engagement. While some initiatives show promise, addressing brain drain will require structural solutions that provide sustainable, high-quality opportunities for young professionals.

Lengua nicaragüense: Deterrence of audience as a rhetorical technique

Jeffrey Wang
Mentor: Dr. Ashli Stokes

Nicaraguan *lengua en salsa*—beef tongue in sauce—might have unknown origins, but its role today is anything but unremarkable. By pairing beef tongue with classic Latin American ingredients like tomato and peppers, the nationally-iconic dish balances its uniqueness with the familiarity of a classic comfort meal. Historically and presently, hours of work and a valued cut of meat make this dish a special occasion. Beef tongue is known to be outstandingly tender, yet simultaneously a mere byproduct of beef production (a fundamental sector of Nicaragua's economy). As one of the Caribbean's poorest countries, *lengua* comes from a culture of resourcefulness that stubbornly refuses to settle for "scraping by". In my research, I examine how this attitude is visible in the dish's role on the external front of Nicaraguan culture. Beef tongue would surely unnerve the casual American diner; I outline how this exoticism plays a deterring role that, ironically, saves it from the exoticist appropriation that is the fate of several popular Caribbean cuisines for the North American audience. The recipe I provide was written by a Nicaraguan immigrant who grew up in Charlotte, and it clearly needs to make concessions in order to make the dish feasible in a Southeastern U.S. home or restaurant. So by facilitating a kind of selective exposure, *lengua en salsa* is able to preserve its own authenticity, making it a powerful way for Nicaraguan expatriates to assert their identity.

Locked Out Potential: Identifying and Remedying the Causes of the Underrepresentation of Hispanic Students in Gifted and Honors Education

Bruno Salvi
Mentor: Cindy Gilson

The fields of gifted and honors education have struggled with the persistent underrepresentation of minority racial and ethnic student populations for decades, particularly Hispanics. A highly debated topic that intersects both gifted and honors education is the factors that lead to the underrepresentation of Hispanic students in these programs. The literature indicates that the factors detailing the underrepresentation of Hispanic students in these fields range from systemic causes, such as identification methods, to personal causes, such as stigma. These factors can be categorized using frameworks such as Bronfenbrenner's bioecological systems theory of development. This project is important because it encompasses previous data and research to provide insight on both the factors and solutions of the underrepresentation of Hispanic students in gifted and honors programs. This contributes to the fields of gifted and honors education by providing educators with the knowledge base to adapt solutions into their own gifted and honors programs. My inquiry question is "What factors have led to the underrepresentation of Hispanic students in both gifted and honors education programs?" To answer my inquiry question, I compiled credible videos, books, quantitative research, and general sources that covered related topics. I then synthesized the data and evidence to determine factors affecting Hispanic student representation and measures to mitigate the issue. This project is still in progress, but I anticipate that the key factor that will affect Hispanic representation in gifted and honors programs will be educational policy and practices, such as teacher nomination bias and a lack of educational support. In conclusion, the results of this project will be useful for school administrators and district board members to understand the root causes of Hispanic underrepresentation and apply recommended strategies and solutions that can be implemented into their school or district.

Macroinvertebrate abundance and diversity in Toby Creek, a restored urban stream
Devin Estep
Mentor: Sandra Clinton

Macroinvertebrates, such as beetles, dragonflies, and mayflies, are important components of stream ecosystems. Macroinvertebrates are a key bioindicator for a river system's health due to their sensitivity to different types of pollutants. By monitoring stream macroinvertebrate abundance and diversity, we can quantify the overall health of the river system over time or changes due to restoration. There are multiple community metrics used in macroinvertebrate monitoring projects, for example, the %EPT which is the abundance of specific sensitive taxa (mayflies, stoneflies and caddisflies) to all other insects collected in the sample. The objective of my project is to quantify the abundance and biodiversity of stream macroinvertebrates in Toby Creek, a restored urban stream on the UNC Charlotte campus. It is important to observe the effects of the urban restoration that concluded in 2023, as urban streams are typically unhealthy due to pollution as a result of runoff. By being able to look at community metrics, it helps determine the success of the restoration project.

Mapping Strengths: Addressing Maternal Health Disparities In Eight North Carolina Counties
Salina Khadka
Mentor: Allissa Desloge, Alicia Dahl.

Introduction: Maternal health disparities in rural areas show a growing public health concern as they may contribute to adverse birth outcomes such as preterm birth, which is when babies are born before 37 weeks of pregnancy. North Carolina had a preterm birth rate of 10.7% in 2023, which is higher than the overall U.S. rate of 10.4%. Preterm birth rates occur due to many reasons, such as low accessibility to maternal services. This project investigates the impact of these disparities in North Carolina and will specifically focus on preterm birth rates in Mecklenburg, Gaston, Cabarrus, Lincoln, Catawba, Iredell, Rowan, and Union counties.

Methods: This study involved two steps: A literature review in Spring 2025, where I reviewed existing literature on maternal health disparities, and analyzed it to get a better understanding of the issue and current solutions. The second step involves an asset mapping approach to visualize and analyze the resource availability and county-level preterm birth rates.

Result: From the literature review, I learned that significant regional variation exists in North Carolina, meaning some regions experience a higher preterm birth rate than others. Applying this to my project plan, the preterm birth rates for each county (varied/were about the same). For each county, the resource availability for pregnant individuals to access (varied/was about the same).

Discussion: The key findings from the literature review highlight that existing disparities result in adverse outcomes, for instance, preterm birth. Preterm birth rates vary by county in North Carolin and may be influenced by factors such as maternal access to care and the availability of local resources. My project focuses on developing an asset map that visually displays the maternal health resources available in each county. This map will be presented at the conference to help identify gaps and opportunities for improving access to care for pregnant individuals.

Mentorship Is Crucial: The Benefits of Structured Mentorship for Honors and Gifted Students Compared to Those Without.
Khristian Woodard
Mentor: Dr. Cindy M. Gilson

The fields of gifted and honors education seek to facilitate both academic and personal growth in students. However, many programs neglect the importance of holistic support that helps students thrive throughout their journey. This is why mentoring is crucial for honors and gifted education. One overlooked factor within these programs is authentic mentoring, which provides support to each student. The literature shows that mentoring not only benefits mentees, but allows mentors to grow through peer mentoring, creating an environment of holistic development. Mentorship doesn't have to only come from faculty; it can be just as impactful through peer-mentoring. Research shows that when structured mentorship is intentionally built into programs, dropout rates decrease while student satisfaction, motivation, and success increase. This project is important because mentorship sustains students in these programs, while strengthening their confidence and long-term success. The project's purpose is to explore how structured mentorship in gifted and honors education benefits students compared to programs that lack mentorship. To answer my inquiry question, I am reviewing peer-reviewed research reports, book chapters, and practitioner articles to identify patterns and key findings. The anticipated results of this project will contribute to gifted and honors education by showing how mentoring can enhance program success and support long-term growth beyond higher education. Although this project is still in progress, I anticipate it will show the significant benefits of mentoring within these programs. In conclusion, the results of this project will be especially useful for programs lacking structured mentorship, whether peer or faculty-based.

Modeling Moretti: Architectural Analysis of Fascist Italy
Jordan Harrelson
Mentor: Jeffrey Balmer

What if architecture's past was not lost but waiting to be rediscovered, once obscured by politics and now restored through research? This is the case with Luigi Moretti's *Casa della Gioventù Italiana del Littorio* (House of the Italian Youth), completed in 1936. Soon after its completion, the building was radically altered to align with a new political order, erasing key elements including its renowned mosaics. Despite its historical and artistic significance, the building's design record remains fragmented, with no comprehensive documentation of how it was conceived, revised, and realized. This research undertakes a digital reconstruction of the Casa, drawing upon original sketches and blueprints preserved in Italian archives. These materials are being digitized, analyzed, and translated into precise three-dimensional models using software such as Rhinoceros 3D, allowing the production of an accurate and richly detailed set of architectural drawings. Beyond reconstruction, these models retrace the evolution of Moretti's design process, offering insight into his architectural logic and creative methods. By layering archival evidence with contemporary modeling tools, the project constructs a "forensic map" of design in mid-century Rome. The outcome will be the first complete visual record of the *Casa della Gioventù Italiana del Littorio* at this level of fidelity and depth, addressing a critical gap in architectural history. More than the documentation of a single lost work, this research preserves its legacy in an accessible format that can inform scholarship, education, and contemporary practice. In doing so, it brings overdue attention to one of Italy's most influential modern architects and ensures that his contributions remain part of the cultural and architectural conversation for future generations.

Osteobiography and the Ethical Dilemmas of Skeletal Collections
Mayah Clark
Mentor: Sara Juengst

Background: In universities across the country, there are teaching skeletons obtained through the skeleton trade, which was popular until the end of the twentieth century. Many of the skeletal remains obtained by universities and institutions during this era are from India, from people who did not give their bodies to science through informed consent. Now, as we go forward as a discipline, we must reckon with our colonialist past and our future ethical responsibilities. My project focuses on the skeletal remains of one individual, studying their pathologies and attempting to give these remains the respect and identity they deserve. Methods: Using the *Standards for Data Collection from Human Skeletal Remains: Proceedings of a Seminar at the Field Museum of Natural History* by Buikstra and Ubelaker I documented the various pathologies and skeletal lesions of the juvenile remains 'HSKJ1' from the University of North Carolina at Charlotte's skeletal collection. Through the combination of skeletal and taphonomic data, I was able to create a clearer picture of the life circumstances of HSKJ1 and place this data in the context of ethics in teaching collections. Results: I found that HSKJ1 was a juvenile individual of approximately 12 years old (± 36 months). HSKJ1 went through significant episodic malnourishment during their adolescence as indicated by the 2-3 layers of linear enamel hypoplasias on the erupted adult teeth. HSKJ1 is also extremely short in stature for their age, lending to the evidence that they lived under general, but especially dietary stress. Conclusion: I conclude through the evident skeletal pathology, that HSKJ1 was a child who endured significant stress during their unfortunately short life, enough to leave permanent lesions on their skeleton. This individual likely died because of their nutritional deficiencies and, in death, was left to be anonymized, haphazardly glued together, and sold for profit to my own university. The history of teaching collections is dark and there is a lot of discussion about the ethical future of these collections. As we collectively decide the best path forward we can work to learn more about what makes these individuals unique and restore a semblance of their identity.

Path Planning of Autonomous Robots in Uncertain Environments
Gilberto Feliu
Mentor: Dipankar Maity

This project presents a hybrid control approach that improves path execution for small unmanned aerial vehicles operating under sensing noise, wind gusts, and other sources of deviation and error. A planner supplies waypoints for collision-free motion; these are converted into a time-parameterized trajectory. During execution, a lightweight reinforcement-learning supervisor—trained with proximal policy optimization—selects among position-, velocity-, and attitude-tracking modes of a standard geometric controller at each time step. The supervisor uses simple features (tracking error and rate, local path curvature, and proximity margins) and optimizes a cost that balances accuracy, responsiveness, and control effort while discouraging unnecessary switching. Stability and interpretability are preserved because the geometric controller stays intact and learning only schedules modes. Evaluation in ROS2/Gazebo compares the method to fixed-mode and rule-based baselines using peak and mean absolute tracking error, completion time, integrated control effort, and switch frequency. A physical Crazyflie-class implementation includes safety interlocks for switch-rate limits, loss-of-signal fallback, and battery/prop constraints.

Perfectionism Within Honors and Gifted Students
Liv Bailey
Mentor: Dr. Cindy Gilson

Believe it or not, students in both honors and gifted education programs struggle with the pressure to be perfect in everything they do. This mindset can lead to several negative mental health affects, and if not addressed properly, can develop into more serious conditions over time. The literature indicates that perfectionism is hard to identify, can create unhealthy competition among peers, and often leads to social bias or exclusion. The aim of this project is to underscore the critical need to prioritize the mental health of these students. My inquiry question is "How does perfectionism affect the mental health within honors and gifted students?" To answer this question, I selected a variety of credible and reliable sources. I synthesized findings from research reports on how perfectionism relates to stress and anxiety, videos from experts on gifted students, book chapters on the development of perfectionism over time, and theoretical articles on different perspectives on the issue. One of the most important results from this project includes how perfectionism is increasing at a rapid rate, particularly among younger individuals. This proves the urgent need to find effective and efficient ways to cope with it. In conclusion, the results of this project can be valuable for educators who work with students in both honors and gifted education on a daily basis.

PHO: WHY IT CAN BE CONSIDERED A GLOBAL DISH/RECIPE
H-Muer Kpa
Mentor: Dr. Ashli Quesinberry Stokes

Pho originated in northern Vietnam in the early 20th century, from a fusion of French and Chinese inspiration combined with local ingredients. Pho evolved from street food made from leftover beef bones and rice noodles to become a widespread staple, with southern variations later that added more herbs and garnishes. In modern times, it is a global comfort food with numerous regional styles, upscale global fusion, and vegan options as well. Pho is considered global due to its widespread presence in restaurants worldwide, which was driven by Vietnamese migration in other parts of the world, and its capacity to adjust to regional preferences. Pho also thrives in the modern community, where the internet, delivery apps, and social media increases its visibility and accessibility. Pho is often described as a comfort food, because the rich, aromatic broth serves beyond taste– the dish evokes feelings of love and home-cooked warmth, acting as a remedy for a sore throat or chilly day delivering a sense of well-being and nostalgia. Pho is worthy of study because it symbolizes Vietnamese national identity, migration, and culture dissemination. Pho's globalization and development sends rhetorical messages about Vietnamese tradition, resilience, and history–specifically, deep rooted culture values. Overall, this paper will discuss the role the food plays in Vietnamese history and culture through a global lens, and the challenges it brings like everyday people versus professional cooks, as well as culture challenges of appropriation and authenticity, while analyzing the food.

Political Economy of Policing
Akshara Sisodiya, Sarah Nti, Mariana Guzman
Mentor: Martin Shuster

In the past several years, numerous stories of police misconduct have gained attention on the national stage. Notably, these cases happen all over the country, with some going to criminal trial and/or civil trial, while others are settled outside of court beforehand. Previous research on aggregate police misconduct has often been focused on individual cities or states, and has discussed the implications of repeat offenders in lawsuits with police brutality. However, the total cost of these settlements on a national scale and the distribution of the various methods to pay for them is largely unexamined. This project aims to compile aggregate data for the entire United States. Data for this project is being compiled through Freedom of Information Act and Public Records Requests to the top five most populous cities in each US state, with requests for data on police misconduct settlements during the years of 2017 to 2022. The mechanisms of how the settlements were paid out are also being collected, whether they were a part of a city's budget, or if an insurance policy or some kind of risk management trust was used to pay. Using a critical theory viewpoint, the research thus far provides an exploratory view into the financial implications of police misconduct in the United States, and how it varies from state-to-state, and city-to-city. After aggregate data is fully collected, this research will be used to place the economics of policing into a broader political context, and how these trends can shape future police misconduct policy.

Re-evaluating Authorship in the Work of Alfonso Reyes
Genesis Dominguez, Cat Beck
Mentor:

Over the past several months, we have been locating and documenting sources for a translation of Mexican literary critic and philosopher Alfonso Reyes's "Marysas, o el tema popular [*Marsyas, or the Popular Theme*]." In "Marysas," Reyes sets aside traditional notions of authorship in order to revalorize a broader selection of linguistic artefacts – like folklore and sayings – as literary. While the lack of a singular author has traditionally divided these nontraditional artefacts from "high" art, Reyes takes a broader approach to how we understand a source's origins, thereby multiplying the kinds of sources that can be discussed through a literary lens. This has interesting implications for the process of translating: while translation studies often assumes that a singular author is the origin of every work, engaging with this work calls for a reevaluation of this assumption, turning sources into nodes in a web that is rooted in traditions rather than particular authors. In this presentation, we will explore how Reyes' re-evaluation of literature challenges conventional understandings of authorship as its sole source. For our purposes, this wider perspective on authorship also enriches translation work by demanding engagement with sources outside of libraries.

Reality Television and the Effect of Restrictive Requirements
Kaylen Massey
Mentor: Andrew Keener

Reality television has become one of the most popular forms of entertainment in today's society. Its popularity sprung from advertisements claiming that these shows are authentic and unscripted. However, there's more than meets the eye when it comes to behind the scenes since reality television operates as both entertainment and a social experiment, reflecting fame, competition, and surveillance. Producers use control mechanisms such as isolation, manipulation of time and information, and selective editing to ensure engaging episodes. Cast members are often subjected to restrictive requirements that create certain narratives that can be far from the truth. Some examples of this are controlled production environments and contractual limitations. Reality production teams have the power to create their own versions of reality to portray to audiences. Alternatively, cast members end up with reduced freedom and a false version of themselves displayed on television. Despite these limitations, they are often hidden from viewers to maintain the status of an authentic reality, such as selective editing. This refers to production teams intervening to exaggerate points of conflict or strong emotions, even if the events in the final cut did not authentically happen. These restrictions raise several ethical and psychological questions about manipulation and the exploitation of contestants for views. In my research, I plan to explore how these requirements and limitations of reality television affect participants. These restrictions challenge the authenticity of reality television and turn contestants into profit while disregarding their autonomy.

Removing "forever chemicals" (PFAS) from drinking water by filtration
Rokia Sissoko
Mentor: Dr. Mei Sun

Everyone deserves clean and safe water. Per- and polyfluoroalkyl substances (PFAS), or "forever chemicals," are persistent pollutants used in products like non-stick cookware and firefighting foam. They resist conventional water treatment and accumulate in the body, posing long-term health risks, such as cancer and developmental delays. Modern techniques for the removal of PFAS use anion-exchange resins (AER), which capture PFAS molecules through electrostatic attraction. Four ammoniated resins were prepared with carbon (alkyl) chain lengths of one to four. Different bottles of ultrapure water were spiked with a mixture of three PFAS before the addition of each AER at a sorbent dose of 25mg/L. Samples were analyzed using liquid chromatography–mass spectrometry (LC-MS) to quantify residual PFAS concentrations following treatment with each resin. Triethylamine-functionalized AERs showed the highest values for average percent capture of PFAS, followed by tripropylamine, tributylamine, and trimethylamine. These methods could be applied in large-scale water treatment plants to enhance PFAS removal and improve global drinking water safety.

Retrofitting Polymer 3D Printers for Fabrication of Ceramic Components
Mary Elizabeth Zifchak
Mentor: Dr. Lynnora Grant-Kahan

Ceramic additive manufacturing enables the production of strong, heat-resistant components, yet much of the available slurry-based equipment is adapted from polymer printing systems, creating challenges for ceramic processing. Purpose-built ceramic printers are often costly and restrictive, limiting opportunities for parameter modification and research innovation. This project combines a literature review of ceramic processing requirements with initial efforts to adapt commercial polymer-based printers for ceramic feedstocks. Two systems are under development. The first is a resin-based digital light projection (DLP) printer that uses a moving FEP film and a doctor blade to spread ceramic slurry for each layer, enabling a continuous, automated process inspired by conventional doctor blade techniques. The second system modifies a fused deposition modeling (FDM) printer with a hardened steel nozzle to extrude alumina ceramic filament. This work investigates the mechanical requirements for ceramic printing and evaluates how consumer-grade equipment can be adapted for ceramic feedstocks. The aim is to establish open printer systems that serve as benchmarks for future research for integrating in situ dimensional metrology. Ultimately, this research seeks to broaden access to ceramic additive manufacturing for educational and research applications.

Revising for a Reason: Impacts from First Draft to Final
Haley Essen
Mentor: Madelyn Colonnese

Mathematical writing instruction and its revision process are often neglected or overlooked across curriculums in developmentally impactful grade levels, which is detrimental when the opportunity to implement it is at educators' fingertips. The purpose is to discover how the process of students selecting and revising their mathematical writing with the intention of sharing it with family, caregivers, and classmates shapes students' composition of writing from the first draft to the final draft. Using existing research, I will develop a rubric to analyze students' initial and final drafts. Some aspects I will analyze include: mathematical vocabulary, sentence structure, and math reasoning. Our research will be drawn from a population of students in a school located in the northeast who demonstrate the importance of the revision process within mathematical writing. Revision is a chance for educators to witness growth, a tool for assessment and learning, and a motivator to independently problem-solve through communication. Students are required to meaningfully dissect and correct their own work samples after they have advanced further academically, which causes them to intentionally reflect. Through direct application, students will have improved their communication through higher-level vocabulary, increased articulation and justification of answers, thoroughly detailed representations, and maximum understanding. As research continues, it examines student writing samples, established peer-reviewed mathematical articles, NUE students' pre- and post-assessments, and scoring rubrics. Writing revisions help catapult students' range of mathematical vocabulary, boost fluent sentence structure, strengthen logical reasoning, influence student motivation, and significantly shift their critical thinking mindset.

Rewiring Through Trauma: Familial Abuse, Neural Development, and Psychiatric Outcomes in Adolescence
Abby Malembi
Mentor: Dr. Erika Montanaro

Childhood and adolescent maltreatment is a significant risk factor for the development of psychiatric disorders, yet the mechanisms that explain how abuse affects the brain remain complex. This literature review synthesizes research on the neurobiological effects of emotional, physical, and psychological abuse, highlighting how these experiences alter brain regions responsible for emotion regulation, cognition, and stress responses. Evidence demonstrates that maltreatment affects amygdala reactivity, hippocampal volume, prefrontal functioning, and neurotransmitter systems, while also disrupting the hypothalamic-pituitary-adrenal (HPA) axis and contributing to allostatic load. These alterations increase vulnerability to psychiatric outcomes including depression, PTSD, and schizophrenia, with neuroimaging studies indicating latent vulnerabilities that may not manifest until later in life. Despite these risks, findings also emphasize the brain's plasticity during adolescence, suggesting opportunities for recovery when positive environments and interventions are provided. Pharmacological treatments, trauma-focused therapies, community-based supports, and emerging preventive approaches are discussed as potential pathways to resilience. Taken together, the literature underscores both the enduring consequences of maltreatment and the need for integrated, multifaceted interventions to reduce psychiatric vulnerability and promote long-term recovery.

Robot Path Planning Using Screw Linear Interpolation
Sean Devlin
Mentor: Srinivas Akella

Robot systems are typically very good at positioning their end-effector precisely at specified locations, but often lack specificity when moving between positions. Some manipulation tasks require certain constraints on the robot's motion as it moves, such as moving a glass of water or opening a door. A robot tasked with moving a glass of water must keep the glass level throughout its movement to prevent spilling, and when opening a door, the robot must move in a smooth arc about the door's hinge. These motion constraints must be satisfied at every point along a robot's path, which can prove challenging for typical motion interpolation systems. In this research, we explore an alternative method for specifying robot motion, using dual quaternions for representing position and rotation in 3d space, and Screw Linear Interpolation (ScLERP) for navigating between these defined positions. This representation should allow motion constraints to be captured implicitly, without needing to be specified by a human operator. We plan to implement and verify the effectiveness of this method through experimental trials with a physical robot arm.

Role of Religious Morality in U.S. Democratic Governance
John Hand
Mentor: Mark Sanders, Stephen Cheyney, Melinda Adnot

U.S. democracy was founded upon ideals of liberty, justice, and equality that were deeply informed by religious and moral traditions. This project investigates how religious morality has shaped—and continues to shape—American democratic governance through its influence on constitutional interpretation, civic virtue, and public policy. Drawing from legal scholarship, historical analysis, and contemporary case studies, the research examines the evolving relationship between religion and state authority from the nation's founding to the modern era. The study explores major Supreme Court decisions, including *Everson v. Board of Education* (1947), *Lemon v. Kurtzman* (1971), *Employment Division v. Smith* (1990), and *Burwell v. Hobby Lobby* (2014), to illuminate how courts have negotiated the tension between religious freedom and governmental neutrality. It also evaluates the roles of religious movements across the political spectrum in shaping current political debates, such as those surrounding abortion, LGBTQ+ rights, and education policy. Findings suggest that religious morality has served both as a source of ethical cohesion and as a catalyst for polarization within democratic life. The project concludes that balancing religious conviction with democratic pluralism remains a central challenge for the United States. By situating these dynamics within historical, legal, and sociopolitical contexts, this research contributes to ongoing interdisciplinary discussions about how moral frameworks can strengthen, complicate, or redefine democratic governance in a religiously diverse society.

School Choice Policy and Students with Disabilities
Alyssa Fowler
Mentor: Jason Giersch

A number of states have begun to adopt school choice policies that are intended to increase schooling options for students. These choices primarily show up in two ways: charter schools, which have been around for several decades, and private school vouchers, which only recently have become more common. Advocates of such policies point out that vouchers provide more options to more students. Yet, do students with disabilities (SWD) have the same array of choices as their non-disabled counterparts? The Individuals with Disabilities Education Act (IDEA) is a law that protects SWD in their pursuit of education by requiring public schools to provide a "free and appropriate public education." However, this law does not apply to private schools, which are free to serve students as they are able and find appropriate by their own judgment. While charter schools are public entities and must adhere to IDEA, research has found that SWD are underrepresented in these schools and often counseled out of attending. Private schools have even fewer regulations -- do they exclude SWD? By conducting interviews and surveying parents of SWD in North Carolina, we seek to examine how expanding school choice policies affect students with disabilities and their perceived educational opportunities. From this, we will produce a research article that conveys our findings and use them as an example to inform school choice policy around the country.

Screens and Attention Spans
Taylor McHone
Mentor: Dr. Keener

Screens have become an indispensable part of modern life, serving countless purposes across education, entertainment, and social connection. From virtual classrooms to streaming platforms and social media feeds, screens offer convenience, access to information, and a window into the lives of others. Their versatility has made them a staple in homes, schools, and workplaces. However, as screen time continues to rise across generations, the drawbacks of this digital immersion are becoming increasingly apparent.

While technology has undoubtedly enhanced communication and learning, it has also introduced a host of mental health concerns. Numerous studies have identified a troubling correlation between excessive screen use and the rise in conditions such as ADHD, anxiety, depression, and other psychological disorders. These issues are particularly pronounced among younger individuals who are growing up in a screen-saturated environment. The constant stimulation, rapid content consumption, and social comparison facilitated by screens can contribute to emotional dysregulation and reduced attention spans.

Moreover, the passive nature of screen engagement often replaces physical activity, face-to-face interaction, and restorative downtime—all of which are essential for mental well-being. As digital devices become more integrated into daily routines, it's important to recognize the potential consequences of overuse. While screens are undeniably useful tools, their impact on mental health should not be overlooked. Striking a balance between screen time and offline experiences is crucial to fostering healthier habits and mitigating the risks associated with prolonged exposure to digital media.

SEM Characterization of Crushed Battery Electrode Surfaces
Bruno Salvi, Jake Kaupang
Mentor: Anthony Bombik

This undergraduate research project investigates the mechanical degradation of commercial lithium-ion pouch cells subjected to impact forces and introduces the concept of structurally embedded batteries (SEBs) as a resilient alternative. Commercial batteries were systematically damaged using a drop weight machine to simulate mechanical abuse. Scanning Electron Microscopy (SEM) was employed to image the resulting microstructural damage, focusing on the electrodes. SEM analysis revealed critical damage mechanisms, including cracking, delamination, and morphological changes in the active materials and separator, providing a visual correlation for macro-scale performance degradation. By quantifying the extent of this structural damage, we aim to correlate micro-scale features with the loss of active lithium and the subsequent reduction in future cycling performance and capacity. This analysis informs the development of SEBs, which are currently being prototyped for manufacturing. SEBs integrate energy storage directly into a load-bearing structure, offering superior mechanical robustness to resist impact-induced degradation. Ultimately, this work provides a comprehensive understanding of mechanical failure in traditional batteries and establishes a critical foundation for designing impact-tolerant, next-generation structural energy storage systems.

Shaping Families & Identities: Parenting Through the Lens of Race and CultureAuthor: Kennedy Frink
Kennedy Frink
Mentor: Dr. Mindy Adnot, Dr. Kendra Jason, Dr. Victoria Rankin

Early parenting research has been heavily dominated by Eurocentric ideals and perspectives, excluding the experiences of those from various racial, ethnic, cultural, and socioeconomic backgrounds. By leaving out these diverse experiences, a limited understanding of how systemic issues and inequalities directly impact the parenting practices of those in marginalized communities remains. The goal of this literature review is to explore how historical and socioeconomic experiences have shaped African Americans' family structures and parenting approaches, with a specific focus on African American mothers. Due to the intersection of race, gender, and class, mothers are typically prominent figures in maintaining family routines and stability. In preliminary research, I find that many African American mothers face structural and economic obstacles stemming from a history of discrimination and economic limitations, resulting in maternal parenting strategies that balance protection and care, which can be misinterpreted as "harsh" or authoritarian by those unfamiliar with cultural and historical context. However, these patterns or strategies are not a monolith but rather represent one of many diverse approaches mothers adopt to navigate social realities. The purpose of this literature review is to create awareness of the experiences of African American mothers, contributing to the idea that all communities of parents should be viewed through a cross-cultural perspective to promote human connection and understanding. By doing this, the implementation of laws, policies, and programs that can better and more effectively support families from marginalized backgrounds can be enacted. Through extensive research on existing studies and discussions from a six-week seminar highlighting the intersectionality of race, ethnicity, culture, and parenting, this literature review aims to connect historical precedents with modern maternal parenting approaches.

Simplifying Causal Extraction and Inference in Computational Social Science using Agentic AI Frameworks
Abhinav Biju
Mentor: Siddharth Krishnan

Authors: Siddharth Krishnan, Abhinav Biju, Saajan Patel, Gowshik Saravanan

Causal extraction and inference are growing components of computational social science, allowing research to derive and quantify cause-effect relationships between variables. Current stages of causal modeling of observational data include defining causal questions, building directed acyclic graphs (DAG), identifying types of variables, selecting estimation strategies for counterfactual outcomes, and validating results. Manual execution is time-intensive and technically complex. This project, however, proposes an agentic AI framework that collaborates with researchers across these stages. Unlike existing methodologies that only provide isolated assistance with model creation, estimation strategies, and analysis, our system allows for shared context throughout the workflow. The agent reasons about the structure of a dataset, proposes identification strategies, verifies logic with the user, and autonomously generates and runs code for specialized analyses. Our approach for developing this framework integrates existing causal inference and extraction libraries, large-language-model (LLM) based code generation, and safety guardrails within a multi-agent architecture. Early work involves prototyping the architecture and benchmarking on social media datasets. We expect accurate, interpretable results that reduces manual workload and anchors to conceptual foundation. The success of this project allows for transparent and accessible causal reasoning, allowing for time and cost efficient testing of hypotheses on social science datasets, allowing prioritization of insights over data exploration and analysis.

Strains to Strength: A Workshop Series on Workforce Emergency Preparedness in Health Systems
Eunice Okyere
Mentor: Alicia Dahl, George Shaw, Robert Fox, Faith Neale

Background: Disasters place immense strain on health systems, particularly on their workforce. Increased demand for care during emergencies can often collide with pre-existing system vulnerabilities, such as staffing shortages, leading to an increased risk to the delivery of care, compounded stress, and mental fatigue among healthcare professionals. As the frequency and severity of disasters continue to rise, with the United States experiencing 23 weather and climate events exceeding $1 billion in damages each from 2020 to 2024 alone, proactive workforce planning becomes essential for the delivery of care. Health systems must prioritize strategic emergency preparedness to ensure business continuity and to safeguard staff well-being during crises. **Methods:** In this project, three workshops will be conducted on healthcare workforce resource management during disaster emergencies. The workshops will be conducted on one day over three weeks, each focusing on a distinct theme: Foundations of Workforce Preparedness, Leadership and Communication, and Technology and Modeling. Each session will last approximately for 2 hours. **Results:** Collected data will be analyzed to identify common challenges, strategic priorities, and systemic vulnerabilities. Key themes from the workshops will be presented at the Honors Research Symposium. **Discussion:** The potential impact of these workshops is to generate meaningful insights from a diverse range of academic and professional disciplines, with the goal of integrating those perspectives into the healthcare industry. Future trainings should teach scalable interventions that address resource management gaps, such as predictive staffing models, adaptive scheduling tools and other suggestions that will be presented at the Honors Research Symposium.

Structure and Prioritization of Advanced Learning Around the World
Isabella Mariani
Mentor: Dr. Cindy Gilson

The fields of gifted and honors education are designed to give students opportunities to grow beyond a set curriculum and reach their full academic potential. A noteworthy intersecting topic in these fields is that many countries around the world do not have an unbiased system in place to adequately teach gifted and honors students of all socioeconomic statuses. Also, many countries have strong cultural beliefs and institutional biases that significantly impact the way giftedness is identified. This project is important because it highlights the persistent inequalities that are seen in global education systems, and it goes into depth about how national priorities differ. By analyzing differences in the structure and culture, we can start to see the patterns that can make more equitable global practices for gifted and honors education. The anticipated result of this project will be an important contribution to the fields of gifted and honors education because they will provide a comparative understanding of how economic status, culture, and government policy intersect and shape the learning of both types of advanced learning. This project specifically investigates the research question: How does the structure and prioritization of gifted and honors education differ in developed and developing countries around the world? To answer my inquiry question, I conducted a review of scholarly articles, reports, videos, and book chapters discussing the programs in different countries around the world. This project is still in progress; however, I anticipate that the answer to my inquiry question will likely reveal that developed nations prioritize innovation and research within gifted and honors programs, while developing countries prioritize identification and access. In conclusion, the results of this project will be especially useful for educators, policymakers, and international education organizations aiming to design more inclusive gifted and honors programs.

Student Food Security: An All-Encompassing Resource for UNC Charlotte Students
Rebecca Tirko
Mentor: Dr. Jessica DeMarco and Dr. Alicia Dahl

Background: In 2023-2024, 41% of college students were food insecure (FI). This key transitional life period is a crucial point to disrupt the health impacts of FI. Students experiencing FI often experience mental health challenges, increased risk of non-communicable diseases (NCDs), and often have lower grades, GPAs, and graduation rates. This project aims to address college student FI and its links to NCDs, helping our students live healthy, successful lives. **Methods:** Phase one involved a literature review (Jan-Apr 2025) using PubMed, Google Scholar and the UNC Charlotte Atkins Library databases. In phase two, an electronic resource guide for students to navigate the campus food environment is being developed. **Results:** The literature review identified three key issues: student lack of resource knowledge, the detrimental effects of stigma, and the substantial long-term health effects it can cause. Based on the results of my literature review, I am developing a resource guide that will focus on student resource knowledge, NCD risk understanding, and decreasing student stigma. My booklet includes a campus map of food locations with Nutrition Environment Measurement Survey (NEMS) scores for the grab and go spots on campus including vending machines, simple NCD risk information, and an exhaustive list of resources for students experiencing FI. The guide will be distributed at the Jamil Niner food pantry, student health services, and other on-campus offices that help our students. **Discussion:** My booklet aims to be a resource guide to help students experiencing FI feel less stigma, get the help they need, and live long healthy lives. We know that students experiencing FI are more likely to continue experiencing FI after college, and into early adulthood. Students are hungry, and it is creating added stress in their lives, impacting their long-term health outcomes, as well as decreasing their chances of graduating by 42%.

Synoptic Analysis of Heatwaves in the Charlotte Metropolitan Region
Victor Avila
Mentor: Matthew Eastin

The Charlotte Metropolitan Region (CMR) is one of the many city-based regions known to experience hazardous summer heat on an annual basis. Moreover, the CMR has experienced rapid growth over the last two decades. Synoptic scale weather patterns are the driving force behind the onset and cessation of heatwave events. While the general synoptic pattern for global heatwaves is well known, identifying features unique to CMR heatwaves can reveal insights into the evolution of such events within the context of the region's distinct physical geography. Utilizing RAP/RUC weather model analyses from the National Center for Environmental Information (NCEI) archive, all CMR heatwaves during 2011-2024 were identified as any three consecutive dates when the daily maximum temperature at the Charlotte airport exceeded 90°F. Next, all dates comprising an event were classified as either first, middle, or end, with heatwaves lasting longer than three days having multiple middle dates. Next, composite synoptic maps of multiple relevant weather parameters (such as heat index, precipitation rate, winds, relative humidity, etc.) were created for each date classification in order to depict the average synoptic pattern throughout the lifecycle of a typical CMR heatwave. The maps revealed that on average a CMR heatwave consists of a high-pressure system, with a clockwise circulation, moving eastward across the Southeast. This flow gets progressively weaker with time, allowing late afternoon thunderstorms to become more prevalent. Most CMR heatwaves end on dates when afternoon storms became widespread across the area. Details about how individual weather parameters exhibited distinct signatures marking the beginning, middle, and end of a CMR heatwave will be presented at the symposium. Overall, this synoptic analysis of CMR heatwaves will help local weather forecasters, urban planners, and regional governments better prepare for and mitigate future heatwave events.

The Effects of Latino Misrepresentation in Film on Audience's Perceptions of Real-World Latinos
Cristina Juarez
Mentor: Mindy Adnot, Paloma Fernandez Sanchez, Will Davis

In the United States, films have enriched the lives of American audiences as a form of entertainment, however, films also influence how audiences see the world with the messages and portrayals they carry. Latino representation in film has been an ongoing issue due to underrepresentation in roles, despite Latinos being the largest ethnic minority in the United States, and due to stereotypical portrayals. In this literature review, I draw from previous studies to find how has Latino representation in film has evolved over time and what implications these portrayals have on audiences. These audiences can fall into the world of film, often internalizing fictional themes and the stereotypical portrayals of Latinos they see on screen, which can cause a particularly strong influence on the perceptions of non-Latino audience members if they don't have Latino exposure. Even Latino audiences can be negatively impacted by these portrayals, often feeling self-conscious of their identity or feelings of anger and shame. By examining past literature, I aim to highlight the importance of film messages and their effects in regards to Latino representation in order to bring awareness to both filmmakers and audiences to be cautious of the portrayals being put out and consumed into society.

The Habitat Preferences of Juvenile Northern Dusky Salamanders Along an Urban Gradient
Emma Miller
Mentor: Sara Gagné

Urbanization causes significant changes to ecosystems, including reduced biodiversity, altered water cycles, and disrupted food webs. In lotic systems, these effects typically follow a pattern known as the "Urban Stream Syndrome". A component of this syndrome is the decline of species richness in urban streams, including for salamanders. The main threats salamanders face include reduced canopy cover, contaminants, and ground cover changes. Juveniles are especially affected by these changes, as they are fully aquatic and vulnerable to predators. I propose to further this knowledge by exploring how local habitat features, including canopy cover, ground substrate, and depth affect salamander reproduction, which is represented by the number of juveniles present. This study will be accomplished by conducting visual encounter surveys and collecting habitat features at 30 stream sites to model habitat selectivity. The results of this study will support an understanding of stream characteristics that better support juveniles in urban and urbanizing landscapes.

The Identification of Twice-Exceptionality and Examining Barriers to Identification
Kai Norris
Mentor: Melinda Adnot, Cindy Gilson, and Kristi Godfrey-Hurrell

For the past 50 years, there has been increasing awareness of students who present as both gifted and having a disability. Known as twice-exceptionality, this field of study has grown rapidly since the 1970s, when federal legislation defined the terms "gifted" and "disabled." Despite increased advocacy for this population, many questions remain unanswered regarding how best to identify and support twice-exceptional students. In this project, I examined how twice-exceptionality is defined, identified, and what the primary barriers to identification are. This literature review explored the existing research on twice-exceptionality, with a focus on identification practices and challenges. While other research in the field has focused on school experiences and educator perspectives, there is a notable gap in the literature on the diagnostic process for twice-exceptional students. This review aimed to address the discrepancy in research regarding how twice-exceptionality is recognized. The literature suggests a major underidentification issue due to limited comprehensive assessment, little overlap between special and gifted education, and limited understanding of twice-exceptionality. Additionally, masking and complications resulting from comorbidity influence how twice-exceptional students present, potentially leading to misdiagnosis or missed diagnosis. Considering the importance of early intervention, these findings indicate a need for more research in the field of twice-exceptionality, particularly regarding the identification process. This would allow for a better understanding of how to recognize and support twice-exceptional students, improving their educational experiences, and giving them the opportunity to thrive.

The Impact of Growth Mindset for Honors and Gifted Learners.
Wallace Love
Mentor: Dr. Cindy Gilson

The fields of gifted and honors education are filled with students demonstrating unique skills that make them successful in a classroom setting. Many of these students have a growth mindset where students learn from mistakes and see their setbacks as step forwards in their academics. The literature has mixed results. Some experts have found that with a growth mindset, honors and gifted students embrace challenges to learn from, are extremely dedicated to their work for their future, and grow from any experience they face. Other experts have found that growth mindset interventions do not work. This project is important because more gifted and honors learners can reach their full potential by instilling this mindset. My inquiry question is "What's the importance of a growth mindset for gifted and honors students?" To answer my inquiry question, I gathered information from research reports that cover growth mindset experiments in a classroom, videos from experts in the growth mindset field, book chapters that provide insight on gifted and honors students, and general sources that go over how to build a growth mindset. This project is still in progress; however, I anticipate the answer to my inquiry question will be that it gives gifted and honors students a mentality to persevere through challenges and to be open to feedback to enhance their learning. In conclusion, the results from this project will be beneficial to both the teacher and their students.

The Impact of Redlining on Black Wealth
Morgan Hatcher
Mentor: Dr. Mindy Adnot, Dr. Chris Cameron, Dr. Kendra Jason

In the 1930s, the Home Owners Loan Corporation (HOLC) created color coded maps, marking areas with high Black and Indigenous populations with red to indicate they were "high-risk" areas. These maps were given to the Federal Housing Association (FHA) and local banks to decide which applicants were credit worthy, and who was not. Redlining is the practice of denying a creditworthy applicant a loan for housing in a certain neighbourhood even though the applicant may otherwise be eligible for the loan. The goal of this literature review is to understand the impact of redlining on today's society and on Black generational wealth. The research shows that through the use of quasi-experimental designs, some researchers find correlations between modern low income neighborhoods and historically redlined areas. Additionally, explain the racial wealth gap, some researchers attribute the difference in income to a gap in financial literacy, savings and investment; however, this is not a widely accepted outlook on the wealth disparities. Another hypothesis for the wealth gap is inheritance. Within the available literature, the general findings are that redlining resulted in underfunded Black neighborhoods, chronic poverty, and has restricted the chances of economic mobility for Black Americans.

TickBusters: Investigating tick-borne diseases in North Carolina
Wynn Oo
Mentor: rvieira@charlotte.edu

Ticks (*Acari: Ixodidae*) transmit various pathogens through blood feeding, causing underreported tick-borne diseases (TBDs) in the U.S. This research builds upon previous findings to improve our understanding of TBD spread and inform public health recommendations for exposure reduction and prevention strategies. We focus on tick species occurring in North Carolina: the Lone Star tick, *Amblyomma americanum* Linnaeus, 1758, and the Gulf Coast tick, *Amblyomma maculatum* Koch, 1844. The Lone Star tick is known for transmitting *Ehrlichia* spp., *Rickettsia* spp., Heartland Virus, and Bourbon virus. It has also been associated with the alpha-gal syndrome, commonly known as red meat allergy. The Gulf Coast tick, usually prevalent in the southeastern U.S., has been spreading north, and it is the vector of *Rickettsia parkeri,* which causes a mild form of Spotted Fever in infected humans.

Our research involves the collection of ticks in public parks of Mecklenburg County, by using dragging and flagging techniques. We are also developing skills in both wet and computational labs to enhance our ability to identify ticks by species, gender, and developmental stage. We use taxonomical keys in our identification process. This research contributed to active surveillance data, helping assess the likelihood of encountering ticks on and off trails in various environments. Currently, no vaccines are approved for human use in the U.S. to prevent TBDs, and the primary strategy remains focused on preventing tick bites. Our findings will serve as baseline data and further contribute to ongoing efforts to improve TBD prevention, early diagnosis, and other public health strategies.

Trajectory Generation & Power Modeling For Solar-powered UAV Networks
Mohammad Hasan
Mentor: Ran Zhang

Solar-powered drone networks could keep our phones and sensors connected anywhere, anytime without building new towers. This project explores how fixed-wing UAVs can work together like a smart, self-sustaining team. When demand is low, some drones climb to sunnier skies to recharge on solar energy. When demand spikes, freshly charged drones swap in to keep coverage strong. We pair physics-based energy estimates with reinforcement learning that learns when each drone should serve users and when it should go "soak up the sun". The big idea: manage charging as carefully as connectivity, so the network never runs out of power. The payoff is resilient, greener communications that adapt to users and the weather in real time.

Understanding the History of Planned Communities and the Impact of Post Hurricane Helene in Swannanoa
Kaylie Vong
Mentor: Emily Makas

Swannanoa is a community located in the mountains of Buncombe County, North Carolina, ten miles east of Asheville. Swannanoa is home to two early-twentieth-century planned neighborhoods, Beacon Blankets and Grovemont, each of which was built to serve a different socioeconomic population. Swannanoa is situated in a valley alongside the Swannanoa River, making it particularly vulnerable when Hurricane Helene struck. Topographical studies and personal accounts reveal how the surrounding mountains and river systems contributed to the severity of the disaster. This study will explore how the two communities, Beacon Blankets, and Grovemont, were developed and contributed to Swannanoa's population. While Grovemont was built on slightly higher ground and prioritized well built homes for middle class families, Beacon Blankets was built closer to the river to support working class families at a nearby mill. This study will also look into how Hurricane Helene damaged both communities and how their development and formation plays a role in the restoration and recovery efforts today.

Understanding the Variability of Total Response Techniques (TRTs): A Qualitative Study of Teachers' Perceptions of their Practice

Livie Apple
Mentor: Dr. Hilary Dack, Dr. Mindy Adnot, Dr. Holly Johnson

Student engagement is essential to learning, yet many classrooms still rely on strategies that allow only a few students to participate. Opportunities to Respond (OTRs) are known to increase engagement, improve academic outcomes, and reduce disruptive behaviors; however, teachers often implement at rates far below the recommended three per minute, averaging just .65 in middle schools. To address this issue, this project introduces **Total Response Techniques (TRTs)**, an author-created instructional framework that extends OTRs by requiring all students to respond to higher-order thinking questions. TRTs uphold the five core teacher actions of OTRs: prompting, questions, allowing wait time, monitoring, and providing feedback, while ensuring full-class cognitive engagement.

This study focuses on middle general education teachers, a group that is underrepresented in existing research, which has primarily examined elementary and special education contexts. Using a constructivist, interpretivist approach, I conducted semi-structured interviews with seven teachers from the Charlotte area. Data will be analyzed through open, selective, and axial coding, utilizing NVivo and analytic memos, to explore teachers' perceptions of their use of TRTs, their effectiveness, and the barriers to implementation. Alongside the study, I designed and facilitated a six-session seminar for first-year honors students, introducing TRTs and demonstrating how these strategies can be applied across various disciplines. Together, the research and seminar emphasized the potential of TRTs to support equitable participation, improve instructional practice, and foster deeper learning in both K-12 and higher education settings.

Utilization of Lipid Anchor Analogue Probes to Study Bacterial Glycan Assembly

Morgan Barnette
Mentor: Dr. Jerry Troutman

Bacteria produce a repertoire of unique complex bacterial surface polysaccharides, known as glycans, that direct interactions with their environment and whether the interaction is pathogenic or symbiotic. Functions of glycans include but are not limited to assisting the formation of biofilm, adhering to various surfaces, and modulating hosts' immune system. Glycans known to have symbiotic function, such as Capsular Polysaccharide A, are a candidate for therapeutic application once isolated as they stimulate anti-inflammatory processes. Many glycans are natively formed on the lipid anchor, bactoprenyl phosphate (BP). This long hydrocarbon chain is difficult to synthesize using traditional chemical methods and cannot maintain solubility in aqueous solution due to its hydrophobicity. The Troutman lab has synthesized short chain analogues that are less hydrophobic and are more readily synthesized with chemical modifications to track the assembly of glycans. In the native enzymatic assembly of glycans, bactoprenol is phosphorylated by a kinase and then a second phosphate and a sugar is transferred onto the anchor by a phosphoglycosyltransferase (PGT) to initiate the biosynthesis of complex bacterial glycans. In this proposed work, four recombinant Escherichia coli strains, each expressing either an empty vector, a kinase, or a PGT will be cultured and introduced to short chain water soluble analogues of BP. The expected product of these trials (analoguePP-glucose) will be detected using reverse phase high performance liquid chromatography (RP-HPLC) with fluorescence and absorbance detection of the probes, respectively. *In vivo* interactions between these enzymes and the applied probes will serve as the foundation for tracking and isolating fully synthesized bacterial polysaccharides for the exploitation of symbiotic glycans.

Visualizing Congressional Partisanship: A Hands-On Approach to Learning Data Structures with BRIDGES
Eric Fackelman
Mentor: Kalpathi Subramanian, Erik Saule

Data structures courses lay a critical foundation for students computational thinking and problem-solving abilities. However, many students struggle to connect abstract representations like graphs, trees and hash tables to meaningful real-world applications. To address this gap, we present a new approach to teaching data structures through the visualization of congressional data using the BRIDGES system. Students work with data structures such as hash maps and adjacency lists to represent congressional networks. These structures are then visualized to reveal patterns of collaboration and partisanship, allowing students to draw connections between data structures and real-world systems. By combining civic network data with interactive visualizations, this approach offers promise to make data structures more engaging and conceptually intuitive for students.

Wearable Flexible Sensor for Performance Management
Shrushti Gandas
Mentor: Roger Tipton

Tethered flexible sensor gloves are essential for high-fidelity hand kinematics (rehabilitation, robotics) but restrict user mobility. This undergraduate project addressed this by integrating a compact, low-power Bluetooth Low Energy (BLE) module into the glove platform. Custom firmware was developed to facilitate efficient, real-time data streaming from embedded flexion and pressure sensors. Validation confirmed sustained 100 Hz data transmission over 10 meters and over six hours of continuous battery operation. This work delivers a successful untethered kinematic sensing solution, significantly broadening the real-world application of the flexible sensor glove.

What are the impacts of growing up in academically gifted programs? How do accelerated learning programs affect motivation, psychological well being and creativity?
Zion Long
Mentor: Dr. Adnot, Dr. Gilson, Professor Matthews

The labeling of academic giftedness can have significant impacts on an individual's psychological well being, motivation, perfectionistic tendencies and creativity. Understanding the complex interplay of these factors is essential to providing a more holistic understanding of how academic giftedness affects a child and student. By examining these dimensions, educators and researchers can better support gifted individuals in navigating both their challenges and their potential, ultimately enhancing their academic and personal development. This literature review examines the effects of giftedness in these dimensions, drawing on 21 peer reviewed and scholarly sources to understand and evaluate how accelerated learning programs and academic giftedness impacts these different dimensions of an individual. Contrary to common assumptions, giftedness does not affect psychological well being, perfectionism, creativity or motivation. Instead, research points to parenting, environment and support systems are better predictors of these domains. Debunking the myth that social exclusion and unhealthy perfectionism are inevitable consequences of giftedness is an essential step in creating a positive accelerated learning environment. Understanding the importance of parental influence, motivation and creativity is something that is also essential in navigating possible challenges in the accelerated learning environment.

Women Printers and Religious Domestic Publishing in Early Modern France and Europe
Abeer Saleem Naznin
Mentor: Amanda Pipkin

This project examines the role of women printers in 16th and 17th century France and the spread into Europe. Focusing on religious domestic as well as academic literature published between 1529 and 1691, we seek to understand how women printers helped shape moral and devotional life through texts intended for use in the home. Beginning in France, where early evidence of women printers is most prominent, the project traces how their work and networks extended into neighboring regions, particularly the Netherlands and other parts of Europe. Compiling a database of women printers and their publications using *Early English Books Online, WorldCat,* and other catalogues, each record will include who printed what, when, where, in which languages, and by which authors. Using GIS software, the geographic spread of these publications help visualize how women printers contributed to broader European patterns of religious and academic printing. This research will highlight the cultural, spiritual, and professional influence of women printers and demonstrate how digital mapping can uncover transnational networks of faith, gender, knowledge, and print that connected life across regions.

"They Just Don't Understand" Exploring the Barriers to Effective Communication of Mental Health Issues Among Children of Displaced Families
Say Paw
Mentor: Alicia Dahl, Jessamyn Moxie

Background: Due to war, extreme poverty, violence, or natural disasters, refugees often develop a variety of mental health issues including psychological distress, post-traumatic stress disorder (PTSD), depression, and anxiety. Due to barriers such as cultural stigma, refugees might not seek mental health services. Studies are limited around refugee families' mental health, however, it is known that children who don't receive interventions for mental health are more likely to experience depression and anxiety, get involved in crime, or engage with bad influences. **Aim:** To examine why children of displaced households have a harder time seeking trauma-informed care and discussing mental health with their parents. **Methods:** I will analyze both primary and secondary data conducted by myself via post survey and data from organizations such as Camino Health, El Faro by El Futuro, and Carolina resettlement agency. Primary data will be collected through the creation of a conversation card deck activity that displaced children would play with their parents. A post activity survey will be completed afterwards. A minimum of three displaced families will be recruited through organizations such as churches and programs that work closely with resettled populations. By utilizing University resources such as Atkin's Library Maker's Space, I will create a card deck to distribute to these families. The cards will consist of 15 different prompts, each with conversation starters on mental health. Every card, including instructions, will be translated both in English and Spanish. **Results:** Qualitative and quantitative data will be collected via survey from children of displaced families who have participated in the interactive activity. The results will be summarized by analyzing the number of participants, similar responses, perspectives, and outliers from the survey responses.

Thank You to Everyone Who Helped Organize and Support the 2025 Honors Research Symposium!

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