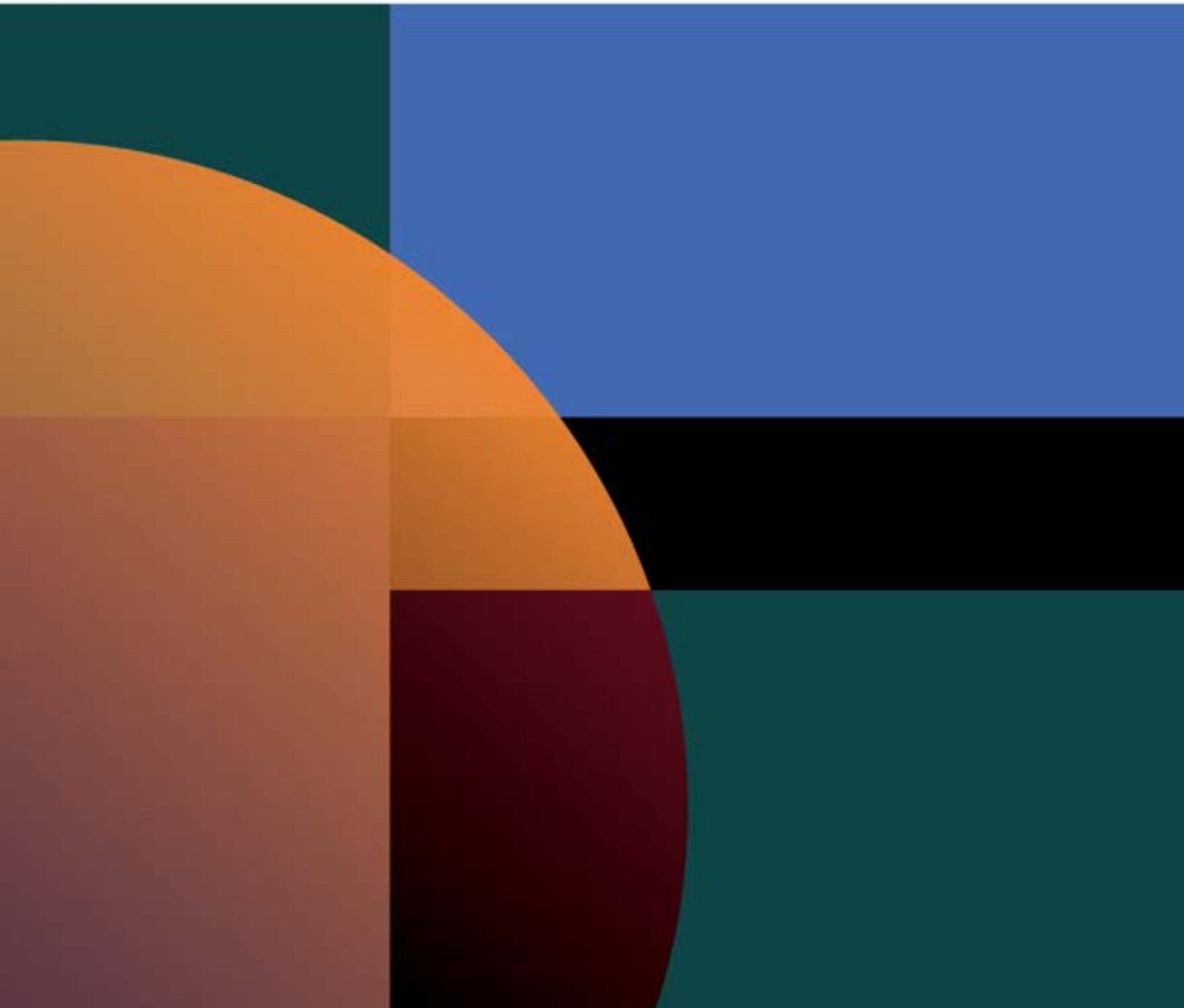
CUNY Research

CUNY CELEBRATION OF UNDERGRADUATE RESEARCH 2025

FRIDAY, MAY 23

JOHN JAY COLLEGE OF CRIMINAL JUSTICE

524 W. 59th STREET, NEW YORK, NY 10019



This celebration is organized and sponsored by the **CUNY Office of Research** in collaboration with the **CUNY Undergraduate Research Council** (CURC) and with additional funding from the **NYC Louis Stokes Alliance for Minority Participation** (LSAMP).

Please direct inquiries to:

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CUNY Office of Research
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Acknowledgements

Louis Stokes Alliance for Minority Participation (LSAMP)

A special thank you to the **NYC Louis Stokes Alliance for Minority Participation** (LSAMP) for making this event possible with additional funding.

NYC LSAMP is an undergraduate research fellowship program supporting students interested in pursuing STEM majors in one of 11 participating CUNY campuses. NYC LSAMP has played a significant role in CUNY's STEM initiatives since its inception in 1992 and has facilitated access to research opportunities for nearly 500 students in the current phase of the program.

CUNY Undergraduate Research Council (CURC)

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Baruch College	Anthony Maniscalco
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Brooklyn College	Lisa Schwebel
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CUNY Office of Research	Ron Nerio
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Hostos Community College	Andrea Fabrizio
Hunter College	Chris Braun
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Kingsborough Community College	Farshad Tamari
LaGuardia Community College	Rejitha Nair
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Macaulay Honors College	Lisa Brundage
Medgar Evers College	Shu Han
New York City College of Technology	Susan Schroeder-Davide
Queens College	Alicia Melendez
Queensborough Community College	Urszula Golebiewska
School of Labor and Urban Studies	Anna Zak
The City College of New York	Claude Brathwaite
York College	Ruel Desamero

Reviewers

The Office of Research and the CUNY Undergraduate Research Council (CURC) thank the following faculty and staff members for reviewing posters during the celebration:

Baruch College	Troy Heffron
Brooklyn College	Tracy Wong
Bronx Community College	Neal Philip
CUNY Central Office	Jojo Karlin Michael Guy Donette Cherry Sherie Holder Kofie Osei YangYun Kim Martin Lee
Graduate Center	Emma Anquillare
Guttman Community College	Ji Kim
John Jay College of Criminal Justice	Edgardo Sanabria-Valentin Caranza Brito
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Lehman College	Laura Oliveira
Queens College	Alicia Melendez
Queensborough Community College	David Sarno Sharon Lall-Ramnarine Urszula Golebiewska
School of Labor and Urban Studies	Anna Zak

UNDERGRADUATE RESEARCH CELEBRATION 2025

Friday, May 23, 2025

Program of Events

TIME	EVENT	ROOM
9:00 - 10:00 am	**Registration and Light Breakfast**	**New Building Lobby**
10:00 - 11:25 am	**Welcome Addresses** Dr. Ron Nerio, Research Programs Director, CUNY Office of Research Dr. Rosemarie Wesson, Associate Vice Chancellor for Research **Keynote Address** Dr. David Gruber, Distinguished Professor, Baruch College and CUNY Graduate Center, "The Application of AI and Advanced Robotics to Translate Whale Communication" **Theater Performance** Queensborough Community College Theater Program, excerpt from *HIT THE WALL* by Ike Holter	**Gerald Lynch Theater**
11:25 - 11:45 am	**Break**	
11:45 - 12:45 pm	**Poster Session A** ASRC, Baruch, BMCC, Bronx, CSI, CUNY BA, SLU, Guttman, Hostos, Hunter, ICORP, John Jay, Queens, York	**Gymnasium**
12:45 - 1:45 pm	**Lunch and Tabling**	**Auxiliary Gym**
1:45 - 2:45 pm	**Poster Session B** Brooklyn, KCC, LAGCC, Lehman, LSAMP, Macaulay, Medgar Ever, City Tech, QCC, City College	**Gymnasium**
2:50 – 3:00 pm	**Introducing CUNY Academic Works!** Dr. Jojo Karlin, Scholarly Communications Manager, Central Office of Library Services	**Gymnasium**
3:00 - 3:10 pm	**Announcement of Awards**	**Gymnasium**

Speakers

Welcome Address

Dr. Rosemarie Wesson | Associate Vice Chancellor for Research at CUNY Office of Research

Dr. Rosemarie (Rose) Wesson serves as the Associate Vice Chancellor and University Vice Provost for Research at the City University of New York (CUNY), where her primary focus is advancing the university's research mission. Collaborating closely with the Executive Vice Chancellor and University Provost and Chancellor, she leads strategic initiatives to foster and support research activities throughout CUNY. Dr. Wesson previously served as Associate Dean for Research at the Grove School of Engineering at the City College of New York (CCNY). In 2020, she assumed the role of Associate Provost for Research at CCNY, becoming the chief research officer and advocate for all research, scholarly, and creative endeavors at the college. Her efforts centered on enhancing scholarly research across academic disciplines and establishing new institutional research programs through strategic partnerships within CCNY and CUNY's 24 colleges and institutions. During her 13 years of experience at the National Science Foundation (NSF), Dr. Wesson served as both a Director and Program Director, securing over $100 million in funding. She holds an S.B. in Chemical Engineering from MIT and an M.S. and Ph.D. in Chemical Engineering from the University of Michigan. She is also a licensed professional engineer.

Keynote Address

Dr. David Gruber | Distinguished Professor at Baruch College and CUNY Graduate Center

David Gruber is Distinguished Professor of Biology and Environmental Sciences at the City University of New York, Baruch College and the CUNY Graduate Center Ph.D. Program in Biology. He is also the founder and president of project Cetacean Translation Initiative (CETI), a nonprofit organization and interdisciplinary scientific initiative that is applying advanced machine learning and state-of-the-art robotics to translate the communication of sperm whales. CETI has made pioneering scientific discoveries including the sperm whale phonetic alphabet. His interdisciplinary research bridges animal communication, marine biology, microbiology and his inventions include technology to help perceive the underwater world from the perspective of marine animals.

Introducing CUNY Academic Works

Dr. Jojo Karlin | Scholarly Communications Manager, Central Office of Library Services

Dr. Jojo Karlin is the Scholarly Communications Manager at the CUNY Central Office of Library Services. A former GCDI Digital Fellow and Manifold Graduate Fellow, Jojo received her PhD from the CUNY Graduate Center English program in 2020, illustrating her dissertation on the letters of Virginia Woolf. After a postdoctoral fellowship in Digital Scholarship Services at NYU Libraries, she joined the Office of Library Services to manage CUNY Academic Works, our open access institutional repository, and to support open publishing and Open Educational Resources across the CUNY system.

Performance

Queensborough Community College Theater presents an excerpt from *HIT THE WALL* by Ike Holter

Cast

Mika	Sade Alleyne
Carson	Rylee DaBreo
Cliff	Kyle Flores
Roberta	Christina Liberus
Cop	Kevin Loughlin
Peg	Lesly Montano
Ensemble	Jeffrey Perez
Tano	Milly Santos
A-Gay	Derek Rey Sepulveda
Madeline	Makayla Stroud
Newbie	Wilber Paiz Valenzuela

Production

Assistant Director	Tavion Hamilton
Assistant Stage Manager	Diana Hernandez
Production Assistant	Omar Pichardo
Production Stage Manager	Ash Rutella

Band

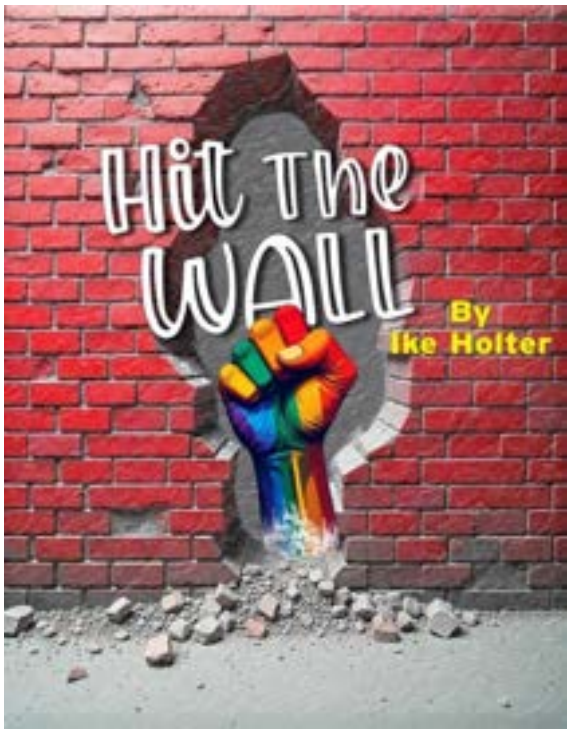
Guitar	Javi Delez (alum' 23)
Bass	Aliyah Gonzalez
Drums	Joseph Peterson

Faculty + Staff

Assistant Technical Director	Christopher Adams
UR-HIP in the Arts + Humanities	Heather Huggins
Costume Shop Manager	Jessica Irvin
Director	C. Julian Jiménez
Technical Theatre Faculty Mentor	Jess Kreisler (alum' 18)

Queensborough Community College Theater presents an excerpt from *HIT THE WALL* by Ike Holter

DIRECTOR'S NOTE



Stonewall is a story we think we know—mythologized, simplified, and repackaged into something digestible. *HIT THE WALL* refuses to do that. Instead, it plunges us into the uncertainty, raw energy, and deeply personal stakes of that night in 1969, presenting history not as a static moment but as a living, breathing confrontation with resistance, grief, and the power of community. Rather than a linear account, the play amplifies ten voices—diverse, flawed, and fierce—whose lives collide in the chaos of uprising. Set against the cultural resonance of Judy Garland's death, it underscores how personal loss and collective struggle are inseparable. The addition of a live rock band fuels this disruption, reminding us that the fight for justice is as electric and urgent now as it was then.

This production embraces theatrical imagination as a tool for reclamation. We do not merely look back at Stonewall; we ask what it means today. How do we honor those who stood on the front lines? How do we recognize the erasure within mainstream narratives? And how do we, as an audience, carry this legacy forward?

At the same time, *HIT THE WALL* demands care. Its language and themes confront racism, homophobia, transphobia, and violence. Our rehearsal room has prioritized a process of intentionality—implementing a community agreement, rehearsing difficult material with awareness, and ensuring that our artists feel safe as they bring this story to life. We do this not to soften the impact but to uphold the dignity of those whose stories this play seeks to illuminate.

To ensure a responsible and mindful process, we have established the following measures in our rehearsal room:

- **Hate speech in the text was omitted during rehearsals** to minimize repeated exposure. These words were only introduced during full runs if deemed necessary, with alternatives explored—such as implied delivery, sound effects, or the ensemble collectively shouting "whoa" to interrupt moments of micro and macro aggressions.
- **A dedicated rehearsal addressed the contextual impact of hate speech**, establishing protective measures for all artists. Individual comfort levels were prioritized and respected throughout the process.
- **Scenes involving sexual assault were stylized and suggested rather than explicit**, using the reading of stage directions to convey these moments. Intimacy discussions ensured that staging choices were handled with thoughtfulness and care.

As you experience *HIT THE WALL*, I invite you to sit in the discomfort, to witness with an open heart, and to reflect on the responsibility we all share in shaping a more just future. The revolution was never over—it's still being written.

C. Julian Jiménez

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Student Poster Abstracts: Session A

11:45 am – 12:45 pm

- Advanced Science Research Center
- Baruch College
- Borough of Manhattan Community College
- Bronx Community College
- College of Staten Island
- CUNY BA Program
- CUNY School of Labor and Urban Studies
- Guttman Community College
- Hostos Community College
- Hunter College
- ICORP
- John Jay College of Criminal Justice
- Queens College
- York College

ADVANCED SCIENCE RESEARCH CENTER (ASRC)

Poster A1

Transport and localization of excitons in a two-dimensional magnetic semiconductor

Vladislav Vostrikov

Mentor(s): Gabriele Grosso
Advanced Science Research Center

Properties of materials change drastically when the thickness approaches the nanoscale, such structures that are only several layers thick are known as two-dimensional materials. There has been a lot of interest in 2D materials due to their unique electronic properties which can be further tuned through layer stacking and twisting. These properties could be leveraged towards applications in electronics, optoelectronics, sensing and quantum information.

CrSBr is an emerging two-dimensional vdW material with strong coupling between its electronic and magnetic properties. In this work we utilize photoluminescence spectroscopy to study the properties of bound electron-hole pairs(excitons) in CrSBr, which are formed when light is absorbed by the material. We analyze the effect of polarization, material thickness, and temperature on the emission spectra and transport properties of excitons. In addition we study the effects of different irradiation techniques on the formation of defects in CrSBr and how these defects affect the properties of the material.

BARUCH COLLEGE

Poster A2

Investigating Potential Sugar-Related Uncertainties in a Proxy for Ancient CO_2

Liam Cooper

Mentor(s): Dr. Ana Gonzalez-Nayeck Baruch College

The ε_p proxy for ancient pCO_2 can potentially estimate ancient pCO_2 as from the evolution of rubisco-based photosynthesis, using the difference in stable carbon isotope ratios ($\delta^{13}C$) between fixed and inorganic carbon, assuming this difference is proportional to pCO_2. This study aims to address uncertainty with the use of photosynthetic microbes in proxies for ancient pCO_2. While previous studies address uncertainties related to the $\delta^{13}C$ of initial fixed photosynthate (e.g., growth rate), we aim to address the effects of downstream carbon allocation. Specifically, if a significant fraction of fixed carbon is allocated towards excreted sugars, this could potentially impact ε_p. Literature has previously assumed that cyanobacterial extracellular sugar (glucose) has the same $\delta^{13}C$ as intracellular sugar. If incorrect, sugar excretion must be accounted for in future use of the proxy. Here, we seek to answer: Is there a carbon isotope fractionation associated with the sugar excreted by cyanobacteria, and does this in turn impact the ε_p proxy for ancient pCO_2? We address this question by growing *Synechococcus* PCC 7002 under two light conditions to promote variable sugar excretion, and we report $\delta^{13}C$ of DIC, biomass, and relative amounts of sugar excretion to determine the effects of sugar excretion on the calculated ε_p. Overall, our findings indicate several key implications for the proxy. While we indicate glucose excretion does not significantly impact the proxy, we show that atmospheric CO_2 alone is not sufficient in accurately predicting ε_p. Considering our current pCO_2 levels (~420 μatm) have significantly surpassed the maximum levels (~300 μatm) recorded in ice cores, which only record up to ~800,000 years ago, proxies that look further back in the paleoclimate record are of the utmost

importance to better understand our current climate crisis. Our findings give assurance that researchers who have relied on the proxy do not have to adjust to account for sugar excretion. However, more research should be done to promote varying EPS excretion in cyanobacteria to confirm these results.

Poster A3

Investigating the Role of Elongin B in *Drosophila melanogaster* Embryonic Somatic Muscle Development

Madelyne Dayan

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Baruch College

Muscle atrophy is a result of a number of muscle diseases, as well as aging, disuse, and infections. Muscles weakened in these ways exhibit a characteristic decrease in size, strength, and mobility. The similarities between muscle in humans and *Drosophila melanogaster* allow for direct implications for vertebrates to be made from studying muscle in *Drosophila.* Gene expression has been shown to play an important role in embryonic muscle development in *Drosophila*. A previous study identified Elongin B (EloB) to be involved in somatic muscle morphogenesis in *Drosophila*, with mutant embryos displaying severe muscle defects, including thin, mis-attached, and missing myofibers. The long-term goal of this project is to clarify the exact function of EloB in muscle and how it contributes to muscle wasting. Previous findings in this project include a high expression of EloB in the dorsal pharyngeal musculature in stage 16 wild type embryos, as well as missing dorsolateral and dorsal muscle, and a possible transformation of ventral muscles in mutant embryos. In this experiment, RNA interference was used to knock down expression of EloB, which led to extra LTs, unfused myoblasts, and severe defects in muscle elongation and attachment. Additionally, CAS9 was used to overexpress EloB, which did not appear to result in any major defects.

Poster A4

Vaccine Apartheid: The Unequal Distribution of COVID-19 Vaccines Among Poor Countries

Isabella Doring, Zilola Ashurboyeva, Michelle Chen, Connie Tai, Nafisa Tarannum

Mentor(s): Yue Zhang
Baruch College

The COVID-19 pandemic swept through the globe in a matter of months, causing disastrous challenges and impacts. Vaccines emerged as the most effective tool to combat the virus. However, income inequality significantly impacted the global distribution and uptake of the COVID-19 vaccination rate worldwide. Motivated by the exacerbation of pandemic challenges in low-income countries due to unequal access to vaccination and other healthcare services, we aim to examine the impact of vaccine inequality on these countries. Moreover, we want to investigate further how the stockpiling by high-income nations hindered efforts to control the pandemic.

Our team gathered data from reputable sources like the United Nations Development Programme (UNDP) and Our World in Data. We utilized regression analysis to examine correlations between multiple independent variables and the death rate as our dependent variable. Additionally, we created visualizations such as line charts, heat maps, and pie charts to identify patterns and trends in our datasets. Our findings reveal the stark disparities in COVID-19 vaccine rates based on income level, with lower-income regions suffering disproportionately. We have proposed a list of possible policy recommendations to implement, aimed at enhancing preparedness for another global health crisis.

Poster A5

Investigating Genetic Regulators of Crystal Cell Development in Drosophila Melanogaster

Andrea Feria, Nyla Walbrook, Anisa Turaeva

Mentor(s): Rebecca Spokony
Baruch College

Crystal cells, a subset of *Drosophila melanogaster* hemocytes, are important for melanization, a crucial immune response. While the genetic regulation of crystal cell develop remains incompletely understood, this study investigates the functions of five candidate genes: ACXB, ACXA, Gp210, CG4390, and Cyp4s3; identified through previous genome-wide association studies. Using the Gal4/UAS system along with RNA interference (RNAi), we exclusively knocked down each gene in third instar larvae and quantified crystal cell populations following heat shock-induced melanization. Our results imply that the knockdown of ACXB and ACXA significantly increased crystal cell counts in both sexes, suggesting these genes either act as negative regulators of hematopoiesis or survival. On the other hand, Gp210 and CG4390 knockdowns showed inconsistent effects, while Cyp4s3 knockdown implied a potential role, though conclusions were limited by small sample sizes. In addition, female larvae consistently showed higher crystal cell counts than males, possible due to their larger body size. Overall, this research contributes to our understanding of genetic regulation of crystal cell development in *D. melanogaster*, highlighting candidate genes for further functional validation.

Poster A6

When Do States Outsource Repression: Evidence from Hong Kong

Ming Kong

Mentor(s): Xiaonan Wang
Baruch College

What explains the variation in states using state versus nonstate actors in responding to civil unrest? Prior research on state repression has predominantly focused on the direct use of force by state authorities, often neglecting the critical role of third parties, such as organized crime groups, in executing repression. This practice, known as "outsourcing repression", enables states to maintain control while preserving plausible deniability, particularly in contexts requiring substantial coercion. This study aims to elucidate the conditions under which states opt to outsource repression. I propose a two step logical framework. First, I argue that outsourcing repression depends on the availability of thugs to hire. Second, when third-party actors are available for hire, the state must consider the reliability of such violent delegations, which ultimately depends on the effectiveness of controls exerted by the states over the proxies. The empirical evidence supporting this framework is derived from 1) a cross-period comparison of Hong Kong police responses to the social movements in 2003, 2014, and 2019 and 2) cross-regional comparisons of police responses in different episodes of protests within the 2019 movement. The first comparison highlights the changing relationship between police and triad that provides the state with available pools to outsource. The second comparison of the 2019 Movement illuminates the strategic calculations made by the police when outsourcing. Based on these findings, I conclude that states are more likely to outsource repression when reliable proxies are accessible and reliable, thus enabling a mutually beneficial relationship that fosters a conducive environment for outsourced repression.

Poster A7

Shifting Alliances: Are Black People Increasingly Identifying as Republican?

Clamont Mack

Mentor(s): Professor. David Jones
Baruch College

This paper investigates claims that Black Americans are increasingly aligning with the Republican Party. Drawing on theories of party identification and political realignment, I compare competing perspectives to determine appropriate indicators of realignment within the Black community. Using quantitative analysis across several datasets, I find a modest rise in Republican identification over the past decade, but a more pronounced decline in Democratic affiliation. These findings suggest not a realignment toward the Republican Party, but rather a dealignment from the Democratic Party. This challenges popular media narratives of realignment and instead points to growing political disengagement among Black Americans.

Poster A8

Decomposition of Polysymmetric Functions and Stack Partitions

David Martinez

Mentor(s): Ying Anna Pun
Baruch College

Polysymmetric functions were introduced by Asvin G and Andrew O'Desky as a generalization of symmetric functions, establishing their natural connection to algebraic geometry and introducing a family of four bases for the algebra of polysymmetric functions. In this paper, we build upon this work by introducing a new basis H^+ to the family of the bases for polysymmetric functions and providing a new combinatorial interpretation of all the five bases in terms of the monomial polysymmetric functions. We also study the transition between the polysymmetric bases and the Pieri rule on the new basis, H^+, in relation to the standard tensor product bases studied by Khanna and Loehr.

Poster A9

Lobbying Laws and Campaign Finance: Shaping the Trajectory of Post-2008 Financial Reforms

Jessica Plepi

Mentor(s): Professor Stephanie Golob
Baruch College

Following the 2008 financial crisis, the United States enacted financial crisis reforms, particularly the Dodd-Frank Wall Street Reform and Consumer Protection Act, to prevent future failures and enhance regulatory oversight of financial corporations. However, financial institutions pushed back against these reforms by utilizing lobbying and campaign finance mechanisms to weaken key provisions. Their efforts increased following the Supreme Court's decision in *Citizens United v. Federal Election Commission* (2010), which allowed unlimited corporate spending. This thesis argues that financial corporations significantly weakened key provisions of post-2008 financial reforms through lobbying efforts and campaign finance. Through a case study of JPMorgan Chase, this research explores legislative history, lobbying disclosures, and campaign finance data, to show how financial institutions influence policymaking. The findings reveal that financial corporations were able to delay implementation, dilute regulatory language, and introduce loopholes in key provisions such as the Volcker Rule and derivatives oversight. While lobbying did not prevent reform, it successfully reshaped them in favor of the corporation's interests. Through a literature review of political science scholarship from Martin Gilens, E.E. Schattschneider, Pamela Ban and Hye Young You, and Robert E. Prasch, this thesis contextualizes these findings with discussions of elite influence, representation, and regulatory capture. This thesis adopts an elite theory framework, contrasted with pluralism and other

interest group theories, and highlights how the JPMorgan case study aligns with an elite theory perspective of policymaking. Ultimately, this thesis shines a light on the challenges of achieving financial reform during growing corporate influence, posing risks on democracy and fairness in the economy. The study concludes with policy recommendations and suggests future topics to further explore the impact of lobbying on legislation.

Poster A10

Protein Stability Retention Under Harsh Conditions

Kaylen Su

Mentor(s): Dr. Baofu Qiao
Baruch College

Plastic waste is a growing environmental concern due to its resistance to natural degradation, leading to long-term accumulation in landfills and oceans. One potential solution is enzymatic degradation, where specific enzymes break down plastic into smaller, biodegradable components. However, enzymes often lose their effectiveness under the extreme conditions plastics experience during manufacturing, such as high temperatures, mechanical stress, and dehydration. This study explores whether small molecules, known as ligands, can help stabilize enzymes and improve their ability to break down plastics.

Using molecular dynamics simulations, we tested four ligands—poly(ethylene glycol) (PEG), 6-hydroxyhexanoic acid (HHA), benzalkonium chloride (BC), and 6-aminohexanoic acid (AH)—to see how well they interact with lysozyme, an enzyme with potential for plastic degradation. We analyzed how these ligands distribute around the enzyme and whether they help maintain its structure under harsh conditions. Among the tested ligands, BC showed the most promising effects by forming a protective layer around the enzyme. Its structure allowed for both hydrophilic (water-attracting) and hydrophobic (water-repelling) interactions, stabilizing the enzyme in a way that could prevent it from breaking down under extreme conditions.

Our results suggest that ligand-assisted stabilization could enhance enzymatic plastic degradation, making this approach more viable for large-scale environmental applications. Further research is needed to refine these methods and explore their real-world potential. By improving enzyme stability, this study contributes to the development of sustainable strategies for reducing plastic pollution and promoting environmentally friendly waste management solutions.

Poster A11

Housing as a Human Right: The Impact of Affordable Housing Programs on Low-Income Families in New York City

Adriana Tavares

Mentor(s): Babak Somekh

Baruch College

This thesis investigates the effectiveness and broader societal impacts of affordable housing programs in New York City, with a focus on the New York City Housing Authority. It examines how housing assistance affects the financial security, health, education and overall quality of life for low-income families. While affordable housing in NYC is often treated as a temporary emergency relief measure, global models particularly Vienna and London highlight alternative approaches that treat housing as a permanent public good. By tracing the historical evolution of NYCHA, assessing its benefits, and confronting the challenges it faces, this thesis argues that New York City's current strategies fall short of ensuring long-term affordability and inclusion. The research calls for renewed public investment, structural reform, and a shift in perspective that recognizes affordable housing not merely as a commodity but as a human right.

Poster A12

Investigating Potential "Hot Spots" for Litter Accumulation in New York City's Constructed Living Shorelines

Rachel (Zheyi) Xie

Mentor(s): Professor Chester Zarnoch
Baruch College

Litter accumulation in coastal environments poses significant ecological challenges, particularly in urban settings where human activity contributes to pollution. Living shorelines are protected stabilized coastal edges made of natural materials. In hybrid living shorelines, which incorporate hard structures like rock sills, litter may become trapped. Research from Chile showed higher litter densities in breakwaters than in natural habitats, suggesting that man-made structures influence litter retention.

This study investigates the accumulation of anthropogenic litter in hybrid living shorelines in New York City, particularly in relation to combined sewer overflows (CSOs) and tidal influences. We hypothesized that hybrid living shorelines would trap more litter than natural vegetated shorelines, and predicted higher litter accumulation in the supratidal (rocky) zone compared to the high tide (marsh) zone, increased litter presence following wet weather events, high litter accumulation in CSO surrounded sites Gansevoort and Randall's island, intermediate levels in West Pond, and varying litter levels between spring and neap tides. Litter was collected at three sites; Gansevoort Peninsula, West Pond, and Randall's Island, from both supratidal and high tide zones. Litter samples were collected at 4-meter intervals, categorized, enumerated, washed, dried, and weighed to quantify accumulation rates (#/m² & g/m²). Results indicated that plastic litter was the most prevalent, constituting 69.53% of total litter by count. Notably, the supratidal zone at Gansevoort exhibited significantly greater litter mass and count compared to the high tide zone, particularly after wet weather events. The data also revealed that spring tides facilitated the transport of heavier litter to shorelines, where it became trapped during neap tides. Sites near CSOs (Gansevoort and Randall's) showed greater accumulation than West Pond. The findings highlight the necessity of integrating litter management strategies into living shoreline maintenance plans, with recommendations for further research to enhance understanding of litter dynamics in these coastal systems.

BOROUGH OF MANHATTAN COMMUNITY COLLEGE

Poster A13

Exploring the Role of Virtual Reality in Teaching Daily Living Skills to Children with Autism

Joseph Collado

Mentor: Dr. Mohammad Azhar
Borough of Manhattan Community College

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition that significantly affects a child's ability to learn and engage with the world around them. Characterized by a range of challenges in social interaction, communication, and behavior, children with ASD may experience difficulties in traditional learning environments. As a spectrum disorder, individuals are affected differently, with symptoms ranging from mild to severe. Children with ASD may face significant obstacles in acquiring essential life skills, such as problem-solving and interpersonal interaction. These learning challenges extend past the child onto their families, who must navigate complex educational systems, seek specialized interventions, and support their child in gaining independence, which can be overwhelming. This project aims to explore how to design a non-traditional learning intervention using Virtual Reality (VR) technology that can be used to teach daily living skills to children with ASD, thus increasing their confidence and independence. Phase 1 of this project involves the development of an immersive virtual

environment that is a re-creation of one of New York City's downtown subway stations. Phase 2 development involves teaching children with ASD how to perform tasks in this environment, such as purchasing and refilling transit cards, navigating the station and platform, and safety precautions. Phase 3 development involves testing the children on their ability to complete their virtually trained tasks in the real world. The overall goal of the project is to measure the effectiveness and efficiency of using accurate and immersive virtual environments as a learning tool for children with ASD.

Poster A14

Ozempic Voice: A Linguistic Analysis of DTC Prescription Drug Commercials

Sophie Faber, Billy Hoyos Rimarachin, Andrea Richino

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Borough of Manhattan Community College

In the United States, pharmaceutical companies are permitted to advertise prescription drugs directly to consumers on television, unlike in Europe where such advertising is banned. Although FDA regulations mandate that these ads explicitly state side effects, American drug companies employ sophisticated linguistic tactics to minimize the risks. Linguistics classes often teach these same tactics to students for future use, however, the purpose of this research paper is to help students defend themselves against these marketing tactics, using an analysis of a commercial for the Type 2 diabetes medication *Ozempic*. Two studies were conducted to this effect-the first to identify the linguistic elements of the speaker's voice, the second to explore the cultural biases of the listener. (1) In our first study, we utilized Praat, a speech analysis software, to separately measure speech rate and pitch levels for the benefits and risks in one 2024 commercial. We found that a normal speech rate was used in the message promoting the benefits of the drug (4.07 syllables per second), but a faster speech rate was used while stating its risks (6.08 syllables per second). As for pitch, a higher pitch (mean-205.07 Hz) was used to discuss the benefits of the drug, which makes it easier for the listener to discern the words. In contrast, a lower pitch (Mean- 179.97 Hz) was used to state the risks. (2) A second study compared the first commercial, which had a female narrator, with an earlier 2022-2023 commercial that featured an identical script paired with a male narrator. 29 students at BMCC were surveyed and showed a strong preference (25 out of 29, or 86%) for a female narrator over a male. In conclusion, this study underscores the strategic use of linguistic strategies in shaping persuasive messaging in prescription drug commercials.

Poster A15

Repurposing Brita® Filters As Potential Low-Cost Adsorbents Of Cu(Ii) Ions From Aqueous Solutions

Amy Lui, Kenneth Suen

Mentor(s): Abel E. Navarro
Borough of Manhattan Community College

Copper is a heavy metal present in the biological processes of many organisms and is considered a micronutrient for animals and plants. This work seeks to provide data on the viability of repurposing used Brita® domestic tap water filters (BF), mainly composed of activated carbon (AC) and ion exchange resins, as low-cost adsorbents of Cu(II) from aqueous solutions.

The efficacy of the chemical regeneration of used BF material was assessed as a function of Cu(II) adsorption capacity (%ADS). NH_4OH (BF_N) and acetone (BF_a) were identified out of ten regenerating solutions as having the highest regenerative properties and were chosen to participate in further studies. Adsorption batch experiments indicated %ADS of 74.4%, 72.8%, and 51.6% for BF_N, BF_u (used), and BF_a, respectively, at pH 6.3. The topography, elemental, and chemical composition of the adsorbents were analyzed via scanning electron microscopy, energy-dispersive X-ray spectroscopy, and Fourier-transform infrared spectroscopy, respectively.

In aggregate, the data appears to support the hypothesis that use of BF as a domestic tap water filter causes the formation of a Cu(II) affinity-enhancing organic layer on the BF AC surface. Overall, BF_N consistently removed the most Cu(II) in solution, with a maximum %ADS of 80.5%. Future studies include the effect of potentially interfering substances such as secondary heavy metals, and Cu(II) uptake as a function of time (adsorption kinetics).

Poster A16

Validation of Bi2O3-catalyzed Electrolysis for CO Production

William Murphcoux, Daralyn Plasencia

Mentor(s): Dr. Luis Gonzalez-Urbina
Borough of Manhattan Community College

As global reserves of natural oil continue to decline and greenhouse gas emissions increase, carbon recapture has become increasingly important. This research explores the electrolysis and reduction of atmospheric CO2 to carbon monoxide (CO) using a molten solution of lithium carbonate (Li2CO3) and lithium oxide (Li2O) as the electrolyte and bismuth (III) oxide (Bi2O3) as a catalyst. Previous studies have demonstrated the reduction of CO2 to molecular carbon via electrolysis, while our work focuses on the generation of CO, a valuable intermediate for fuel synthesis and industrial applications. We aim to validate Bi2O3 as a catalyst in the reduction of CO2 via electrolysis as a promising method for both carbon recapture and sustainable fuel generation.

Poster A17

Application Of Biomaterials As Adsorbents Of Salicylic Acid

Katrina O'Brian

Mentor(s): Abel E. Navarro
Borough of Manhattan Community College

Personal care and pharmaceutical products (PCPP) pose potential environmental risks due to their prevalence in ponds, rivers, and oceans. This study focuses on the adsorption of salicylic acid (SA), a known PCPP, onto biomaterials such as Avocado Skin (ASs), Brita Filter (BF), Orange Peels (OPs), Purple Corn (PC), and Pineapple Peels (PPs) from aqueous solutions in batch experiments as a function of pH level and adsorbent dose. Preliminary adsorption capacity results show maximum adsorption of SA at pH 3 for all adsorbents and followed the trend BFs>ASs>PPs>OPs>PC. Mass dose assays.

Poster A18

Optimizing Image Quality in Medical Scan Reconstructions

Angel Ostolaza

Mentor(s): Professor Younes Benkarroum
Borough of Manhattan Community College

As of 2023, about 4.2 billion medical imaging procedures, including X-rays, CT scans and MRIs, are performed each year. The images gathered help us understand the structure and function of different biological specimens which we use in surgical planning, medical research, and diagnosing ailments. While these procedures are a cornerstone of modern healthcare, the reconstructed images often suffer from blurriness and noise that compromise their accuracy. This research aims to enhance the image quality by optimizing the widely used technique of Filtered Back Projection (FBP), which, while fast and relatively simple, tends to produce low-quality images when handling incomplete or noisy data.

The project began with the development of phantom images (simulated objects/people) on 2D arrays and the generation of corresponding projection data, or sinograms (the projection data a CT scan outputs), which was then reconstructed to recover the original phantom. The results came with significant blurring that made details in the images extremely difficult to make out, highlighting the need for filtering. To obtain greater clarity, the next phase focuses on integrating filtering techniques into the reconstruction process by bringing the image data into the frequency domain (a different

mathematical domain where noise is easier to remove). This study looks to reduce blurring and enhance fidelity of the reconstructed images. Initial results suggest inclusion of these techniques will lead to sharper, more accurate representations of the original phantoms.

This research aims to lay the groundwork for improved image reconstruction pipelines that potentially contribute to more reliable diagnostic tools and, most importantly, better clinical outcomes.

Poster A19

GIS-Based Assessment of the Impact of Neighborhood Socioeconomic Status on Flood Mitigation in Brooklyn, NY

Mia Pinto

Mentor(s): Dr. Henry Bulley
Borough of Manhattan Community College

New York City has increasingly dealt with major flooding over the years due to Climate Change. Across the boroughs we have seen excessive damage to infrastructure, property loss and even fatalities. Green infrastructures such as rain gardens, rainbarrels, Right-of-way bioswales, etc. have been shown not only to help with flood mitigation efforts but also provide other ecosystem services. In response to this the NYC Department of Environmental Protection (DEP) has deployed Green Infrastructure (GI) initiative to mitigate this crisis. For my research I examined Brooklyn, NY to find how Socioeconomic Status, GI presence and NYCHA housing correlate with a neighborhood's flood vulnerability. To find the correlation I used a qualitative research method. I input the data that showed the quantity and location of the GIs in NYC, location of NYCHA housing, and the household Median income. I also used an equity map that displayed the neighborhoods that faced disparities in healthcare, water management, workforce and more. ArcGIS Pro software was used to perform overlay analysis and geovisualization of the various data to examine whether neighborhoods areas with low median income benefited from the GI Investment, as compared to high median income neighborhoods. The results showed that Brooklyn neighborhoods with low socioeconomic status actually had a higher presence of GIs than neighborhoods with a higher socioeconomic status despite the latter having a higher flood risk. Green infrastructures have been shown to help with flood mitigation efforts as well as provide other ecosystem services. With the equitable utilization of these Green Infrastructure we can help protect New Yorkers who are more vulnerable to the impacts of perennial flooding.

Poster A20

A Data-Driven Approach to Exploring Retention of Women in Computing Using Machine Learning

Giovanna Rodriguez, Darlyn Gomez

Mentor(s): Dr. Mohammad Azhar, Professor Louise Yan, Sam Karasik
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Gender disparities continue to be prominent in computing fields, especially in two-year college programs. This research analyzes gender-based retention patterns and gender disparities within BMCC, a minority-serving institution, to provide insights in developing targeted interventions for improving women's retention in computing majors. Using anonymized student data from Fall 2021 to Spring 2023, we employ machine learning models, decision trees, Shapley values, and clustering to identify critical factors impacting women’s success in computing. Our cluster analysis revealed three distinct student groups (i.e., Struggling, Average, and High Achieving Students) with first-generation students disproportionately represented in the struggling and average clusters characterized by lower retention rates and moderate academic performance. We trained a gradient boosting model with decision trees to accurately predict future grades and used the model’s Shapley values which determined that performance in specific 100 and 200-level computing courses strongly predicts success in 300-level computing courses. Using the Shapley results, we identified key differences in critical courses between male and female computing

students. Our findings suggest opportunities for targeted interventions such as peer mentorship programs and academic support for those critical courses. To complement our data-driven analysis, we incorporated student perspectives by conducting a quantitative survey and facilitating focus groups on 40 students to identify where they perceive gaps in resources, experience disparities, or encounter challenges related to their backgrounds or current experiences in computing. We aim to integrate the qualitative data from focus groups and quantitative survey results with our machine learning findings to recommend evidence-based guidance for junior colleges and educators in designing interventions that support women's retention and success in computing.

Poster A21

Adsorptive removal of divalent nickel ions from aqueous solution using marine algae

Ronniel Vasquez

Mentor(s): Abel E. Navarro
Borough of Manhattan Community College

The constant growth of the manufacturing of electronics and electric automobiles increases the search for new metal alloys that optimize electricity storage. Nickel is industrially used in corrosion-resistant alloys, electroplating, stainless steel preparation, and other applications. The World Health Organization and the US-EPA have established a maximum allowable concentration of nickel (II) in drinking water of 70ppb, due to their impact on human health such as respiratory and kidney damage. To mitigate the prevalence of divalent nickel ion in wastewater, this study proposes the use the marine algae (Fucus Vesiculosus, FV; and Sargassum sp., SG) and spent (BU) and new (BN) commercially available filters as alternative adsorbents of Ni(II) ions from contaminated solutions. Preliminary results indicate that the maximum adsorption percentage is observed at pH 8 with 150mg of both filters BN and BU, whereas 60mg of FV and 100mg of SG maximize the uptake of Ni(II) at pH 5 and 6, respectively. The adsorption follows the trend BU~BN>SG>FV with adsorption percentages from 39%-85%. Instrumental analysis with FTIR indicate that marine algae and filters are rich in hydroxyl and carbonyl groups, which can act as potential adsorption sites for Ni(II) ions, and SEM studies demonstrate the surface heterogeneity, porosity and appropriate textural properties of the adsorbents. Future work includes isotherm and kinetics modeling of the adsorption process to elucidate the mechanism and equilibrium parameters.

BRONX COMMUNITY COLLEGE

Poster A22

Investigation of Weed Biodiversity in Ethnic Enclaves in New York

Milton Baquedano

Mentor(s):
Bronx Community College

This study looks at how human migration affects plant species distribution in urban neighborhoods. We aim to understand whether human movement contributes to the introduction or spread of certain plants, especially weed in cities like New York City. Using fieldwork and DNA barcoding we collected plant samples from different neighborhoods with diverse populations to see if patterns in plant migration align with human migration. Our initial findings suggest that human migration may impact local plant diversity. But, as we expand this research into more neighborhoods, we hope to gain a clearer understanding of how cultural diversity and urban environments influence plant life. These findings could help guide future urban planning and efforts to protect biodiversity in growing cities.

Poster A23

Strengthening Jamaica's Natural Disasters Resilience through News Analytics and Satellite Imagery

Marlee Barnes-Henry

Mentor(s): Cheila Cullen
Bronx Community College

Jamaica, like many Small Island Developing States (SIDS) in the Caribbean, faces significant vulnerabilities to natural hazards, like hurricanes, floods, droughts, and landslides, which are exacerbated by climate change. Such events frequently disrupt economic stability, infrastructure, and livelihoods, with annual damages amounting to millions. The significant lack of comprehensive historical disaster data is a major challenge for Jamaica, limiting the effectiveness of disaster risk reduction (DRR) and preparedness strategies.

This project addresses this gap by employing advanced data analysis and programming techniques to analyze and process news reports from the Global Database of Events, Language, and Tone (GDELT). Additionally, Earth Observation (EO) technologies, utilizing platforms like Landsat and Sentinel-2, serve as essential sources for validating and confirming events derived from GDELT. They also help examine critical environmental variables using indices such as the Normalized Difference Water Index (NDWI) and the Normalized Difference Vegetation Index (NDVI).

The results indicate that data wrangling processes can effectively utilize GDELT as an information source for natural hazards, especially given the current scarcity of such data. Future research will conduct a comparative analysis of these findings with various global databases concerning historical disasters, in addition to collecting data for input into machine learning algorithms.

Poster A24

The Hidden Danger of PM2.5 Pollution

Victor Carrion Jimenez

Mentor(s): Dickens Saint-Hilaire
Bronx Community College

Particulate matter smaller than 2.5 micrometers (PM 2.5) represents one of the most pervasive and harmful pollutants in the atmosphere, often invisible to the naked eye yet capable of penetrating deep into the human respiratory system. This report examines the sources, concentration levels, and health impacts of PM 2.5 pollution, with an emphasis on its effects on respiratory and cardiovascular health. Drawing on recent data from urban and industrial regions, the study highlights correlations between PM 2.5 exposure and increased incidence of asthma, lung cancer, heart disease, and premature mortality. The analysis also explores disparities in exposure across different populations and geographic regions. By uncovering the "hidden danger" in the air we breathe, this paper underscores the urgent need for stronger regulatory policies, public awareness, and international cooperation to mitigate the health risks posed by PM 2.5 pollution.

Poster A25

Small Dose, Big Impact: Exploring the Effects of Microdosing Cannabis for Health-Related Symptom Management

Jingnan Chen, Frankie Davila

Mentor(s): Diane Banks
Bronx Community College

This study aims to investigate the effectiveness of medicinal and recreational cannabis in alleviating pain, anxiety, and insomnia. The study will compare the experiences of individuals who use cannabis for medicinal purposes with those who use it recreationally. To gather data, we will distribute a survey to CUNY faculty, staff, and students using Microsoft Forms. The study hypothesizes that

people who use medicinal cannabis may not be practicing microdosing techniques to relieve symptoms. This research will help inform medical professionals, research institutions, and patients about the perception of microdosing cannabis for symptom relief.

Poster A26

Advancing Animal Classification Systems Through AI Models and Computer Vision

Nagib Gonzalez

Mentor(s): Edwin Reed-Sanchez
Bronx Community College

We're exploring how Artificial Intelligence (AI) can open up new ways to track and observe wildlife. The goal is to see how AI can help conservationists and researchers gather insights and make decisions that wouldn't be possible with traditional tools alone. As the technology continues to evolve, it offers real potential to improve how we protect wildlife and the places they live.

A big part of this effort involves camera traps which are motion-activated devices that automatically take photos or videos when animals pass by. These traps have become standard tools in wildlife research because they work around the clock, leave animals undisturbed, and provide valuable data on things like species presence, behavior, population size, and interactions. Thanks to their reliability and minimal footprint, they're now essential in both conservation work and biodiversity studies.

Poster A27

Quantitative Analysis of Neuronal Dendrites and Spine Pathology Using ImageJ

Leidy Gutierrez, Hamida Hassan, Sharna Hines-Thomas

Mentor: Rujin Tian
Bronx Community College

Synaptic failure is a key pathological hallmark of neurological diseases such as Autism, Schizophrenia, and Alzheimer's disease, playing a central role in the cognitive dysfunction associated with these conditions. To accurately and efficiently detect early synaptic alterations, we utilize ImageJ—a powerful, open-source computational tool—to analyze dendritic spine morphology and assess overall synaptic health.

Specifically, we quantified six critical parameters of dendritic spine and dendrite structure: (1) total dendrite length, (2) dendrite diameter, (3) spine density, (4) spine area, (5) spine length, and (6) spine head diameter. These measurements serve as reliable indicators of synaptic integrity and function. Applying this methodology, we performed preliminary analyses on hippocampal neurons from a mouse model of neurological disease. By comparing wild-type and mutant neurons, we observed that wild-type neurons exhibited thicker dendrites and larger, shorter, and more robust spines—morphological characteristics suggestive of enhanced synaptic connectivity and strength. These findings highlight the effectiveness of ImageJ in identifying early structural abnormalities linked to synaptic dysfunction.

Ultimately, our results support the potential of early dendritic spine analysis as a diagnostic approach. Leveraging ImageJ to detect early pathological changes may enable timely diagnosis, targeted therapeutic interventions, and even preventive strategies. Preserving existing synapses and preventing synaptic loss could be critical for maintaining cognitive function in individuals affected by neurological disorders.

Poster A28

Rocks as Fertilizer in Geological Agriculture

Corrine Pieper

Mentor(s): Dr.Dickens St.Hilaire
Bronx Community College

As our planet continues to heat up, the demand for sustainable agriculture is growing. In anticipation of the agricultural problems to come, we are looking to geological agriculture in this study as a sustainable alternative. Of the 4 GeoAg methods named by Dr.Dickens St.Hilaire and Richard Campbell, this study focuses on the GeoAg water method. This experiment aims to use rocks as fertilizer, and involves growing lentil plants from seeds in soil and different rocks to compare how well they grew. The lentil plants in soil grew the most of all, but we found the lentil plants grown in marble chips grew the most in comparison to all other rock mediums. This was expected, as marble contains calcium which is a macronutrient for plants. The lentil plants ultimately did not make it to harvest due to other environmental factors. In addition are soaking rocks in water to measure how long it takes for the water to be mineralized. This research is ongoing.

Poster A29

Comparative Analysis of Micro-Scale Air Pollution Patterns in Delhi and Mumbai India

Donique Spencer

Mentor(s): Neal Phillip

Bronx Community College

The complexities of urban air quality in New Delhi and Mumbai were examined in this study, with a particular emphasis on gaseous pollutants (CO and SO2) and particulate matter (PM2.5) within diverse community contexts. Mobile sampling and mapping methodologies were employed to discern variations in pollutant concentrations, analyze inter-pollutant correlations, and investigate potential associations with vehicular traffic, smoke from cooking, and construction activities. The outcomes of this research offer valuable insights into the dynamics of urban air pollution in India and provided a basis for further understanding the temporal and spatial sources of these pollutants.

Poster A30

Stormwater Resilience in New York City Urban Area

Donique Spencer

Mentor(s): Michael Bobker

Bronx Community College

This study explores the complexity of urban stormwater management in Wakefield, Bronx, with a primary focus on downspout disconnection systems. Through neighborhood observations, the aim was to address the challenges associated with downspout disconnection. The findings provide valuable insights into the effectiveness and difficulties of implementing this stormwater management technique.

COLLEGE OF STATEN ISLAND

Poster A31

The Effects of Chronic Social Isolation During Adulthood on Dopamine Axon Terminal Density in the Anterior Corpus Callosum

Colin Alarcon

Mentor(s): Dr. Leora Yetnikoff
College of Staten Island

Our lab has recently demonstrated that dopamine terminals originating from the midbrain innervate the anterior corpus callosum and interact with oligodendrocyte precursor cells (OPCs) in this region. This suggests that dopamine may play a role in experience-dependent myelin plasticity. One behavioral manipulation known to cause myelin plasticity in the corpus callosum is chronic social isolation, causing hypomyelination in adolescence

and in adulthood. While the precise mechanisms underlying this effect are unclear, it is worth noting that chronic social isolation also increases dopamine function. To explore the role of dopamine in myelin plasticity, we recently examined what effect two months of chronic social isolation during early adolescence has on the density of dopamine axons in the anterior corpus callosum. We found that there is an increase in dopamine terminal density in the anterior corpus callosum for socially isolated mice relative to the control group. This was particularly interesting because early adolescence is a critical period in myelination. This led us to question whether a similar effect would occur if chronic social isolation began during adulthood. To explore this, we examined the brains of mice that were either group housed (2-5 mice per cage) or singly housed (1 per cage) for two months starting in adulthood. Dopamine terminals were labeled using tyrosine hydroxylase (TH) immunofluorescence, imaged with a Leica DM6 THUNDER microscope, and quantified using Imaris software. Our results show that, similar to the effects observed during adolescence, mice socially isolated during adulthood exhibit a greater density of dopamine terminals in the anterior corpus callosum relative to the control group. These findings further suggest that social isolation regulates the density of dopamine terminals in the anterior corpus callosum regardless of the age of onset, further implicating dopamine's role in experience-dependent myelination.

Poster A32

Understanding the Impact of Emotional Intelligence in Managing Mental Health in the Workplace

Emily Albano

Mentor(s): Lauren Mullins
College of Staten Island

In today's dynamic work environment, effective management of mental health leaders requires navigating the complex interaction between emotions and reactions among employees, who recognize the unique human scale affected by reciprocal conditions and emotions.
The workplace has developed significantly in the landscape, by strengthening the importance of mental health and emotional welfare among employees. While organizations are trying to create auxiliary environment for additional tasks, leaders play an important role in promoting a culture that prefers mental health. However, the management of mental health in the workplace is only outside guidelines and procedures; This requires emotions, mutual mobility and a nice understanding of a human scale.

The importance of mental health in the workplace: Increase awareness of mental health problems in the workplace and discuss their impact on employees' welfare, productivity and organizational performance. Emotional intelligence in management practice: Find out its significance in the concept of emotional intelligence and its significance in management practices, and emphasizes someone's own feelings and ability to identify, understand and manage others. Navigating feelings and reactions to the workplace: Examine the complications of handling emotions and reactions among workplace employees, including stress, conflict and mutual mobility. Discuss strategies for leaders to effectively navigate emotional conditions, including active hearing, sympathy and conflict resolution techniques. The human scale: emotional relationships and feelings: Find out the concept of human scale in the workplace, highlights the importance of mutual conditions and feelings in shaping employees' experiences.

Poster A33

Cross-Cultural Comparison of Focused Attention in Infants from Tajikistan and the United States

Abrar Alzandani

Mentor(s): Sarah Berger, Lana Karasik College of Staten Island

Focused attention (FA) is the concentration that infants exhibit when exploring objects. FA indicates the active processing of information and lays the

groundwork for future learning by improving selectivity and application of information (Surkar et al., 2015). Given these claims are based on Western samples, we have a limited understanding of how cultural childrearing practices shape attention. Gahvora cradling, a common practice in Tajikistan, is a traditional swaddling method that restricts movement for extended periods and affects motor skills (Karasik, et al., 2023). Does this childrearing practice shape infants' attention?

We coded FA from videos of 8-month-old pre-sitters and 12-month-old new sitters in Tajikistan playing with toys. For 90 seconds of each video, we identified the onset of FA, characterized by simultaneous looking and manipulation, facial expressions, and reduced extraneous body movements. We marked the offset when infants stopped attending.

One-sample t-tests compared the FA of 8-month-old Tajik infants to published FA scores for Western 6—to 8-month-olds sitting with support and the FA of 12-month-old Tajik infants to published scores for Western 6—to 8-month-olds sitting independently. Tajik 8-month-olds spent more time in FA, had fewer bouts, and had a higher maximum FA duration than Western infants. Tajik 12-month-olds spent more time in FA and had fewer bouts than Western infants.

The results reflect that early restricted experience can shape attentional processing. This study emphasizes the need for further research into the differences in FA of Tajik and Western infants, contributing to our understanding of global infant development.

Poster A34

Staten Island Beach Morphodynamics and Sediment Distribution

Jasmine Brancati

Mentor(s): Dr. Jane Alexander & Sean Thatcher
College of Staten Island

Naturally occurring events and human interventions constantly influence coastal environments. In 2012, Superstorm Sandy significantly reshaped Staten Island's eastern shoreline. This area is set to undergo future modification with the planned construction of a buried seawall by the U.S. Army Corps of Engineers. However, it is unclear how this seawall will affect sand transport and beach shape morphology over time. This study aims to establish a baseline for future coastal monitoring by analyzing beach morphodynamics and sediment texture variations throughout multiple transects during different seasons and years.

Sand samples were collected from multiple transects along the beach to analyze grain size distribution and sediment sorting patterns. These samples were sieved, and standard statistical methods were applied using SDAR in RStudio. Traditional transit sighting and GPS techniques were used to collect data to determine the continuous beach morphology modeled in ArcGIS Pro using Inverse Distance Weighting techniques. This study will identify long-term sediment transport trends and shoreline stability patterns by comparing datasets collected in May and June 2023, with new fieldwork measurements from Spring 2025. Past results suggest that grainsize distribution is influenced by storms, longshore currents, and seasonal changes shaping sediment movement over time, with these natural changes being modified by human intervention, such as artificial dunes supplying sand to the beach during erosion and the shape of the beach being modified by raking.

This study contributes to coastal management and planning by showing how reflective beaches respond to natural and human-induced influences. Findings from this long-term project may guide future engineering solutions that potential seawalls can support both beach stability and community safety from fluctuating sea levels and storm surges.

Poster A35

OFDM Based Image Transmission through Plastic Optical Fibers for Low-Rate Internet of Things Applications

Jade Carranza

Mentor(s): Neo Antoniades
College of Staten Island

This study proposes and investigates an image transmission system that utilizes Orthogonal

Frequency-Division Multiplexing (OFDM) and Software-Defined Radio (SDR) to transmit images over Plastic Optical Fiber (POF) in Internet of Things (IoT) scenarios. The initial system focused on transmitting and receiving grayscale images due to the resource limitations of an IoT-like OFDM signals and the SDR system. To broaden the applicability of this system, the deep learning library, DeOldify, was used to recolor the received images. Different hardware and software parameters were tested, focusing on various frequencies and laser biases to observe how they affected and to determine which conditions performed best. Finally, results show the feasibility of the proposed system according to usual metrics as Bit Error Rate (BER) and decoded colored image examples are presented.

Poster A36

Psychological Impacts of Intimate Partner Violence Among Hispanic/Latines in New York City

Shannon Farnum

Mentor(s): Shiryn Sukhram
College of Staten Island

Intimate partner violence (IPV) is widespread in the United States, affecting over 61 million women and 53 million men who have experienced psychological aggression from an intimate partner during their lives. IPV remains a significant public health issue, with serious health consequences, especially for marginalized groups and ethnic minority women. However, many victims are reluctant to report their experiences, which makes it difficult to accurately determine the true extent of IPV. This study focuses on examining the psychological impact of IPV within Hispanic communities in New York City (NYC), where cultural and structural factors often create barriers to accessing essential support services. By analyzing data from the 2020 NYC Community Health Survey, the research investigates both the prevalence of IPV and the psychological distress experienced by Hispanics, with a specific comparison between Foreign-Born Hispanics (FBHs) and U.S.-Born Hispanics (USBHs). Our preliminary findings suggest that USBH women, in particular, report significantly higher levels of psychological IPV, with psychological distress serving as a major contributing factor. To further explore these factors, we employed linear regression models that account for risk factors such as multiple sex partners, binge drinking, marital status and mental health treatments which also influence IPV experiences. Through this approach, the research aims to highlight the critical need for culturally tailored interventions that address mental health and gender dynamics. Ultimately, the goal is to inform the development of more effective, community-centered IPV prevention and intervention strategies to reduce IPV incidence among Hispanic populations in NYC, fostering safer and healthier communities.

Poster A37

Regulation of Clustered Protocadherin-Mediated Adhesion: Insights from Junction Length and Continuity Analysis

Lauren Ferguson

Mentor(s): Greg Phillips
College of Staten Island

Clustered protocadherins (Pcdhs) are a family of approximately 60 cell adhesion molecules expressed throughout the nervous system. These proteins are believed to generate a unique barcode on the surface of individual neurons, yet their role in cell-cell adhesion remains ambiguous. In some cases, Pcdhs mediate stable cell-cell adhesion, while in others, such as the avoidance of same-cell dendrites, they mediate anti-adhesion. This suggests the presence of a regulatory switch that allows Pcdhs to mediate both stable cell adhesion and self-avoidance. The Pcdh cytoplasmic domain's negative effect on Pcdh cell adhesion and a regulatory mechanism involving endocytosis are hypothesized to contribute to the switch. This study explores the formation of cell-cell junctions by cytoplasmic mutant Pcdhs. Using confocal microscopy, we identified that wild-type Pcdhs form discontinuous, segmented, cell-cell junctions. In contrast, deletions of the cytoplasmic domain, in a region previously found to be important for Pcdh intracellular

trafficking and ubiquitination, produced more continuous cell junctions. To explore this regulatory mechanism further, we aim to develop a quantitative assay to characterize Pcdh cell-cell junction continuity. Using this assay, specific point mutations within the Pcdh intracellular trafficking motif will be tested. Current results suggest that select deletions in the cytoplasmic domain led to maintained junction length but greater continuity that is quantifiable. Overall, this project will provide new insights into the cytoplasmic regulatory mechanisms governing Pcdh-mediated adhesion.

Poster A38

Designing Mouse Femur Replicas: A Parametric Study of 3D Printed Beam Mechanical Properties

Lawrence Goldfeld

Mentor(s): Dr. Jean-Philippe Berteau
College of Staten Island

Previous studies have linked bone fracture risk to alterations in biomechanical properties. However, for individuals with bone diseases like osteoporosis, the relationship between disease progression and bone mechanical properties is not well established. Investigating this link could enable clinicians to better assess fracture risk and improve treatment strategies.

This project aims to establish a cost-effective and reliable 3D printed replica of a mouse femur to simulate bone mechanical behavior under controlled conditions. To optimize the accuracy of these simulated bones, we conducted a parametrically-designed mechanical study to quantify how changes in 3D printing parameters affect mechanical performance. We hypothesized that higher infill percentages and gyroid patterns would replicate the nonlinear and anisotropic mechanical behavior of real mouse femurs.

To test our hypothesis, we investigated mechanical properties (e.g., modulus of elasticity, maximum stress, and yield points) of rectangular 3D printed beams of three different sizes with different infill percentages (50%, 75%, 100%), infill pattern (rectilinear, gyroid), and layer height (0.12 mm, 0.20 mm). For each of the 12 parameter combinations, six beams were printed using PLA and tested in three-point bending. Our preliminary results suggest that beams with higher infill and gyroid patterns exhibit greater stiffness and strength, aligning closely with natural bone behavior.

Next, we will apply selected combinations of 3D printing settings to fabricate mouse femur replicas. Our goal is to mimic both healthy mouse femurs and bone alterations due to osteoporosis-induced porosity. This will lay the groundwork to better understand size effects in 3D printed structures and assess the scalability of our femur models. This work supports the development of inexpensive, reproducible, and ethically responsible models for biomechanical research.

Poster A39

Targeting Diabetes Inequities: The Role of Education and Neighborhood Poverty Among Hispanic Adults in New York City

Poornima Ilangachcharige, Miguel Padilla, Shane Desilva

Mentor(s): Shiryn D. Sukhram
College of Staten Island

Individuals with diabetes are two to three times more likely to experience depression than those without diabetes, yet many remain undiagnosed or untreated. In New York City (NYC), Hispanic residents of socioeconomically deprived neighborhoods face compounded challenges in managing diabetes due to limited healthcare access, economic hardship, and lower educational attainment. This study examines the relationship between diabetes and sociodemographic factors among Hispanic adults living in deprived NYC neighborhoods, using data from the 2020 NYC Community Health Survey.

Descriptive statistics and chi-square tests were used to examine the distribution of diagnosed diabetes across demographic and socioeconomic indicators. Logistic regression models were applied

to identify predictors of diabetes diagnosis, controlling for age, gender, weight status, high blood pressure, education level, neighborhood poverty level, and psychological distress as measured by the Kessler-6 (K6) scale. Although psychological distress was included as a covariate, it was not a significant predictor. In contrast, lower educational attainment and higher neighborhood poverty levels were significantly associated with increased odds of a diabetes diagnosis.

Among Hispanic adults in NYC's deprived neighborhoods, lower education is a significant predictor of diabetes diagnosis, independent of psychological distress. These findings underscore the need for targeted public health strategies that address educational disparities and expand access to culturally and linguistically appropriate diabetes care in underserved urban communities.

Poster A40

Exploring the Gut-Brain Axis and Microbiota in Human Physiology: A Spotlight on Pharmaceutical Intervention

Julia Palka

Mentor(s): Faiza Peetz
College of Staten Island

The microbiome-gut-brain axis is a vital communication pathway linking gut microbiota with the central nervous system (CNS), influencing physiology, behavior, and overall health. This bidirectional pathway integrates microbial signals from the gut with neural, hormonal, and immune systems, impacting brain function and homeostasis. Understanding the neurophysiological mechanisms behind this relationship is crucial for elucidating its role in gut health and its contribution to neurological and physical diseases. The specific pathways through which gut microbes influence neural function and behavior remain under investigation. Studying the microbiome-gut-brain axis requires rigorous microbiological and computational methods. Much of the research relies on animal models, which do not fully replicate human physiology. Utilizing both animal and human models presents challenges due to ethical concerns and costs. This research includes a literature review of over one hundred studies, journals, and existing reviews, assessed using CASP, PRISMA, and CONSORT rigor. The top 50 articles were selected to explore the relationship between the microbiome-gut-brain axis, human physiology, and pharmaceutical interventions. Studies show that the microbiome-gut-brain axis involves bidirectional communication between the gut microbiota and CNS, influencing neurotransmitter production such as Gamma-Aminobutyric Acid (GABA) and short-chain fatty acids (SCFAs). Changes in gut microbiota composition are linked to diet, genetics, and environmental exposures, highlighting the microbiome-gut-brain axis's role in health and disease onset. Current research indicates that pharmaceutical interventions can modulate the microbiome-gut-brain axis, providing new strategies for treating neurological disorders. Probiotics have shown promise in alleviating anxiety and depression by improving gut-brain communication. Emerging treatments like fecal microbiota transplantation and microbiota-targeted therapies are being explored, aiming to restore gut-brain axis function. Understanding the microbiome-gut-brain axis offers significant implications for preventive and therapeutic interventions targeting neurological disorders, ultimately enhancing human health and paving the way for future research.

Poster A41

Factors in Major League Baseball Team Valuations

Joseph Sollitto

Mentor(s): Jonathan Peters
College of Staten Island

This study observes what factors affect a sports team's valuation, more specifically in Major League Baseball. Through an analysis of financial status, team performance, market size, stadium history, recent team acquisitions, and the publicly traded

stock of the Atlanta Braves, we identify six primary valuation drivers: Forbes Inc. identified sport power, market power, brand power, and stadium power. We posit two additional items: vanity power and ownership. We determined that factors such as winning, market size, stadium ownership, location, team ownership decisions, and the premium price someone is willing to pay to own a team are the biggest drivers of a team's valuation. These findings provide a comprehensive framework for understanding the financial dynamics of MLB franchises and offer valuable insights for investors, team owners, and league stakeholders.

Poster A42

Measuring Bit Error Rate in Plastic Fiber Optics under Bending Conditions

Alicia Vidal, Jade Carranza, Philip Nicotra

Mentor(s): Neophytos Antoniades
College of Staten Island

Plastic optical fibers, POF, play a significant role in telecommunications. Their advantages make them a popular choice against their glass fiber counterparts and copper cables. With their resistant material and efficiency in data transmission, not to mention cost-effectiveness due to easier installation compared to that of glass fiber, applications of POF are surging. Despite being a popular choice, POF does have its limitations, mainly scarce power budget that can be impaired when transmitting under bending conditions. Investigation regarding POF behavior under bending conditions is needed to gain better understanding of the limits to their transmission properties. In this paper, additional information is provided regarding 3 fiber types: step-index, graded-index, and multicore step-index fibers, and their behaviors under bending conditions. The transmission properties measured are bit error rate, also known as BER, and optical power. This paper investigates the effects, as well as the relationship, between optical power and BER under these conditions.

CUNY BA Program

Poster A43

Can AI Have Gender? A 4E Cognition Approach to Gender Identity and Artificial Systems

Alexandria Rohn

Mentors(s): Emily Crandall, Daniel Harris
CUNY BA Program, Hunter College

Judith Butler's influential theory of gender performativity—arguably the touchstone in contemporary gender studies—describes gender as the product of the repeated citation of socially regulated norms. Yet, this discourse-centered model leaves largely unaddressed the embodied, affective, and cognitive dimensions through which gender is lived. Drawing on the cognitive science 4E (embodied, embedded, enacted, and extended) paradigm, I argue that gender identity emerges as an ongoing, embodied process of sense-making. This account accommodates Butler's insights regarding the role of normative social performance, while situating those performances within a living system that seeks equilibrium between body, self, and environment.

Predictive processing clarifies the causal dynamics of gender identity. On this view, individuals maintain high-level predictive models ("gender priors") about their bodily and social experiences. When persistent mismatches arise between these priors and actual experiences, prediction errors are generated, prompting corrective actions aimed at restoring equilibrium. Gender, therefore, is continuously negotiated through cycles of prediction, error detection, and bodily and social adjustments.

Two test cases sharpen this account. First, transgender experience illustrates how gender dysphoria emerges from chronic misalignment between bodily signals, sociocultural affordances, and autobiographical self-models. Transition practices (e.g., hormone therapy, voice training, social acknowledgment) function as adaptive strategies to reduce this predictive disequilibrium.

Second, gendered AI agents, such as Siri and Alexa, demonstrate the absence of essential conditions—embodiment, narrative selfhood, intersubjectivity, and reflective agency—thus merely mimicking rather than genuinely enacting gender.

By integrating philosophical analysis with insights from cognitive science, this 4E predictive-processing account advances a non-essentialist yet materially grounded theory of gender. The resulting framework illuminates the embodied mechanisms underlying gender, clarifies transgender experience, and offers criteria for evaluating claims about gender in artificial systems.

CUNY SCHOOL OF LABOR AND URBAN STUDIES

Poster A44

PACs on Attack: Political Spending in Local and National Elections

Rashaun Donovan

Mentor(s): Professor Kaufi Attoh
CUNY School of Labor and Urban Studies

The researcher has proposed this study to address issues surrounding PACs and Super PAC's engagement in political spending and how it affects the balance of power in Congress. Most of my research design will be using a "case study approach." I will be using two case studies to examine AIPAC's strategies in spending to boost its preferred candidates against candidates it wants to oust out of Congress. The two case studies that my research will examine will be the 2024 primary losses of Corey Bush and Jamaal Bowman. Both candidates were targeted by AIPAC due to their vocal stances of United States support for Israel's war on Gaza. These case studies are helpful in showing how the power of PAC's are currently being used to influence election outcomes. These two high profile case studies are good examples because they show how AIPAC spent $30 million on what turned out to be two of the most expensive Democratic House primaries in history. The data collected as part of my research will show how PACs like AIPAC and super PACs like United Democracy project undermine the democratic process and have the potential to disrupt the solidarity of any political party.

GUTTMAN COMMUNITY COLLEGE

Poster A46

Investigating the Impact of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) Contamination on Communities of Color

Nicolli Mesquita, Emiliano Corte

Mentor(s): Dr. Jihyun Kim
Guttman Community College

This research investigates PFAS contamination, policies, and the socioeconomic and health consequences of exposure in the U.S. Methodologies include assessing contamination levels, analyzing case studies, cross-examining household income with affected areas, and evaluating the EPA's PFAS Action Plan. PFAS, or "forever chemicals," persist in the environment and bioaccumulate, posing severe health risks such as cancer, immune dysfunction, and infertility.

Industries producing PFAS are often located near water sources of low-income and minority communities. Military bases and airports also use PFAS-heavy firefighting foam. Low-income areas, with majority Black and Latino residents, disproportionately face higher exposure risks, as seen in case studies from California and New Jersey. An analysis of the EPA's PFAS Action Plan reveals critical oversights, particularly regarding PFAS in soil.

Data from New York, Michigan, and New Jersey demonstrate a strong correlation between income disparities and PFAS exposure. Case studies highlight the intersection of environmental challenges with public health concerns and racial and socioeconomic inequalities. Community-led grassroots efforts provide critical insight into policy shortcomings, reinforcing the need for stronger regulations and improved science communication to protect vulnerable populations.

Poster A47

Once Upon a Time in the Big Apple: Folklore and Fairytales in the Making of Hyphenated-Americans

Lanasia White, Campbell Brice, Sabrina Qiu, Ejatu Jalloh

Mentor(s): Samuel Finesurrey
Guttman Community College

Our Project, “Once Upon A Time in the Big Apple: Folklore and Fairytales in the Making of Hyphenated-Americans,” explores how childhood storytelling shaped identities, values and our perspective of the world. We focused on students from diverse backgrounds and asked them about the stories they were told growing up; via parents, grandparents, religious communities, and media. Centered in the heart of New York City, the project reflects how shared urban space still allows for vastly different cultural lessons and inherited narratives. The interviews revealed how storytelling often carried moral lessons, reinforced gender roles, passed down cultural pride and even fear. After reflecting on these messages, some were challenged while others let them go completely. Whether it is fairytales, religious teachings or immigrant family stories, each one has contributed to our personal realities and upbringings. Our project highlights how storytelling extends beyond entertainment, it’s how we pass down defense mechanisms, pressure and beliefs that we as individuals decide whether or not to carry with us.

HOSTOS COMMUNITY COLLEGE

Poster A48

Ethical Integration of AI Tools in Science Courses for Non-Science Majors

Evan Brown

Mentor(s): Nelson Nunez-Rodriguez
Hostos Community College

This project investigates the ethical integration of artificial intelligence (AI) into science courses for non-science majors, focusing on online asynchronous activities that foster scientific reasoning skills. Building on previous work with high school teachers and college faculty, the proposal explores how AI is transforming classroom environments and how it can be utilized to teach inquiry skills and support scientific thinking. The project aims to create a set of logic-driven prompts designed to be applied in science courses, with a focus on disciplinary knowledge. This set of strategies will be valuable for fostering critical thinking and promoting ethical AI usage in educational settings.

Poster A49

Nanotechnology in Super capacitors and Energy Storage

Mahammadou Camara

Mentor(s): Oluwafemi Ligan, Reginald Dorcely
Hostos Community College

Nanotechnology has revolutionized energy storage by enhancing the performance of supercapacitors, which offer high power density, rapid charge-discharge cycles, and long lifespan compared to conventional batteries. The integration of nanomaterials, such as graphene, carbon nanotubes (CNTs), and metal oxides, significantly improves electrode surface area, conductivity, and electrochemical stability. These advancements enable the development of next-generation supercapacitors for applications in portable

electronics, electric vehicles, and renewable energy storage. This study explores the role of nanomaterials in improving supercapacitor efficiency, current challenges in large-scale implementation, and future directions for high-performance energy storage systems.

Poster A50

Exploring the Mathematics of JPEG Compression and its Impact on Various Image Categories

Mohamed Bachir Cisse

Mentor(s): Tanvir Prince
Hostos Community College

Data compression is vital in computer science and engineering, significantly shrinking large file sizes for more convenient storage and transmission. Among image compression methods, the Joint Photographic Experts Group (JPEG) technique is one of the most commonly employed, effectively compressing millions of digital images we interact with daily on devices and online.

This study is divided into two sections. Initially, I will explore the mathematical principles behind JPEG image compression, analyzing essential processes like transformation, quantization, and encoding. With my mentor's guidance, I will comprehensively understand how each process aids in minimizing file size while preserving image quality.

In Part 2, I will carry out experiments to examine how JPEG compression affects various image categories. Collaborating with classmates, I will choose a category for detailed study. Possible categories include “Single Color” or “Multicolor,” “Zoom In” or “Zoom Out,” and “Day” or “Night.” Additional options are “Black and White” or “Color,” “Natural Scenes” (like Landscapes) or “Man-Made Structures” (such as Buildings), and “High Detail” or “Low Detail.” I will concentrate on one of these categories to analyze the effects of JPEG compression on each type of image.

This research will help me develop essential skills in technical and engineering fields. I will practice teamwork, effective communication, and time management. I will do this through collaborative experiments. I will improve my presentation skills by sharing my findings with my peers. I may also present at conferences. In addition, I will build my skills in research, data analysis, and scientific reading. I will gain experience in writing scientific papers. I will also learn how to submit abstracts to conferences. This experience will prepare me for future academic goals. It will also support my professional growth.

Poster A51

Discovery of BACE1 Inhibitors for the Treatment of Alzheimer’s Disease

Anthony Gonzalez, Egli Gjuzi

Mentor(s): Professor Yoel Rodríguez, Ph.D. Hostos Community College

Alzheimer’s Disease (AD) is a progressive neurodegenerative disorder characterized by the gradual loss of cognitive and regulatory brain functions. Despite extensive research, no curative therapy currently exists. One promising therapeutic strategy involves the inhibition of β-site amyloid precursor protein cleaving enzyme 1 (BACE-1), a key enzyme implicated in the production of β-amyloid peptides. Small-molecule inhibitors targeting BACE-1—particularly at its catalytic site and allosteric exosites—have shown encouraging preclinical results. In this study, we employ Computer-Aided Drug Design (CADD) to identify novel small-molecule modulators of BACE-1. An initial literature review was conducted to compile and analyze previously reported BACE-1 inhibitors. We are currently performing molecular docking-based virtual screening using VIDA, OEDocking, and FRED software tools to assess the binding affinity of commercially available, drug-like molecules against the crystallographic structure of BACE-1 (PDB ID: 4DJW). The top ~50 candidate compounds identified through this in silico screening will undergo experimental validation. Successful identification of selective, high-affinity BACE-1 inhibitors could not only advance AD drug development but also provide a framework for targeting proteases in other neurodegenerative diseases.

Poster A52

The Study of the Effect of Lemon Balm on Water Contaminated with Copper

Elsa Holguin, Jade Blando

Mentor(s): Dr. Anna Ivanova and Mr. Emilio Pena
Hostos Community College

Water pollution caused by heavy metals is a serious environmental problem. Phytoremediation is an eco-friendly, cost effective and natural way to clean water contaminated with heavy metals. The results of our previous research on treatment of water polluted with heavy metals copper and zinc using several herbaceous aromatic plants, have shown the potential effectiveness of Lemon Balm in treating copper-contaminated water. Thus, to better assess the ability of Lemon Balm as potential treatment for water polluted with copper, the effectiveness of this plant in reducing copper concentration in polluted water should be further investigated. The ***objective*** of this project is to study the effectiveness of Lemon Balm in reducing the concentration of copper in water samples under varying pH. The experimental plant is grown in hydroponic gardening system - a soil-free approach to grow plants. The benefits of using hydroponic system include growing plants indoors at any time of the year in controlled environment, such as water enriched with necessary nutrients, controlled temperature, and pH, and necessary for the growth amount of light, among other parameters. The effectiveness of Lemon Balm is tested at different stages (early, middle and late) of its growth development. Specifically, leaves and stems of Lemon Balm are tested for their effectiveness in reducing concentration of copper in contaminated water samples. We ***hypothesize*** that change in pH of water samples affects the ability of the plant to reduce the concentration of copper in water. The spectrophotometric method is used to measure the concentration of heavy metal in the water samples before and after the treatment of the samples with the experimental plant.

Poster A53

Enhancing Cybersecurity Awareness: Evaluation the Impact of Virtual Training on Knowledge and Behavior

Amelia Lindha

Mentor(s): Dejolie Mbe Fokam, Reginald Dorcely

Hostos Community College

As cyber threats evolve, effective cybersecurity education is crucial. This study examines the impact of virtual cybersecurity training on knowledge retention and behavior. Between January 6 and 15, 2025, Hostos Community College's Department of Mathematics and Computer Science held six virtual Cybersecurity Awareness Workshops with CSTEP, MACSS, and Africatech Global Link INC. These sessions, which averaged 36 participants, used presentations, demonstrations, and Q&As to promote safer online practices. Post-session surveys from 31 participants showed cybersecurity knowledge ratings of "excellent" or "good" rose from 39% to 90%. Nearly all adopted password managers, multi-factor authentication, and email verification. Notably, 84% had never attended cybersecurity training, highlighting its necessity. Findings suggest that frequent workshops and stronger collaboration among faculty, student organizations, administrative departments, and external partners can enhance cybersecurity education, ensuring a more comprehensive approach to reducing cyber threats and improving digital security awareness.

Poster A54

Leveraging Intersectionality to Understand the STEM Student Experience at a CUNY Community College

Minji Nam

Mentor(s): Professor Antonios Varelas
Hostos Community College

This research project explored the minority undergraduate STEM student experience at Hostos Community College (HCC) through an Intersectional lens. Peer-to-peer semi-structured interviews were conducted to understand the perceptions, motivations, and barriers to enrolling, staying enrolled, and graduating at STEM fields for HCC students from populations underrepresented in these disciplines. The Intersectional lens considers an aggregate of social factors, such as race ad gender and sexuality, and may integrate towards an experience that is singular to that individual. Analysis of interview responses via the Listening Guide Methodology reveals how these factors contribute to the minority undergraduate STEM experience, and new obstacles or advantages.

Poster A55

From Conversation to Healthcare: The Potential of Large Language Models

Marquis Santiago

Mentor(s): Reginald Dorcely
Hostos Community College

Large Language Models (LLMs) employ artificial intelligence to interpret and generate human language. This project aims to explore the potential of LLMs to enhance daily life, with a focus on developing more human-like AI interactions. The goal is to advance LLMs to a point where interaction with AI becomes increasingly indistinguishable from human conversation. A key application area is in healthcare, where LLMs can assist families and patients in understanding policies, managing patient information, and developing personalized health plans. This project will involve continuous learning, model creation, and the integration of multiple models to achieve more sophisticated and human-like AI. Ultimately, this work envisions AI as a tool for enhancing, rather than hindering, our lives, similar to the supportive role of AI assistants in fictional contexts.

Poster A56

Voices in Two Languages: Understanding Bilingual Student Experiences in Criminology and Criminal Justice Fields

Sancheska Tapia

Mentors: Dr.Sarah Hoiland, Cristina Lozano Argüelles, and Rosemary Barberet
Hostos Community College

Bilingual students, who understand both English and Spanish, who study criminology and criminal justice at John Jay College and Hostos Community College are an understudied and underserved population . This project seeks to shed light on how bilingualism influences academic and professional experiences at two City University of New York (CUNY) Hispanic-Serving Institutions (HSIs). This study is significant as it highlights the challenges and opportunities bilingual students face. The research involves a 30-minute survey and 70-minute focus group discussions with participants on both campuses. As a research assistant and a bilingual criminal justice major at Hostos, I played a crucial role in recruiting students, distributing surveys, assisting participants, organizing focus groups, and supporting data collection. I also provided Spanish-language assistance to students who needed help understanding the research materials. Through this experience, I gained hands-on exposure to analysis skills, contributed to meaningful academic work, and strengthened my professional network by collaborating with faculty and fellow researchers.

A presentation of this research will provide an overview of the project's purpose, early insights, along with a detailed reflection on my role as a bilingual research assistant and criminal justice student at Hostos Community College. It will also highlight the challenges encountered in recruiting participants and how cultural sensitivity and

language access played key roles in successful engagement. Preliminary findings suggest that bilingual students often face systemic barriers but also demonstrate unique strengths, such as resilience, adaptability, and community awareness. Their ability to navigate between languages provides both academic advantages and personal identity challenges. This research contributes to a broader understanding of the need for culturally responsive support systems in higher education and offers recommendations to better serve bilingual students in criminology and criminal justice programs at HSIs.

HUNTER COLLEGE

Poster A57

Ion Dynamics in Pyrazole-Based Deep Eutectic Solvents: Exploring Sustainable Alternatives for Electrolytes in Lithium-Ion Batteries

Maritza Campoverde

Mentor(s): Steven Greenbaum
Hunter College

Lithium-ion batteries (LIBs) are vital to modern technologies, yet their dependence on flammable organic electrolytes continues to raise safety and environmental concerns. Deep eutectic solvents (DESs) have emerged as promising alternatives, offering low volatility, thermal stability, and tunable chemical environments. This study investigates the transport properties of two DES systems comprising lithium bis(trifluoromethanesulfonyl)imide (LiTFSI) combined with either Pyrazole (PYR) or 3-Methylpyrazole (MePYR) as hydrogen bond donors. Mixtures were prepared in molar ratios of 2:1 to 5:1 for PYR:LiTFSI and 3:1 to 7:1 for MePYR:LiTFSI.

Self-diffusion coefficients for Li^+, $TFSI^-$, and the donor molecules were measured using pulsed field gradient nuclear magnetic resonance (PFG-NMR) from 298–338 K. In PYR-based systems, lithium ions exhibited diffusion rates equal to or exceeding those of the $TFSI^-$ anion at lower donor ratios (2:1 and 3:1), suggesting effective lithium transport and a highly coordinated solvation structure. In contrast, MePYR-based systems consistently showed slower Li^+ diffusion, with D_{Li^+}/D_{TFSI^-} decreasing to approximately 0.6 at higher donor content. These results indicate that the methyl group in MePYR introduces steric hindrance that weakens hydrogen bonding and limits lithium coordination, despite enhanced fluidity at higher ratios.

Further structural insights were obtained via heteronuclear Overhauser effect spectroscopy (HOESY) performed on PYR:LiTFSI (3:1), which revealed strong spatial correlations between PYR and Li^+. The extracted cross-relaxation rate ($\sigma = 0.0638\ s^{-1}$) supports the existence of a structured solvation shell that facilitates Li^+ mobility. This comparative analysis demonstrates that subtle structural modifications in the hydrogen bond donor significantly affect electrolyte performance and highlights PYR-based DESs as more promising candidates for safer, high-efficiency LIB electrolytes.

Poster A58

Quantifying and Predicting Agricultural Climate Migration Risk in the Central American Northern Triangle Region

Stephanie Chernyavsky

Mentor(s): Randye Rutberg, Ramiro Campos
Hunter College

Climate change has had unequal impacts around the world and is expected to intensify in regions with vulnerable populations. Displacement fueled by these changes, known as climate migration, can be expected to become a growing problem as climate change accelerates. However, in the case of the Northern Triangle countries—Guatemala, Honduras, and El Salvador—the reasons for migration tend to be complex. To date, climate has often not been recognized as a leading factor. In this paper, the relative risk of future climate migration by workers in the agricultural sector was calculated using five indicators: the Notre Dame Global Adaptation Initiative's (ND-GAIN) Country Index,

percent employment in agriculture, remittances as a percent of gross domestic product (GDP), historical average surface temperature change, and projected temperature change. Findings show that the three Northern Triangle countries are at relatively elevated risk both in the short and long-term future, due to high reliance on agriculture, existing migrant networks in destination countries, and high social and economic vulnerability. Future research should be directed towards creating an index that predicts migration using quantitative counts of migrants, rather than relative values from different regions. Additional research is also required to fully understand the impacts of climate change on regional agriculture. Once these impacts are quantified, governments can develop policies to mitigate climate impacts and ensure efficient and equitable expenditure in agriculture.

Poster A59

Positively Charged Amino Acids in Mutant p53 C-terminal Domain Modulate PARylation and PARP1 DNA Damage Repair

Tamar Gurgenidze

Mentor(s): Dr. Jill Bargonetti
Hunter College

Mutant p53 (mtp53) drives the oncogenic progression of triple-negative breast cancer (TNBC), often acquiring gain-of-function (GOF) properties that promote tumorigenesis.The Bargonetti lab demonstrated that the loss of the C-terminal domain (CTD) of R273H mutant p53 reduces interactions with replicating DNA, Poly-ADP-Ribose Polymerase1 (PARP1), and Poly-ADP-Ribose (PAR).

This study investigates the role of positively charged amino acids (AA) in the CTD of mtp53 in mediating interactions with negatively charged PAR. Replacing these residues with neutral alanines weakens electrostatic attraction between mtp53 and PAR, potentially altering mtp53's oncogenic functions.To assess amino acids in mtp53-PAR interactions the lab generated stable lines using retroviral gene transfer in MDA-MB-157 cells expressing R273H and R273H-5A (five CTD AA alanine substitutions). Stable cell lines were treated with the DNA-damaging agent Temozolomide (TEMO) for four hours, followed by a recovery period to observe DNA damage repair. Using western blot analysis, we assessed levels of PARylation, PARP1, and γ-H2AX.

Untreated R273H-5A expressing cells exhibited significantly lower total PARylation levels compared to R273H. Following TEMO treatment, PARP1 activity remained reduced in R273H-5A cells. DNA damage was confirmed by increased γ-H2AX levels. After the repair, these cells maintained decreased total PARylation levels compared to R273H.

Findings suggest that positively charged CTD residues play a crucial role in PAR binding and PARP1 activity. Alanine substitutions disrupt these interactions, influencing mtp53-driven DNA repair and oncogenic functions.Understanding mtp53-PAR-PARP1 interactions could potentially expand the clinical applications of PARP inhibitors for TNBC.

Poster A60

Synthesis Of D_1 And D_3 Dual Selective Ligands On A Tetrathydroprotoberberine Skeleton

Aaron Lyons

Mentor(s): Ashok R. Gudipally, Wayne Harding
Hunter College

Selective targeting of dopamine subtype receptors D1R and D3R appears promising as a therapeutic strategy to treat psychostimulant addiction. Prior studies demonstrate that a dual-specificity D1R agonist/D3R antagonist attenuates addictive behaviors, with the two functions acting in an apparently synergistic manner. However, there is a paucity of ligands that exhibit this dual-selective D1R/D3R functional behavior. En route to the discovery of such dual-targeted molecules, we have

taken the approach of utilizing the tetrahydroprotoberberine (THPB) scaffold of (S)-isocorypalmine as a lead template for structure-activity optimization. We hypothesize that strategic incorporation of a thiourea motif at the C-2 position of (S)-isocorypalmine will enhance dual-targeted D1R agonist/D3R antagonist activity, by improving H-bond donor interactions critical for receptor engagement. A library of 22 thiourea analogs was synthesized via a seven-step sequence starting from berberine to yield the key precursor (S)-isocorypalmine. Thereafter, the phenolic hydroxyl group at the C-2 position was converted to an amine through sequential C-2 triflation and Buchwald amination, followed by coupling with diverse thiocyanates to introduce the thiourea motif. The purified compounds are currently undergoing evaluation via radioligand binding assays, in hopes of confirming that the thiourea modification serves as an optimal bioisostere.

Poster A61

Dynamics of Pyrazole-LiTFSI Eutectic Solvents as Promising Lithium-Ion Battery Electrolytes

Emilia Pelegano-Titmuss

Mentor(s): Dr. Steven Greenbaum
Hunter College

Eutectic solvents (ES) have emerged as promising candidates to replace conventional organic solvents in various technological applications due to their distinctive physicochemical properties, such as lower vapor pressure, low flammability, and ease of preparation at low costs compared to ionic liquids. Type IV ESs, formed by a molecular component and a metal salt, have recently garnered attention as electrolytes for lithium-ion batteries (LIBs) due to their potential to enable efficient charge-discharge cycles in LIBs.

We studied different eutectic mixtures formed by Pyrazole (PYR) and lithium bis(trifluoromethane)sulfonimide (LiTFSI) at varying compositions, focusing on their transport properties. Measurements were conducted at 283K. Fast Field Cycling NMR Relaxometry was utilized to investigate the dynamics of the system as a function of the magnetic field, ranging from 30 kHz to 15-35 MHz in ^{1}H Larmor frequency. Additionally, Pulsed Field Gradient (PFG) NMR was used to measure the self-diffusion coefficients. All measurements were carried out in the ^{1}H, ^{19}F, and ^{7}Li domains.

Our investigation revealed an intricate interplay between the lithium salt and pyrazole at different concentrations. Notably, the 1:2 LiTFSI:Pyrazole mixture exhibited a unique trend compared to other samples, with all nuclei relaxing faster and displaying higher R1 values at lower frequency ranges. Additionally, PFG NMR results indicated that Li+ ions have two distinct diffusion coefficients, likely due to their different local environments. These results also revealed that the lithium transference numbers in our ESs range from 0.13 to 0.47, underscoring their potential application in LIBs.

Poster A62

Regulation of PARP, MDM2, and MDMX Abundance in MDA-MB-231 Cancer Cells

Nicole Press

Mentor(s): Jill Bargonetti
Hunter College

The ubiquitin ligase Mouse Double Minute 2 (MDM2) is a known negative regulator of p53, and an oncoprotein with p53-independent functions that is frequently upregulated in cancer cells. The protein Poly(ADP-ribose) Polymerase 1 (PARP1) binds to single-stranded DNA breaks, where it creates chains of PAR to recruit repair proteins. MDM2 ubiquitinates PARP1 in cells with wild-type p53 (wtp53), suppressing this repair pathway. The objective was to further understand interactions between MDM2, its homolog MDMX, and PARP1 in cells with mutant p53 (mtp53).

Our experiments were performed in MDA-MB-231 cells with and without constitutive knockdowns of MDM2, and in MCF-7 cells. We treated cells with the PARP inhibitor Talazoparib, or transfected with MDM2 plasmids or MDM2-C449N plasmids

(a missense mutant expected not to heterodimerize with MDMX). Whole cell lysates were prepared and probed for levels of MDM2/X, p53, and PARP/PARylation via western blot.

Talazoparib inhibited PARylation and caused accumulation of reduced-size PARP. It also decreased MDMX protein while showing no significant effect on the level of MDM2. In MDA-MB-231 cells, the knockdown of MDM2 or rescue of MDM2 by transfection did not increase or affect the amount of PARP/PARylation. MDM2-C449N accumulated to a greater degree than MDM2. In MCF-7 cells, the missense mutation rendered MDM2-C449N incapable of degrading wtp53. However, in 231 cells addition of the mutant protein still appeared to correlate with reduced amounts of MDMX.

After PARP inhibition, MDMX appears to be degraded by a mechanism unrelated to abundance of MDM2. In MDA-MB-231 cells harboring mtp53, MDM2 appears not to negatively regulate PARP1, though it does in wtp53 cells. To check if MDM2 does not inhibit PARP1 in a broader mtp53 context, this study should be extended to other mtp53 cell lines. Understanding these protein's interactions helps improve targeting them in cancer treatments.

Poster A63

Decoding Mixed Microbial Communication Through Stereoisomeric Enantiomers of 12-Hydroxystearic Acid

Bahar Sakar

Mentor(s): Akira Kawamura
Macaulay Honors at Hunter College

Bacterial species use signaling molecules to communicate, but the mechanisms underlying communication in mixed-species environments are not well understood. In our study, we identify several signaling molecules produced by Wheatgrass mixed microbial culture (MMC). Notably, Wheatgrass MMC predominantly produces the (R)-isomer of 12-hydroxystearic acid (HSA), which is commercially available, alongside a smaller quantity of the (S)-isomer, which is not commercially available. Using the Mitsunobu reaction, which can be used to invert the stereochemistry of secondary alcohols, we successfully produce the (S)-isomer for further investigation of its role in biofilm formation. While the individual effects of each isomer on biofilm formation are explored, we also examine their combined effects, as interspecies communication appears to involve both enantiomers. This raises an intriguing question: how do varying ratios of these isomers influence bacterial behavior, potentially signaling them to form biofilms or adopt a planktonic state? To address this, we test different (R) and (S)-isomer ratios on biofilm formation, revealing new insights into how bacteria in mixed microbial cultures, mirroring their natural environments, communicate through stereochemical differences. Understanding these mechanisms is critical, as biofilms pose significant challenges across healthcare and industrial sectors, contributing to antimicrobial resistance and contamination. By gaining a better understanding of how bacteria chemically "talk" using (R) and (S)-12-HSA isomers, we may unlock innovative strategies to disrupt harmful biofilms, raising the question of whether manipulating these stereochemical signals could hold the key to controlling bacterial behavior in complex ecosystems.

Poster A64

Eliminating Variability in Transcription Factors Generated Vascular Organoid Formation by Manipulating Key Signaling Pathways

Maliha Tasnim

Mentor(s): Liyan Gong, Juan Melero-Martin
Hunter College

Current methods to form matured vascular organoids that faithfully recapitulate the complexity of in-vivo organs remains a challenge. This project's goal was to study the impact of growth factors (VEGF) and key signaling pathways (Notch and TGF-β) inhibitors independently and in combination on vascular organoid formation. It was

hypothesized that an increased concentration of VEGF would promote arterial-like endothelial cell differentiation and that the inhibition of the two pathways would promote venous-like endothelial cell differentiation.

The method entailed a differentiation period of 5 days and comprised two steps: (i) differentiation of hiPSCs into intermediate human mesodermal progenitor cells (h-MPCs) and (ii) organoid generation on day 3, grown in treatment accordingly. Techniques such as qPCR, flow cytometry, and immunofluorescence staining were employed to analyze markers for specific vascular cell types.

Using these generated vascular organoids (VOs), it was demonstrated that VEGF promotes endothelial and arterial differentiation and that Notch inhibition inhibits arterial differentiation. However, no definite conclusion was reached about the effect of TGF-β on endothelial cell differentiation or the effect of VEGF and TGF-β on mural cell differentiation, but it was determined that TGF-β inhibitor plays an important role in directing mural cell formation.

Future steps will assess the impact of TGF-β and Notch inhibition at different stages of organoid development, testing different dosages of inhibitors, and employing RNA sequencing and qPCR to analyze changes in gene expression associated with arterial, venous and mural differentiation markers at the different stage.

Poster A65

Neutron Absorption Material: Materials Informatics Prediction and Synthesis of Novel $Gd_{10}RuCd_3$ Intermetallic

Brook Xhabrahimi

Mentor(s): Anton O. Oliynyk PhD
Hunter College

Nuclear power is a rapidly expanding method of energy generation with increasing demand for affordable and safe energy. An effective absorption of neutrons helps to control the process and increase its efficiency. Searching for novel materials is beyond the stage of exploratory synthesis and should be targeted with data-driven approaches. This project explores the $RE_{10}MCd_3$ (*RE* = rare-earth, *M* = transition metal) series with a focus on elements with high neutron cross-section (e.g., Gd). As such, we predict, test, and synthesize a novel intermetallic $Gd_{10}RuCd_3$ with superior neutron absorption properties.

Using an in-lab developed recommendation engine, we synthesized $Gd_{10}RuCd_3$. Several variables were tested including reducing and increasing the mass percentage of one element at a time and decreasing and increasing the soaking temperature the samples would be placed in. When the variable of weight was considered, the intermetallic was pressed into a pellet and synthesized at 800 ºC with subsequent testing. X-ray diffraction (XRD) patterns and scanning electron microscopy metallographic data were collected, and the XRD data were refined for a detailed crystal structure analysis. Density Functional Theory (DFT) calculations were performed using VASP software.

The novel intermetallic $Gd_{10}RuCd_3$ exhibits negative thermal expansion and high neutron absorption, making it a potential control rod material. The electronic structure calculations reveal 0D-electride like behavior. Electronic and thermal transport properties measurements are in progress.

$Gd_{10}RuCd_3$ is a novel compound found in the lab with the help of a data-driven recommendation engine to expand crystal structure series. The compound exhibits unusual negative thermal expansion, with its electronic properties currently being investigated. Because the demand for energy generation and consumption is growing, the nuclear energy generation process will become more efficient, safer, and affordable with the newly discovered material.

Poster A66

Investigating biological differences between KRAS G12 mutations in response to KRAS inhibitor RMC-6236

Elesha McGrath

Mentor(s): Andrew L. Wolfe
Hunter College

KRAS is among the most frequently mutated oncogenes and it is implicated in highly lethal cancers. KRAS inhibitors capable of targeting all RAS variants offer a promising new therapeutic avenue. RMC-6236 is a RAS(ON) noncovalent inhibitor that has demonstrated tumor regression in preclinical models. It is unclear whether resistance mechanisms that arise in response to treatment with RMC-6236 vary across different KRAS mutations.

We investigated the differential inhibitory effects and resistance mechanisms of RMC-6236 on an isogenic panel of SW48 cells with KRAS mutations G12C, G12D, G12R, G12S, G12V, or wild-type G12 after 2 hours and 2 weeks of treatment. The 2-week experiment generated drug-tolerant persister (DTP) cells, and included a second condition with a 3-day drug holiday to evaluate the reversibility of drug-induced changes. Following this experiment, dose-response viability assays and extracellular acidification rate assays were performed to determine the impact of RMC-6236 on cell viability and glycolytic rates. Macropinocytosis assays were performed to assess differential nutrient uptake.

Our experiments revealed significant variability in cell viability and glycolytic rates among the different cell lines. The G12R DTPs were significantly more resistant to RMC-6236 than all other genotypes. All lines exhibited reversibility of drug resistance upon drug holiday.

The reversibility of medium-term resistance to RMC-6236 suggests transcriptional mechanisms, not genetic mutations. These findings have potential clinical implications, as understanding the differential response and resistance mechanisms of KRAS G12 mutant cells to RMC-6236 could allow clinicians to tailor treatment plans for optimal patient outcomes.

Poster A67

The Developmental Effects of Prenatal Exposure to Curcumin on Emotional Behaviors in Mice

Isabella Bodziony, Belkairys Taveras Tapia

Mentor(s): Nesha S. Burghardt
Hunter College

Curcumin, a compound found in the turmeric root, is known to have anti-inflammatory, antidepressant and anti-anxiety effects when taken in adulthood. However, it is unknown if consuming curcumin during pregnancy affects the development of offspring. Here, we gave female mice food pellets containing 1.5% curcumin or a control chow throughout pregnancy. Shortly before giving birth, each chow was replaced with a standard laboratory chow, ensuring that curcumin exposure only occurred during prenatal development. Once male and female offspring reached adulthood (9 weeks of age), their emotional responses were tested in a range of behavioral tasks, including the elevated plus maze, the social interaction test, and the forced swim test. Our preliminary findings reveal that prenatal exposure to curcumin decreased time spent in the open arms of the elevated plus maze in females, but not males. In the social interaction test, curcumin did not affect the amount of time either sex spent with a novel or a familiar mouse. However, curcumin increased the amount of time mice spent floating and decreased time spent swimming in the forced swim test, with effects that were stronger in females than males. Collectively, these findings demonstrate that prenatal exposure to curcumin increases anxiety-like and depressive-like behaviors in females and only leads to a subtle increase in depressive-like behavior in males. Future studies will investigate whether there are sex differences in the effects of curcumin on the development of neural circuits known to regulate emotion.

INNOVATIVE CAREER OPPORTUNITY AND RESEARCH PROGRAM (ICORP)

Poster A68

The Life of Hans Christian Andersen Through his Works: A Close Reading of Biographical Works

Jenessa Jasmin

Mentor(s): Agnes Wong
Brooklyn College

Hans Christian Andersen, often celebrated for his children's fairy tales, used his stories as a medium for autobiographical expression, encoding personal experiences within fantastical narratives. This research explores how Andersen's internal struggles, particularly with social alienation, unrequited love, and identity, are reflected in *The Little Mermaid***,** *The Ugly Duckling*, and *The Shadow*. Writing during the dynamic 19th century, Andersen navigated societal expectations and personal hardships, especially regarding his concealed sexuality. Through vivid imagery, symbolic characters, and allegorical plots, he expressed emotions and addressed taboo subjects that he could not openly discuss. *The Little Mermaid* explores body and mind dissonance, resonating with a queer reading that reflects Andersen's own unfulfilled desires and emotional sacrifices. *The Ugly Duckling* mirrors his transformation from an outcast to an acclaimed literary figure, symbolizing resilience and the power of self-acceptance. *The Shadow* presents a more somber view of identity, depicting the dangers of suppressing one's true self and highlighting Andersen's internal conflict between public persona and private identity. Together, these tales reveal a deeply personal dimension to Andersen's storytelling, elevating them beyond mere moral instruction for children. By embedding his life experiences in his fairy tales, Andersen ensured both creative authenticity and a lasting literary legacy, affirming his belief that "everything you look at can become a fairy tale." This analysis contributes to a deeper understanding of Andersen not only as a master storyteller but also as a complex individual navigating the constraints of his time through the transformative power of narrative.

Poster A69

Race, Age, and Frequency of Violence Among Black Americans

Jada Johnson

Mentor(s): Dr. Ken Irish-Bramble
Medgar Evers College

This research explores the relationship between age and frequency of violence among African American adolescents. Drawing on a critical race theory framework, this study hypothesizes that younger Black individuals (16 years old and younger) are more susceptible to violence compared to older Black individuals (17 years old and older). Building on previous scholarship on systemic racism and using the CDC 2021 Adolescent Behaviors and Experiences Survey, this research project examines the disparities in violence among Black Americans, with a particular focus on the distinct experiences of adolescents and young adults. Using SPSS software and statistical analysis, the study analyzed data to explore these distinctions and identify patterns in the age groups affected by violence within the Black community. Preliminary findings suggest that younger Black individuals are more susceptible to violence compared to older generation. These results highlight the urgent need to address the issues of racial inequality and violence in communities.

Poster A70

The Use of Artificial Intelligence (AI) to Transform the Aviation Industry

Dinah Attipoe Mensah

Mentor(s): Dr. Billy Metallinos
York College

The data found in the research examines how artificial intelligence (AI) can improve the airline industry's operational effectiveness, customer satisfaction, and environmental sustainability. It illustrates how AI technologies, including route optimization, predictive maintenance, and personalized customer services, are changing aviation practices by drawing on industry reports, recent academic literature, and real-world case studies. Artificial intelligence (AI) greatly improves operational effectiveness by analyzing real-time data to predict flight delays, reschedule flights, and anticipate aircraft maintenance requirements. These advancements also reduce maintenance expenses and operational disruptions by about 20% and improve flight punctuality. Thanks to AI, airlines can now offer more individualized services, which boosts consumer satisfaction by 15%. Chatbots with AI capabilities improve communication even further by providing prompt answers and real-time flight information. Pertaining to the environment, AI is used to minimize emissions and fuel consumption by means of effective scheduling and optimal flight routes. Furthermore, AI-powered contrail prevention techniques that use satellite imagery and weather data can reduce aviation's climate effect by up to 35%. The data elucidates a mixed-methods approach, combining quantitative data from operational metrics and environmental assessments with qualitative analysis of case studies. The findings highlight AI's increasing significance as a strategic tool in the aviation industry, giving airlines the chance to become more effective, customer-focused, and environmentally responsible.

Poster A71

Hair as a Cinematic Weapon: How Blaxploitation Films Weaponized Black Hair in the 1970s

Alexis Ricketts

Mentor(s): Tracy Wong, PhD, MPH, CHES, CT
Brooklyn College

"You're a disgrace to everything the Black fists stand for." – Cleopatra Jones (1973)

For Black Americans, hair has never been just style—it's a statement, a symbol, and a battleground. The 1970s Blaxploitation era sharpened this tension: afros defied Eurocentric beauty standards as crowns of Black Power, while wigs and straightened hair became survival tools in a white-dominated industry. Films like *Shaft* (1971) and *Coffy* (1973) weaponized these choices, turning hairstyles into cinematic code for power, rebellion, and assimilation.

This project decodes how the decade's 10 highest-grossing Blaxploitation films used hair as visual rhetoric. Through close analysis of *Super Fly* (1972), *Cleopatra Jones* (1973), and others, I reveal:

- Afros radicalized protagonists (e.g., Foxy Brown's halo-like 'fro), while straightened styles villainized antagonists (e.g., *Super Fly*'s Priest's conk).
- Gender split the symbolism: Women's hair balanced respectability politics (straightened bobs) with tactical subversion (wigs as disguise), while men's styles pit bald individualism (*Truck Turner*) against Afro solidarity (crowd scenes).
- Screen time hierarchy: Leads' evolving hairstyles marked agency (Coffy's wig-to-Afro arc), while background characters' static Afros echoed collective struggle.

Drawing on critical race theory and film semiotics, I argue that Blaxploitation's hair politics reinforced and disrupted Hollywood's racial narratives. The afro wasn't just a style—it was a frame-by-frame revolution.

Poster A72

Psycho-physiological Impact of Virtual Non-verbal Communication on Gen Z Workforce: A Study of Memes

Lucely Sosa

Mentor(s): Hadler da Silva, Mercedes Olmsted
Hunter College

The study *Psycho-physiological Impact of Virtual Non-verbal Communication on Gen Z Workforce: A Study of Memes* by Paramjit Singh Lamba and Neera Jain explores how memes, as a form of virtual non-verbal communication, affect the mental health of Generation Z employees. While memes are often used for humor and stress relief, this research highlights their potential negative effects, particularly when they convey criticism or sarcasm in professional settings. The researchers conducted a survey involving 528 Gen Z professionals across sectors. Using the Patient Health Questionnaire and analytical tools like SPSS, a statistical software, they assessed the psycho-physiological responses to meme exposure. The findings revealed that female participants exhibited greater resilience to the negative impacts of memes compared to their male counterparts. This study underscores the importance for employers and managers to recognize the potential adverse effects of meme culture in the workplace. It suggests the need for awareness and strategies to mitigate the negative psycho-physiological impacts of virtual non-verbal communication on young employees.

Poster A73

Racial Bias in Education: A Case Study for African Americans

Ghavita Sugrim

Mentor(s): Dr. Ken Irish-Bramble
Medgar Evers College

This study investigates the intersectional experiences of gender and racial discrimination among African American adolescents within the educational system. Employing Critical Race Theory, which posits race as a social construct influencing marginalization, this study examines gender differences in reported racially motivated mistreatment in schools. Analyzing data from the CDC's 2021 Adolescent Behaviors and Experiences Survey (ABES) (n = 7,676) using a t-test, findings revealed that while overall reports of racial mistreatment were infrequent, female African American students reported experiencing significantly more discrimination than their male counterparts. These results highlight the necessity of interventions like ethnic-racial socialization and restorative justice practices to foster inclusive and equitable learning environments.

JOHN JAY COLLEGE OF CRIMINAL JUSTICE

Poster A75

Academic and Financial Support Perceptions and GPA Variability as Factors of Retention and Graduation: A Pilot Study at a Hispanic-Serving Institution

Anthony Cruz Hernandez, Marquis Santiago

Mentor(s): Reginald Dorcely, Moise Koffi
John Jay College of Criminal Justice

Post-secondary institutions face challenges in retaining and graduating low-income students in STEM fields. This mixed-methods pilot study examined the impact of academic and financial support services on GPA stability and student persistence among Mathematics and Computer Science (CS) majors at a Hispanic-Serving Institution (HSI). The study compared students in the Mathematics and Computer Science Scholars (MACSS) program, who received scholarships, tutoring, and technology support, with their non-MACSS peers. Quantitative analysis of GPA data from 180 students (Fall 2022–Spring 2024) showed that MACSS scholars had significantly lower coefficients of variation (CV) in GPA (3–7% for Math, 10–17% for CS) compared to non-MACSS

students (26–32% for Math, 28–36% for CS), indicating more stable academic performance. Additionally, a survey of 108 students, with 20 Mathematics and CS majors responding, provided qualitative insights. Respondents highlighted tutoring, academic advising, and scholarships as key factors in maintaining GPA and advancing toward graduation. CS students reported a greater reliance on online resources, while Math students preferred in-person support. Across both groups, financial aid was consistently identified as essential in reducing stress and enabling continued enrollment. These findings underscore the value of integrated academic and financial interventions in supporting underrepresented students in STEM. Expanding models like MACSS may improve retention and promote equity at HSIs and comparable institutions.

Poster A76

Investigation into the Microbiome Composition of Blow Fly Eggs Using MicroSEQ™ ID

Samantha Davis

Mentor(s): Jennifer Rosati, Ph.D.
John Jay College of Criminal Justice

There is little published research characterizing the microbiome associated with blow fly eggs and how they may affect the colonization behaviors of certain blow fly species. Once deposited, blow fly eggs are rapidly introduced to a diverse range of microorganisms, which can vary depending on the species of blow fly, the environment, and the decomposition stage of the substrate (Junqueira et al., 2017). Since blow flies are among the first insects to colonize decomposing remains, the microbial communities present on their eggs could serve as key indicators of the decomposition stage at the time of egg-laying, thus providing a potential new method for refining PMI, or post-mortem interval, estimations (Joseph et al., 2011). In this study, the egg microbiomes of three blow fly species were studied: *Lucilia sericata* (Meigen), *Phormia regina* (Meigen), and *Calliphora vicina* (Robineau-Desvoidy). For each species, eggs were collected, and swabbed within one hour of deposition and plated onto both tryptic soy agar (TSA) and 5% sheep's blood agar. From these plates, individual microbial strains were identified and plated on TSA or blood agar to create isolate colonies to be used for species-level identifications using the MicroSEQ™ ID workflow. MicroSEQ™ ID provided an easy, efficient, and reliable sequencing method for identifying egg-associated microbes, and this study demonstrated that 5% sheep's blood agar was useful in identifying hemolytic-specific microbial strains. The specific microorganisms identified in this experiment demonstrated that the microbiome associated with blow fly eggs is highly complex and diverse and has many consistent and species-specific aspects between blow flies. This study highlighted the relevance of using MicroSEQ™ ID and blood agar in a variety of contexts beyond forensic entomology and how the microbiomes of blow fly eggs could play a role in colonization behavior.

Poster A77

Killing The Black Body: The Eugenic-Necropolitics Framework of Reproductive Oppression Against Black Women

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Eugenics, coined by Sir Francis Galton, was an erroneous ideology that aimed to improve the quality of human beings through state intervention and reproduction control, based on the pseudoscientific belief that human qualities were a direct byproduct of genetics. The genetic hierarchies pedestalized by eugenics rested on the legacy of institutionalizing hierarchies of human beings through state policy and under the lens of necropolitics, these hierarchies justified and reinforced state authority over mortality. We designed and present a novel eugenic-necropolitics framework for reproductive oppression, based on an extensive literature review encompassing eugenic and necropolitics theory, to demonstrate how Black women, a member of the historical eugenic class of the unfit, are targets of this discrimination part in parcel because of their status as disposable human

beings, through examination of forced sterilization, maternal health inequities, and access to abortion.

Poster A78

Cell Cycle Arrest and Cellular Senescence Mediated by Mancozeb: Insights into Its Role in Neurodegenerative Diseases

Patricia St. Fleur, Ryan-Alexa Liquori

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Mancozeb (MZ), a fungicide that contains manganese, has become a topic of concern due to its potential neurotoxic effects, particularly in relation to disorders like Parkinson's and Alzheimer's. The manganese component in its chemical makeup may lead to excessive manganese buildup in the brain's basal ganglia, posing a risk to dopaminergic neurons and possibly playing a role in the onset of neurodegenerative conditions. Previous studies from Cheng's lab have indicated that MZ can promote senescent cell death, marked by early cellular aging and arrest in the cell cycle. To further explore this, the current study examined how MZ influences cell cycle regulation in neuronal PC12 cells derived from rat adrenal medulla pheochromocytoma. Using a combination of senescence assays, cell cycle analysis, ingenuity pathway analysis, and western blotting, the impact of MZ at concentrations of 1 μM, 5 μM, and 50 μM over a 24-hour period was assessed in terms of cell cycle progression, protein expression, and associated signaling pathways. The results revealed a significant increase in the percentage of cells in the G0/G1 stage, indicating that MZ causes cell cycle arrest. In addition, cells exposed to 50 μM MZ showed significant upregulation of p53 and p21 proteins, along with a notable change in CDK4 expression. These findings suggest that MZ contributes to cellular senescence by disrupting essential cell cycle regulators, underlining its potential role in mechanisms associated with neurodegenerative processes.

Poster A79

The Intersection of Foster Care and Human Trafficking: Vulnerabilities, Offender Tactics, and Systemic Gaps

Jheyleinnies Guerrero

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This study analyzes the systemic deficiencies within the U.S. foster-care system that facilitate the sexual and labor trafficking of youth while also identifying evidence-based strategies for prevention and intervention. Utilizing a qualitative method, we performed a systematic literature review encompassing over 400 peer-reviewed articles, government reports, and NGO publications from 2014 to 2024, and conducted a theme-focused content analysis on 83 eligible sources. Using grounded theory allowed for open, axial, and selective coding to identify how individual issues, like unstable living situations, unresolved trauma, and social isolation, are linked to trafficker methods, such as emotional manipulation, peer recruitment, and online exploitation, along with problems in institutions like poor screening, data separation, and lack of oversight. Five main risk domains were identified: systemic vulnerabilities (n = 37), prevention and intervention strategies (n = 9), policy and legal gaps (n = 8), risk-factor profiling (n = 7), and screening and identification issues (n = 6). The findings indicate that frequent placement changes disrupt attachments and elevate the incidence of runaway episodes, which traffickers exploit via orchestrated "family" relationships and online coercion. Insufficient background checks and inconsistent policy enforcement allow predators to access foster environments, while disjointed data systems hinder timely victim identification. It is advisable to mandate the use of validated trafficking screeners during intake and placement transitions, establish multidisciplinary assessment teams, implement interoperable case-management systems featuring survivor-led dashboards, and incorporate social-media monitoring into early-warning tools. It is essential to shift media narratives toward victim-centered framing and expand trauma-informed

training for caseworkers, caregivers, and law enforcement. Future research should investigate platform-specific grooming scripts, assess the efficacy of digital interventions, and examine long-term recovery trajectories, especially for BIPOC and LGBTQ+ foster youth.

Poster A80

Functional Categorization Of 5 Prostate CTCs & Epithelial Cell

Sumaya Jashim

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Prostate cancer remains a significant clinical challenge due to its aggressive nature and substantial heterogeneity, which complicates treatment approaches. This National Science Foundation funded study (grant: SOC230017) employs bioinformatics analysis to elucidate the preservation of core methylation signatures between circulating tumor cells (CTCs) and their organ of origin (the prostate). R-based functional categorization was performed on publicly available whole genome bisulfite sequencing methylation data, comparing CTCs from five prostate cancer patients to a prostate epithelial cell. Findings validate that certain CpG islands should be avoided when developing targeted therapies, as they are essential for normal cellular function in both cancerous and healthy prostate cells. A novel "methylation exclusion framework" is proposed to enhance therapeutic specificity while reducing off-target effects in normal tissue. Future investigations may implement this framework to design interventions that selectively target cancer-specific methylation patterns while preserving critical signatures in the tissue of origin.

Poster A81

Walls of Resistance: Graffiti, Gentrification, and the Fight for Identity in Bushwick

Briana Moncayo Campoverde

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Graffiti is used as an act of resistance and method to address social injustices. New York City has street art in every corner and Brooklyn, in particular, has stood at the foreground of creating graffiti organizations and crews in regards to the ongoing presence of gentrification. Focusing particularly in Bushwick, an urban neighborhood that experienced drastic changes in the landscape and racial segregation, graffiti is utilized to collectively unite residents whose voices, existence, and lived experiences have gone unseen. Graffiti's evolution from tagging on walls to art activism, is now used to re-establish the existence of longtime residents in their neighborhood.

A year long ethnographic research project, under the theoretical framework *testimonies* with the methodological tools, i.e. the collection of artifacts and photographs with graffiti organization the Bushwick Collective, crews, and independent artists are used to understand the dynamics of art activism as it relates to graffiti as a political tool. This study gives an understanding of graffiti culture in the 1970's as machismo ran in crews, to now unite and educate community residents and local artists of their work in recognition of their representation as a person of color with similar lived experiences. Findings show that graffiti artists unknowingly contribute to gentrification, as their street art attracts tourists and adds a sense of authenticity to the neighborhood. For many graffiti writers, graffiti is a way to express themselves creatively and without hesitation. Additionally, some crews and nonprofit organizations dedicate murals and street art to specific themes, aiming to send messages to both the community and outsiders.

Poster A82

Seguridad Publica en Ecuador

María Moran

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En los últimos años, la seguridad pública se ha convertido en un problema notable en Ecuador. Para mi proyecto de clase de métodos de investigación, analicé investigaciones que evalúan la situación actual de la seguridad pública en Ecuador. Localicé diez fuentes, todas en español, que utilizaban varios métodos: datos secundarios, rastreo y comparación de las prácticas utilizadas por el gobierno en Ecuador con las utilizadas en otros países. Después de la pandemia de Covid-19, la seguridad pública disminuyó en todas partes de Ecuador debido a la situación económica y a la corrupción gubernamental, con un aumento de jóvenes que se unieron a grupos criminales organizados cometiendo actos violentos, robos y tráfico de drogas. Sugiero que una investigación que entreviste a jóvenes involucrados en pandillas, o que han estado involucrados en pandillas, aportaría a la literatura identificando los factores que llevaron a esto y las consecuencias para ellos, también asi como esto los afecto o beneficio de alguna manera en su vida diaria.

In recent years, public safety has become a notable problem in Ecuador. For my research methods class project, I analyzed research that assesses the current situation of public safety in Ecuador. I located ten sources, all in Spanish, that used various methods: secondary data, tracing, and the comparison of practices used by the government in Ecuador with those used in other countries. After the Covid-19 pandemic, public safety decreased in all parts of Ecuador due to the economic situation and governmental corruption, with an increase in young people joining organized criminal groups committing violent acts, robbery and drug trafficking. I suggest that research that interviews young people involved in gangs, or that have been involved in gangs, would add to the literature by identifying the factors that led to this and the consequences for them, also as this affected or benefited them in some way in their daily lives.

QUEENS COLLEGE

Poster A83

Questioning 421-a: Making “Below Moderate” Progress in Assisting Economically Distressed Renters

Henry Alonso

Mentor(s): Prof. Dwayne Baker
Queens College

Since the 1970s, the New York State legislature has employed 421-a, a property tax exemption program to incentivize residential development, and more recently, affordable housing. Though popular with developers, 421-a has been criticized by housing planners and activists for predominantly incentivizing market-rate and affordable housing geared toward middle-income households. These outputs persist despite multiple policy amendments to ensure deeper affordability for low-income households—many of whom live within economically distressed communities and are severely rent-burdened. Thus, isolating renter household income and locating where, and how much, 421-a has produced low-income affordable rental housing is essential to evaluating the policy’s overall impacts—specifically, if and how 421-a has assisted communities of lower-income, rent-burdened residents.

As such, this paper interprets New York City as two distinct geographies—below moderate AMI and moderate AMI or above—defined by their renter households’ appropriate area median income (AMI) ranges. This study similarly stratifies and quantifies affordable rental housing in 421-a-incentivized projects that were approved within each geography between 2014 and 2019. This paper's findings suggest that 421-a did not incentivize significant lower-income affordable rental housing in the below-moderate geography during the study's timeframe. Its results expand on criticisms of 421-a by identifying how the policy has failed to aid specific communities in need of

affordable housing. The author proposes that future affordable housing incentives mandate more lower-income affordable rental housing to account for income disparities revealed in this study's methodology. Furthermore, the author encourages researchers to implement this paper's methodology when critiquing affordable housing policy to advocate for lower-income renters.

Poster A84

How Does BMP Signaling Execute Its Fat-Regulatory Function at The Subcellular and Molecular Levels

Alan Cantos, Kat Yamamoto

Mentor(s): Professor Savage-Dunn
Queens College

Lipid metabolism is involved in different active functions of our body, such as energy storage, hormone regulation, nerve impulse transmission, and fat-soluble nutrient transportation. The aberrant increase or decrease of lipids can cause various human diseases. For example, increased triglycerides and LDL instead of HDL can mediate the transport of bad cholesterol. Similarly, the accumulation of fatty LDLs and triglycerides can damage the arteries and have serious consequences for cardiovascular health.
Previous work in DBL-1, the *C. elegans* homolog of bone morphogenetic protein 2/4 (*BMP2/4*), has identified it as a significant regulator of body size, lipid metabolism, and innate immunity in *C. elegans*. In wild-type animals, DBL-1 promotes growth to normal body size, lipid synthesis to allow normal fat storage, and is necessary for normal defense against pathogenic bacteria. In contrast, *dbl-1* mutants exhibit a shorter body size, low-fat phenotype, and increased sensitivity to pathogens.

In this study, we used *C. elegans* to investigate how *BMP* signaling executes its fat-regulatory function at the subcellular and molecular levels. We hypothesized that genetic suppressors of the low-fat phenotype of *dbl-1* mutants will reveal regulatory networks that interact with *BMP* signaling to modulate fat storage. We are conducting genetic experiments to identify the causative mutations that result in suppression of the low-fat phenotype of *dbl-1* mutants, reversing the fat accumulation defect. We are also interested in whether the lipid metabolism phenotype affects the other functions of *DBL-1*. Previous studies showed that the body size and lipid metabolism phenotypes are independent. We are testing whether the regulation of lipid metabolism impacts survival of *C. elegans* on the bacterial pathogen *Serratia marcescens*. *C. elegans* is a good model of study since it is a genetically tractable model for studying lipid regulatory mechanisms, and its lipid metabolism pathways are highly conserved.

Poster A85

Disruption of Wnt Signaling Alters Tubulin Mechanics and Cell Cycle Regulation During Development

Cherese L. James

Mentor(s): Timothy Q. DuBuc

Queens College

Regulation of the cell cycle is instrumental to life, and we are particularly interested in understanding how animals regulate this phenomenon across developmental time. Using two distinct pharmacological drugs to over activate Wnt/Beta-catenin signaling, we demonstrate that cnidarians and annelid worms utilize Wnt to initiate cell cycle progression by directly regulating tubulin mechanics. Complementary drug exposures either halt development completely, leading to embryonic arrest or loss of differentiated tissues maintained through homeostasis. Or, inversely generated increased somatic differentiation leading to ectopic head formation and nervous system duplication. Our immunostaining analyses revealed that Wnt agonist 1 disrupts tubulin polymerization and decreases cell cycle activity evidenced by reduced EdU incorporation, while GSK3β inhibition increases differentiation when the cell cycle remains intact. These findings establish Wnt signaling as having an evolutionarily conserved role in cell cycle regulation during development and homeostasis

across diverse invertebrates, with tubulin serving as a key mechanistic link between cell cycle progression and differentiation. I am thrilled to embark on this scientific journey exploring the fundamental mechanisms that show developmental biology across diverse evolutionary organisms. This opportunity to uncover these cellular pathways not only advances our understanding of basic biology but also provides insights into human development.

Poster A86

Monitoring Influenza A, B and SARS-CoV2 in NYC Public Hospitals Wastewater

Valeria Martinez, Sukhleen Kaur, Christa Huang, Riki Posner, Layla Wang, Aiden Stanciu

Mentor(s): Drs S. Kannoly, JD Dennehy and M. Trujillo
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Wastewater-based epidemiology (WBE) is a new tool that monitors pathogen levels in sewage, contributing to public health surveillance. Both symptomatic and asymptomatic Infected individuals shed pathogens in their stools, making WBE more inclusive than clinical testing. Our group has developed and patented an easily deployable passive *in situ* concentration device. It uses a chemically inert material to adsorb cells and viruses. The device is deployed in manholes or sewer pipes from NYC Health and Hospitals and removed after 24 hours. It is then brought to the laboratory where, using proprietary buffers and a commercial kit, total nucleic acids are extracted. One key challenge for WBE is detecting low concentrations of pathogenic viruses in wastewater before a disease outbreak. Thus, (1) we are now using the more sensitive Digital PCR over quantitative PCR and (2) made improvements to the capture efficiency of the device.

Additionally, normalization is crucial to account for variations in wastewater flow and population size, ensuring accurate and reliable trend analysis for public health decision-making. We are currently using the GoTaq® Enviro Wastewater Flu A, Flu B, SC2 System, which provides a cost-effective multiplex primer and probe kit. Here, the levels of Influenza A, Influenza B, SARS-CoV-2, and Pepper Mild Mottle Virus (PMMoV) are measured in a single reaction. PMMoV concentrations are a measure of human contribution to the sewershed and are used for data normalization.

The purpose of this study is (1) to compare recovery using two versions of the concentration device and (2) to gauge whether PMMoV levels can be used to normalize virus concentrations.

Our results show that our device modifications significantly improved detection of the viruses tested. The WBE data can be used for situational preparedness during an outbreak, which in turn allows proper allocation of limited resources.

Poster A87

When It Comes to Crime by Neighborhood, Do Socioeconomic Factors Tell the Whole Story? Disadvantaged Neighborhoods and Gun Violence in NYC: A Post-Regression Analysis of Environmental and Social Contributors

Michael Morello

Mentor(s): Mindy Rhindress, Joseph Cohen, Shige Song
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This research examines how environmental burdens, and social vulnerabilities interact to shape neighborhood disadvantage and influence patterns of gun violence in New York City. Drawing on NYSERDA's 2023 Disadvantaged Communities dataset and NYPD's shooting incident data, I used beta regression and simulation modeling to estimate the effect of 45 variables—spanning climate risk, pollution, health, and population factors—on NYC's Disadvantage Score. This score reflects the structural conditions communities face, with higher values indicating greater disadvantage.

Results show that both environmental and health-related variables contribute substantially to predicted Disadvantage Scores. Benzene

Concentration and Particulate Matter emerged as top environmental predictors, while Asthma Emergency Department Rate and Drive Time to Healthcare were leading health indicators. These findings support the hypothesis that gun violence is more likely in neighborhoods burdened by overlapping structural risks. The analysis also confirms the value of the Disadvantage Score as a reliable indicator for identifying vulnerable areas.

By pinpointing which structural factors contribute most to predicted disadvantage, this study highlights the need for targeted, equity-driven interventions. Recommendations include expanding gun violence prevention strategies to incorporate environmental justice measures, such as pollution mitigation and investment in green infrastructure. These efforts will support not only public safety but also long-term neighborhood resilience.

Poster A88

The Effects of Environmental Enrichment on c-Fos Expression in the Ventral Tegmental Area of Cue-Induced Heroin Seeking Rats

Ziv Nachshon

Mentor(s): Dr. Robert Ranaldi
Queens College

The brain's reward and cognition systems are susceptible to a type of neural plasticity that causes the pathological condition known as substance use disorder. This condition arises from the abnormal activation of gene expression programs from extended drug use. In order to effectively develop interventions, the use of rat models–with operant conditioning–have contributed to further research on ways to counteract relapse; identifying the behavioral and neurological aspects of substance use disorder. Specifically, cue-induced reinstatement has provided valuable insights into the resumption of drug-seeking actions following a period where heroin self-administration is extinguished. It was found that rat models placed in environmentally enriched (EE) cages had a reduction in drug craving and seeking behaviors during reinstatement, in comparison with rat models placed in non-environmentally enriched cages (nEE). To further these results, immunohistochemistry techniques such as RNAscope were used to analyze the brain's ventral tegmental area (VTA) for c-Fos and dopamine expression. It was determined that rat models in EE cages had lower c-Fos expression, and thus, lower dopamine activity in the VTA. These results suggest there is a connection between environmental enrichment and the neurological mechanisms associated with substance use disorder, and suggest that environmental enrichment may constitute a potential treatment for addiction.

Poster A89

The Effects of Chronic Nicotine Exposure on Dopamine-Mediated Reinforcement Learning using Optical Intracranial Self-Stimulation

Amrit Pabla

Mentor(s): Dr. Jeff Beeler

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Despite the declining rates of smoking, nicotine use is still prevalent in the United States, affecting approximately 22% of the population. Nicotine has been known to affect cognition, motivation, and reinforcement; research suggests that nicotine induces neurological adaptations in the mesolimbic dopamine (DA) pathway, which alter the effects of reward stimuli and drive learning. However, the current literature addressing nicotine's effects on reward behavior is centered around acute administration, which does not reflect the constant, low-level of nicotine in the blood serum of smokers. Using concurrent fiber-photometry (FP) recording in the striatum and optical intracranial self-stimulation (oICSS) in the ventral tegmental area, we investigated chronic nicotine (cNIC) exposure on behavior and neurotransmission during dopamine-mediated reinforcement. ChR2-YFP x DAT-IRES-Cre(het/het) mice were given either cNIC or drinking water before being trained to press levers and self-stimulate. After acquiring oICSS behavior, lever contingencies changed: one lever was reinforced on a Fixed Ratio (FR) 4 schedule,

and the other was on FR 10. After a contingent lever press, a cue light was presented followed by optogenetic stimulation. cNIC mice exhibited increased self-stimulation behavior on the FR 4 lever compared to controls, however, this increase was not observed on the higher-cost lever. Furthermore, the dopamine transients during self-stimulation events were blunted on the FR 4 lever in comparison to the FR 10, but only in the cNIC mice. These results suggest that long-term nicotine exposure affects the reward response to different reinforcers by altering DA transmission in the striatum; decreases in DA are associated with increased motivation, thus driving self-stimulation behavior. This bias in reward response may explain the difficulties in quitting nicotine, and co-use with other drugs. Understanding the relationship between cNIC and reward is critical in elucidating the mechanisms behind addiction, abstinence, and relapse for nicotine and concurrent use of other substances.

Poster A90

Characterization of SARS-CoV-2 Replication and Transcription Complexes via Structural and Evolutionary Approaches

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Mentor(s): Eleonora Gianti
Queens College, CUNY Graduate Center

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) took center stage in 2020, causing almost over 700M cases and over 7M COVID-19-related deaths recorded worldwide (as of March ‘25 by WHO). Aiming to effectively combat this and other disease-causing Coronaviruses (CoV), unprecedented research efforts led to the development of new vaccines and antiviral therapies. However, due to emergence of several variants of concern (VOCs), SARS-CoV-2 continues to represent a major threat to global health, due to increased transmissibility, immune evasion from vaccination, and the potential to resist the available treatments. Hence, there is a pressing need to discover new antivirals with broad spectrum efficacy against multiple SARS-CoV-2 variants and closely related CoVs. The focus of this study is to establish sequence conservation and coevolution frameworks of SARS-CoV-2 enzymatic domains that are critical to viral replication and transcription, such as the polymerase (nsp12-RdRp), exonuclease (nsp14-ExoN) and RNA capping (nsp16/nsp10) ones. By identifying regions of these proteins that remain conserved across VOCs (as well as CoVs), drugs that target these regions can be designed that are less likely to lose their efficacy due to mutations. Specifically, for each of the investigated proteins, we employed multiple sequence alignments (MSA), phylogenetic tree reconstructions, and coevolution analysis to identify functionally significant residues across multiple CoVs. We then performed Principal Component Analysis (PCA) to separate large sequence data sets into sub-groups, based on sequence conservation. Finally, by combining our results with superimpositions of experimental structures of these proteins in complex with potential drugs, we identified locations within key functional domains to be further explored as potential drug-binding sites. Our work provides a general framework to assist the design of new drugs with broad antiviral properties against SARS-CoV-2 and other emerging CoVs.

Poster A91

Noncanonical Roles of Autophagy Genes in Proteostasis and Cellular Stress

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Macroautophagy (hereafter autophagy) is an essential cellular process that facilitates lysosome-mediated degradation and recycling of subcellular structures, including proteins, lipids, and organelles. Autophagy involves several distinct steps, including phagophore formation, the creation of a double-membrane-bound vesicle, and its fusion with the lysosome, for degradation and recycling. Disruption

of autophagy has been linked to a range of diseases, such as cancer, infectious diseases, and neurodegeneration. Although autophagy is typically considered beneficial for cellular homeostasis, this study makes the surprising discovery that mutations in *atg-4.1*, but not *atg-4.2* in *C. elegans*, exhibit improved survival to ER stress.

ATG-4.1 and ATG-4.2 are the *C. elegans* orthologs of yeast Atg4, a protease required for the cleavage and lipidation of Atg8. Mechanistically, the LGG-1/GABARAP and LGG-2/LC3 orthologs of yeast Atg8 in *C. elegans*, require cleavage by ATG-4.1 and ATG-4.2 to expose a critical invariant Glycine residue that is essential for lipidation. ATG-4.1 and ATG-4.2 are also required to deconjugate LGG-1 and LGG-2 from lipids. Intriguingly, the ER stress resistance of *atg-4.1* mutants was dependent on the presence of the ATG-4.1 substrate LGG-1, suggesting that alterations in LGG-1 processing by ATG-4.1-deficiency are crucial for promoting proteostasis. In addition, animals that carry a mutation in LGG-1 that exposes the Glycine and would function as constitutively cleaved nonlipidated LGG-1, were not resistant to ER stress. We have generated by CRISPR a mutant of LGG-1, *lgg-1(E112P)* and similarly, a mutation in LGG-2, *lgg-2(Q138P),* which are expected to be resistant to Atg4-mediated deconjugation. Interestingly, we find that animals carrying these mutations were also resistant to ER stress. Thus, our findings indicate that LGG-1 and LGG-2 together may be acting in a process of Atg8ylation that results in resistance to ER stress. While the cellular functions of protein Atg8ylation remain largely unexplored, our findings link the process of Atg8ylation to proteostasis and cellular stress responses.

YORK COLLEGE

Poster A92

The Role of Stabilizing Cardiolipin in Pruritus in an Acute Diabetic Skin Model in Mice

Sara Arain

Mentor(s): Dr. Alexander Birk
York College

Chronic pruritus is a prevalent and debilitating condition that hinders the quality of life for patients and caregivers across various cutaneous and systemic diseases such as atopic dermatitis, chronic wounds, chronic kidney disease, and diabetes. In diabetes, chronic hyperglycemia leads to metabolic imbalances, resulting in the overproduction of methanol. Methanol is then oxidized to formaldehyde which is cytotoxic. Formaldehyde is then converted into formic acid, a mitochondrial complex IV inhibitor, producing reactive oxygen species (ROS) and cytotoxicity. In the skin, C-fibers are unmyelinated neurons that transmit itch sensations. These fibers contain abundant mitochondria in their axon terminals to provide ATP to facilitate neurotransmitter release making them sensitive to mitochondrial dysfunction. Mitochondrial dysfunction is linked with sensory abnormalities, including histamine-independent pruritus and neuropathy, especially during diabetes. Therefore, we hypothesize that methanol, a precursor for formic acid and formaldehyde, can induce ROS and itching in mice as an acute diabetic skin model. We demonstrated that intradermal administration of methanol induces 276 seconds of itching over a standard 40-minute observation period. Next, Antimycin is a mitochondrial complex III inhibitor that induces ROS formation. Co-injection of Antimycin and methanol increased itching to 330 seconds, supporting the hypothesis that ROS contributes to histamine-independent pruritus. FCCP is a selective mitochondrial uncoupler that promotes electron transport and inhibits ROS formation. Co-injection of FCCP and methanol inhibited methanol-induced itching to

only 20 seconds suggesting that ROS formation promotes histamine-independent pruritus. Our laboratory has developed a high-density aromatic peptide (HDAP) that has no ROS-scavenging properties and stabilizes the bi-layer phase of cardiolipin supporting membrane integrity. We demonstrated that HDAP systemically and locally inhibited methanol-induced itching. Therefore, the destabilization of cardiolipin is likely to play a significant role in this acute diabetic skin model. Future studies will focus on understanding ROS formation in C-fibers and the morphology of mitochondria.

Poster A93

Towards A Reliable Synthesis of Oxazolone – Optimization of the Initial Anodic Oxidation

Jennifer Duverge

Mentor(s): Dr. Stephen Philip Fearnley
York College

Oxazolone has proved a useful starting material in the synthesis of several alkaloid natural product targets. We therefore need a reliable route to this heterocycle. We currently use an electrochemical method, but this has proved unpredictable, and we therefore seek to optimize this process. Starting with oxizolidone, this initially undergoes an electrochemical oxidation process in order to produce methoxyoxizolidinone, which is then eliminated to oxazolone itself. In order for this to be successful, the starting material must be pure. The initial goal of our research is thus to optimize it's production to yield the purest product we can. Using a simple undivided cell we are presently investigating key factors in the anodic oxidation of this molecule. This includes co-electrolytes, concentration, solvent, and current/voltage. Proton NMR is then used to monitor the reaction in D-Chloroform as the solvent. Our recent progress will be discussed.

Poster A94

Revolutionizing Plant Gene Editing: A Compact Vector Design for Efficient CRISPR/Cas9 genome editing in plants.

Gavin Greenidge, Anthony Abreu

Mentor(s): Louis Bradbury-Boyd
York College

In recent years, the transformation of plants via Agrobacterium-mediated methods has seen significant advancements. Among these, the application of CRISPR/Cas9 for targeted gene editing has been a pivotal development in plant science. Furthermore, the employment of developmental regulator genes to induce meristem formation, bypassing the need for labor-intensive tissue culture, has expedited plant genetic modification processes from six months to as little as one or two months. The use of chickpea dwarf virus replicons for initiating rolling circle replication facilitates the extra-chromosomal replication of the T-DNA carrying the CRISPR/Cas9 cassette. This method enables gene editing without the permanent, random integration of T-DNA into the plant genome and obliviates the need for selectable markers, such as antibiotic or herbicide resistance genes.

Plasmids integrating these elements—CRISPR/Cas9, viral replicons, and developmental regulator genes—are now available to the plant science community. However, given their proximity to the size limit for plasmids (~20kb), there is insufficient space to include additional elements, such as templates for homologous recombination-mediated repair (typically >3kb). Consequently, these plasmids are suitable for generating gene knockouts but not for gene substitution or overexpression. Moreover, the lack of straightforward cloning mechanisms for new guide RNA sequences complicates their use.

This project optimized one of these plasmids (pMKV Cas-9) in terms of stability by removing a high copy origin of replication and replacing it with a low copy version along with supporting replicating and resistance genes. Additionally, we

incorporated recognition sequences for two type-IIS restriction enzymes, facilitating golden-gate cloning of new guide RNAs. Following this, we successfully incorporated guide RNAs to target the genes encoding 15-cis-zeta-carotene isomerase (Z-ISO) and Carotenoid Isomerase (CRTISO) two enzymes involved in the carotenoid biosynthesis pathway. This new plasmid will enable us to achieve precise editing of plant genomes.

Poster A95

Urban Mammal Adaptations: Insights from Nationwide Camera Trap Data (Snapshot USA)

Fasmin Marikar, Rakiba Kaniz

Mentor(s): Dr. Monica Mowery
York College

Urban landscapes are often underestimated as reservoirs of biodiversity. Our research utilizes data from Snapshot USA, a nationwide camera trap project launched in 2019 that employs standardized methods to monitor mammal populations across wild, rural, suburban, and urban habitats across the United States. We began by analyzing mammal diversity in southern Queens, New York City, setting up eight motion-sensing cameras across green spaces and cemeteries over a 60-day period. Results indicate that areas with low and moderate human activity tend to support the highest species diversity, and larger green spaces exhibit somewhat greater species richness. Commonly detected species—such as raccoons, squirrels, mice, rats, and domestic cats—were adapted to the surveyed small, urban green spaces. In addition to diversity measures, the study examined diel activity patterns of the three most common urban species in the Snapshot USA survey from 2019-2024. Northern raccoons in wild habitats displayed a notable shift in activity, becoming more active during morning hours compared to raccoons found in rural, suburban, and urban environments. This suggests behavioral flexibility in response to varying levels of human presence. Building on these findings, our next phase involves a broader analysis of urban mammal diversity from 2019 to 2024, examining patterns through the lens of land use and historic housing segregation via Homeowners' Loan Corporation (HOLC) maps. We hypothesize that neighborhoods historically graded lower (C-D) will show reduced mammal diversity compared to higher-graded areas (A-B). This work highlights the ecological value of urban green spaces and the potential impacts of socio-environmental factors on urban wildlife distribution.

Poster A96

Prompt Engineering: Unlocking Better Responses from LLMs

Ngawang Tendrel Samdrup

Mentor(s): Abu Kamruzzaman
York College

Large language models (LLMs) like ChatGPT-4 have made significant advances in generating human-like text, answering questions, and solving problems. However, how well these models perform often depends on the clarity and precision of user-provided instructions, known as "prompts." The process of designing prompts, called prompt engineering, plays a critical role in achieving accurate and useful responses. This technique became essential with the rise of advanced LLMs, which are trained on vast amounts of text to perform tasks like answering questions, creating summaries, and solving problems (Brown et al., 2020). Research highlights that structuring prompts effectively can unlock the full potential of LLMs. For example, few-shot learning, where the prompt includes examples, has been shown to improve response accuracy (Zhao et al., 2023). Additionally, studies emphasize that understanding and refining prompting strategies is key to ensuring models perform consistently across tasks (Sahoo et al., 2024). Despite these advances, creating prompts that consistently deliver high-quality results remains challenging. Current studies lack comprehensive frameworks to standardize and optimize prompt engineering techniques, which would help users better control the quality of model outputs across different applications. This paper explores key methods of prompt engineering and their impact on

LLM performance. To support this exploration, an experiment was conducted comparing the effectiveness of zero-shot, few-shot, and chain-of-thought prompting strategies in improving response quality. Applying structured prompt techniques is expected to enhance the relevance, clarity, and completeness of LLM-generated responses, making model outputs more reliable and useful across various applications. By focusing on simple and practical ways to design prompts, the study aims to make it easier for users to utilize these models effectively in different fields.

Poster A97

The Effects of Phenylalanine Mutants on the Aggregation of Amylin

Ranjit Singh, Ayanna Stewart, Natasha Charles

Mentor(s): Professor Ruel Desamero, Adam Profit
York College

Amylin aggregation plays a crucial role in the formation of amyloid deposits associated with type 2 diabetes, which contributes to pancreatic β-cell dysfunction and disease progression. This project investigates the synthesis and characterization of the pentapeptide FLPN-Xaa and its phenylalanine mutants to assess their potential in inhibiting this aggregation. Studies indicate that the pentapeptide FLPNF interacts with human islet amyloid polypeptide (hIAPP) to reduce amyloid formation. The pentapeptide FLPNF is derived from residues 11-15 (RLANF) of human islet amyloid polypeptide (hIAPP) (Yue Shi, Wu Lv et al., 2019). This region falls within the critical amyloidogenic sequence 8-20 of hIAPP, which is known to lead to amyloid aggregation. By introducing mutations at the phenylalanine position, we aim to investigate how structural modifications affect amyloid formation. To explore this, FLPNW, FLPNY, FLPN-Phe-(4-NO_2), FLPN-Phe-(4-CN), FLPN-Phe-(4-guanidino) and FLPN-Phe-(4-NH) have been synthesized using solid phase peptide synthesis (SPPS). These peptides will be cleaved, purified, and analyzed using high-performance liquid chromatography (HPLC) and mass spectrometry (MS) to confirm their purity. Further analysis will include turbidity assays, Thioflavin T fluorescence, circular dichroism (CD), molecular dynamics (MD) simulations, and transmission electron microscopy (TEM) to assess their structural properties and ability to inhibit fibril formation.

Poster A98

Quantification of the Neuronal Density Across Cortical Depth of Macaque Primary Auditory Cortex (A1)

Kerryann Van Velzen

Mentor(s): Dr. Virgina Garcia-Marin
York College

Understanding the neuronal density across different cortical layers is essential for uncovering the structural organization of the primary auditory cortex (A1) in macaques. This study quantifies the neuronal distribution at varying depths of A1, providing insights into its functional architecture. Using immunohistochemical markers and confocal imaging, we analyzed neuronal populations across distinct cortical layers. Preliminary findings indicate layer-specific variations in neuronal density, suggesting functional specialization within A1. These findings contribute to the broader understanding of auditory processing and cortical organization. Compared with previous data in macaque V1, the density in A1 is approximately half.

Poster A99

Quantification Of Desmosines in An Invitro Oxidation Assay Using Maldi-It

Kerryann Van Velzen

Mentor(s): Muhammad Ali
York College

Desmosine and isodesmosine, collectively known as desmosines, are crucial cross-linking amino acids in elastin that play a vital role in tissue elasticity. These amino acids are proposed to be biomarkers for elastin degradation, which is implicated in various connective tissue disorders and diseases

such as chronic obstructive pulmonary disease (COPD). This study aims to develop and validate a novel, highly sensitive method for quantifying desmosines using Matrix-Assisted Laser Desorption/Ionization Ion Trap (MALDI-IT) mass spectrometry. The research methodology encompasses four main phases: sample preparation, MALDI-IT mass spectrometry analysis, data analysis, and application to oxidative stress studies. Desmosines are subjected to Fenton type reaction using Cu^{2+} /H_2O_2 in-vitro system and desmosines degradation is recorded in real-time through a time-course measurement using MALDI-IT, processed, and prepared for MALDI-IT analysis using appropriate matrix compounds. The mass spectrometry phase involves optimizing parameters for desmosine detection, developing a calibration curve, and analyzing the prepared samples. Subsequent data analysis includes processing mass spectrometry data, comparing results with existing quantification methods, and assessing the new method's sensitivity, accuracy, and reproducibility. The technique is then applied to oxidative stress studies, measuring desmosine levels before and after treatment to analyze the correlation between oxidative stress and desmosine concentrations. Results demonstrate that the MALDI-IT technique offers high sensitivity and accuracy in determining desmosine concentrations, successfully quantifying changes in desmosine levels in response to oxidative stress-induced elastin degradation. This novel method presents a powerful tool for accurate desmosine quantification, with its high sensitivity and precision making it particularly suitable for studying elastin degradation in various pathological conditions. Furthermore, it require small volume approximately 0.5-1.0 ul for each run sample without any prior purification or solid-phase extraction steps. Ultimately, this technique has the potential to significantly improve diagnostics and therapeutic strategies for elastin-related disorders, including COPD and other connective tissue diseases.

Poster A100

Revolutionizing Plant Gene Editing: A Compact Vector Design for Efficient CRISPR/Cas9 genome editing in plants.

Anthony Abreu

Mentor(s): Louis Bradbury
York College

In recent years, the transformation of plants via Agrobacterium-mediated methods has seen significant advancements. Among these, the application of CRISPR/Cas9 for targeted gene editing has been a pivotal development in plant science. Furthermore, the employment of developmental regulator genes to induce meristem formation, bypassing the need for labor-intensive tissue culture, has expedited plant genetic modification processes from six months to as little as one or two months. The use of chickpea dwarf virus replicons for initiating rolling circle replication facilitates the extra-chromosomal replication of the T-DNA carrying the CRISPR/Cas9 cassette. This method enables gene editing without the permanent, random integration of T-DNA into the plant genome and obviates the need for selectable markers, such as antibiotic or herbicide resistance genes.

Plasmids integrating these elements—CRISPR/Cas9, viral replicons, and developmental regulator genes—are now available to the plant science community. However, given their proximity to the size limit for plasmids (~20kb), there is insufficient space to include additional elements, such as templates for homologous recombination-mediated repair (typically >3kb). Consequently, these plasmids are suitable for generating gene knockouts but not for gene substitution or overexpression. Moreover, the lack of straightforward cloning mechanisms for new guide RNA sequences complicates their use.

This project aims to optimize one of these plasmids by relocating three genes essential for plasmid replication to a secondary plasmid, thus saving an estimated 3.5 kb. This reduction will make room for the insertion of DNA sequences

necessary for homology-directed repair at the target site. Additionally, we plan to incorporate recognition sequences for two different type-IIS restriction enzymes, facilitating the golden-gate cloning of new guide RNA and homologous sequences for Cas9-targeted homologous recombination.

Poster A101

Smart Traffic Light Control System with Emergency Vehicle Detection and Boom Barriers Using Arduino

Niroj Koirala

Mentor(s): Thitima Srivatanakul
York College

Urbanization and modernization have significantly increased traffic congestion, creating challenges for daily commuters and emergency services. The traditional traffic light system, which runs on a fixed timer, results in commuters often being stuck in unnecessary traffic, wasting time and fuel, while emergency services face delays costing crucial time in emergency situations. Additionally, intersection-related accidents account for 40% of all traffic incidents and nearly half of all serious injuries, with red-light running causing approximately 165,000 accidents annually, resulting in 700 to 800 fatalities. This study investigates the use of an Arduino-driven traffic control system to integrate real-time traffic density monitoring, emergency vehicles prioritization, and enforcement mechanisms such as boom barriers to enhance intersection safety and optimize traffic flow. The system demonstrated the ability to detect the density of vehicles in each lane of the road using ultrasonic sensors and prioritize emergency vehicles using sound sensors. These sensors provide data that serve as input to the Arduino which results in boom barriers to function accordingly. The prototype simulated traffic challenges at traffic intersections with approaching emergency vehicles. Results showed that a scaled prototype demonstrated reduced congestion, improved intersection safety, and enhanced emergency vehicle response times. This prototype system offers a cost-effective, scalable solution to modern urban traffic management challenges. Future work will focus on developing the prototype on a larger scale, addressing system maintenance challenges, and exploring its usage in diverse urban environments to further enhance safety and efficiency.

Poster A102

Investigating the Effect of Peptides Derived from SARS-CoV-2 on the Aggregation of Serum Amyloid A

Md Rashidul Imran Sunny

Mentor(s): Ruel Z. B. Desamero, Ph.D.
York College

Serum amyloid A (SAA) is an acute-phase protein that plays a crucial role in inflammatory responses. However, its misfolding and subsequent fibril formation are associated with systemic amyloidosis, a condition linked to chronic inflammatory diseases such as rheumatoid arthritis, tuberculosis, and prolonged infections. The process of amyloid fibrillization of SAA is a key pathological event contributing to disease progression and organ dysfunction. Given the increasing evidence that viral infections may influence amyloidogenesis, recent studies have raised concerns about the potential interactions between SARS-CoV-2 proteins and amyloidogenic proteins. Specifically, the SARS-CoV-2 spike protein (S-protein) has been reported to interact with various human proteins, including amyloidogenic ones, thereby altering their aggregation patterns. This study investigates whether specific SARS-CoV-2 peptides (SK9 and FI10) affect the aggregation behavior of SAA. Furthermore, the study examined the effects of SK9 and FI10 together to determine whether their interaction would amplify, neutralize, or modify aggregation. The research employs solid-phase peptide synthesis, biophysical characterization, additionally molecular docking, molecular dynamics and computational studies suggest that SARS-CoV-2-derived peptides may interact with human amyloid proteins, affecting their structural integrity and aggregation kinetics.

Student Poster Abstracts: Session B

1:45 pm - 2:45 pm

- Brooklyn College
- Kingsborough Community College
- LaGuardia Community College
- Lehman College
- LSAMP
- Macaulay Honors Program
- Medgar Evers College
- New York City College of Technology
- Queensborough Community College
- City College of New York

BROOKLYN COLLEGE

Poster B1

"This is mine now": Chronic Pain, Chosen Pain, and Pain Reimagined

V. S. Blue

Mentor(s): Naomi Braine
Brooklyn College

This paper explores what pain means to chronically pained people that choose to seek out other forms of pain on a regular basis. Working from a basis of crip theory and an interactionist perspective, I examine how normative understandings of pain flatten it to live firmly within the medical sphere as an inherently unpleasant biological process, and then challenge those constructions. Through semi-structured interviews with six participants, I discovered that pain often has a dual meaning, creating both genuine suffering while also offering pleasure, release, distraction, connection, and more. Relying primarily on the words of my participants themselves, I explore the nuances in their experiences in order to create a new narrative of pain that lends them the shades of grey that the medical field so often has not.

Poster B2

An Exploratory Analysis of Neural Activity During Pavlovian and Instrumental Summation Tasks

Thijs Bon

Mentor(s): Andrew Delamater, Daniel Siegel
Brooklyn College

Previous experiments indicate that rats summate their learned behaviors to individual stimuli when those stimuli are presented together in a stimulus compound. However, when stimuli predicting qualitatively different rewards are compounded inconsistent results have been reported. Across three experiments, animals were trained to expect different rewards (liquid sucrose, food pellet) after presentation of on two auditory (tone, white noise) and two visual (flashing light, steady light) stimuli, and their responding to cross-modal compounds was assessed compared to their elements in a final test with the individual stimuli alone or in compounds signaling either the same or different rewards. In Experiments 1 and 3, brain activity across 13 regions was also assessed. Experiment 2 reassessed the parameters of the first to inform the third. While the results of the test sessions except on Experiment 2 did not indicate any significant summation, neural data measured through expression of an activity marker, phosphorylated ribosomal protein S6 (p-rPS6), a marker for the dopamine precursor, Tyrosine Hydroxylase (TH), and DAPI, in Experiments 1 and 3 returned significant results. In Experiment 1 Differences in p-rPS6 expression were found in the lateral hypothalamus (LH) favoring compound groups over their elements, whereas results for intensity were reversed, with elevated Element group intensity over the compounds. Additionally, p-rPS6 expression in the orbitofrontal cortex (OFC) was lower for the Different group, and caudal granular retrosplenial cortex (RSC) p-rPS6 expression followed the same pattern. In Experiment 3, TH positive tissue colocalizing with p-rPS6 positive tissue was significantly lower in the Different group, and the same pattern was displayed in the rostral granular RSC p-rPS6 expression. In the OFC, group differences indicated higher p-rPS6 intensity in the Different group over the others. Further research should aim to examine brain differences in tandem with a significant outcome-selective summation during test.

Poster B3

The Russo-Ukrainian War and Implications for the Western Balkans

Sydney Greta Gdanski

Mentor(s): Dr. Brigid O'Keeffe
Brooklyn College

While the Russian sphere of influence traditionally centers on the former Soviet Union, its reach now spans globally from military operations in Africa to a growing media presence in Latin America. In Europe, this influence is most aggressively asserted

in the Balkans, particularly in the largely unaligned post-Yugoslav states, making the region a critical focal point for understanding the broader impact of Russian foreign policy.

This analysis examines the impact of the Russo-Ukrainian War on the Western Balkans, a region where Russia has long maintained influence through political, religious, media, and military means. Focusing on Bosnia and Herzegovina, Montenegro, Serbia, and Kosovo, the research explores how the ongoing war in Ukraine affects these non-aligned states, where deep ethnic divisions and fragile democratic institutions make them particularly vulnerable to external influence. As one of the last unaligned areas in Europe, the Western Balkans hold strategic value for Russia in its efforts to resist NATO and EU expansion and maintain a sphere of influence on the European continent.

In this context, the study investigates how Russia's actions in Ukraine shape Balkan regional dynamics, including peace, stability, democratic development, and western integration efforts. By tracing the "what," "how," and "why" of Russian influence in the Balkans, this research aims to provide insight into the complex power dynamics of Eastern Europe and implications for the region's future. Ultimately, understanding Russia's ambitions in the Western Balkans is vital for preventing violence, promoting democratic resilience, and defending European security in the face of ongoing Russian aggression.

Poster B4

Genotype Effects Between Methyltetrahydrofolate and Folic Acid in Maternal Blood

Penelope Hammond

Mentor(s): Galina Drozdova, Xinyin Jiang
Brooklyn College

Folic acid (FA) is a synthetic form of folate found in most prenatal multivitamins (PMVIs). The purpose of FA in PMVIs is to help reduce methyltetrahydrofolate (MTHF). FA supplementation during pregnancy reduces the risk of birth defects such as neural defects in which there's a rising concern that it is an accumulation of unmetabolized FA. This study aims to assess whether using 6s-5-MTHF instead of FA in prenatal MVI provides equivalent efficacy while reducing levels of unmetabolized FA in maternal blood. To assess this, we compared two groups of first-trimester pregnant women participants, one receiving a PMVI with folate(MTHF group) and the other receiving a regular PMVI (FA group). Using the MTHFR SNP, we determined the allele profiles CT (group 0), CC (group 1), TT (group 2). The participants with the TT allele profile are less efficient in metabolizing folate and we tested to see if 6S-5-MTHF accumulates with the TT mutation.

KINGSBOROUGH COMMUNITY COLLEGE

Poster B5

Micro-Raman Imaging Of High-Pressure Phases In Gujba Meteorite: Insight Into Shock Metamorphism

Faruq Anjorin

Mentor(s): Steven Jaret
Kingsborough Community College

Understanding the effects of planetary-scale impacts is key to unraveling the early history of our solar system. The Gujba meteorite, a metal-rich CBa chondrite discovered in northern Nigeria in 1984, records one such ancient collision. With its large metal clasts and barred olivine chondrules, Gujba provides an ideal specimen for studying shock metamorphism. Previous studies identified high-pressure minerals such as wadsleyite and majorite, suggesting peak shock conditions exceeding 19 GPa and 2000°C.

This study applies micro-Raman spectroscopy to map and identify high-pressure phases within the meteorite, revealing the spatial distribution of minerals like olivine, enstatite, wadsleyite, majorite, and for the first time in Gujba clinoenstatite. Spectra and hyperspectral images were collected using a WiTec Alpha 500R system, capturing fine-scale mineral transformations across chondrules and matrix.

Key findings include the discovery of a clinoenstatite phase with a distinct doublet near 1012 and 1032 Δcm^{-1} and evidence of majorite-olivine intergrowths at nanoscale resolution. Wadsleyite distributions suggest solid-state transformation during impact, and differences between areas highlight how shock effects vary on a micrometer scale. Estimated pressures (16–20 GPa) fall within the transformation range for these minerals, confirming the meteorite's record of extreme, heterogeneous shock events.

This work deepens our understanding of shock-induced phase transitions and planetary impact dynamics. Notably, this is the first time large-scale micro-Raman mapping has been used to visualize the distribution of high-pressure phases in Gujba, offering a new approach for decoding the complex histories recorded in meteorites and early solar system materials.unmetabolized FA. This study aims to assess whether using 6s-5-MTHF instead of FA in prenatal MVI provides equivalent efficacy while reducing levels of unmetabolized FA in maternal blood. To assess this, we compared two groups of first-trimester pregnant women participants, one receiving a PMVI with folate(MTHF group) and the other receiving a regular PMVI (FA group). Using the MTHFR SNP, we determined the allele profiles CT (group 0), CC (group 1), TT (group 2). The participants with the TT allele profile are less efficient in metabolizing folate and we tested to see if 6S-5-MTHF accumulates.

Poster B6

Cannabis Users' Cognitive Function Reveals Potential Neurological Deterioration of Brain Structure, Particularly During Adolescence

Tareq Awawdeh

Mentor(s): Prof. Roberto Mariani, PhD
Kingsborough Community College

Cannabis use is increasing globally, but critical gaps remain in understanding its effects on the brain and cognitive functions. This study aims to evaluate the potential neurological impact of cannabis use. We will investigate the relationship between cannabis use patterns and changes in neural connectivity, focusing on memory-related cognitive functions. Through a comprehensive analysis of peer-reviewed articles, we identified consistent patterns of altered neural connectivity in cannabis users, particularly in regions crucial for memory processing. Regular users showed a 15–20% decrease in memory task performance, with the most significant effects on short-term and spatial memory. Neuroimaging studies revealed distinct changes in white matter integrity, especially in individuals who began use during adolescence. Acute cannabis consumption also significantly reduced functional connectivity between the hippocampus and frontal/precuneus cortex regions across age groups. Additional findings included reduced gray matter in memory-related brain regions and altered hippocampal and amygdala structure. These neural alterations persisted in 70% of studies, even after periods of abstinence, although some cognitive functions showed partial recovery after 30 days of discontinued use. This study demonstrates that cannabis use is associated with measurable changes in neural connectivity, with pronounced effects on memory-related brain regions. Early-onset cannabis use during adolescence poses risks for cognitive development. These findings emphasize the need for evidence-based public health policies and targeted interventions, especially for young users. Furthermore, while cannabis shows promise for certain medical benefits, such as chronic pain relief and seizure reduction, the neurological risks, particularly for frequent or early users, warrant serious consideration. Future research should focus on understanding the potential reversibility of these neural changes, incorporating longitudinal neuroimaging, and establishing clear guidelines for safer cannabis use.

Poster B7

Geo Code – A Tool for Mineral Estimation

Mireya P. Cortes

Mentor(s): Steven Jaret
Kingsborough Community College

Geo Code is an interactive tool designed to help geology students and researchers practice estimating mineral percentages in rock samples. The project uses randomized black and white patterns to visually represent different mineral concentrations, allowing users to sharpen their visual estimation skills in an engaging way.

The backend is written in Python and uses the libraries NumPy, io, and Matplotlib to help generate heatmaps on a 10x10 grid. Each generated image represents a specific mineral percentage. Ranging from 5% to 100%. This approach closely mimics how minerals might appear in actual rocks. Every generation is randomized, ensuring that users get a fresh image each time they interact with the tool. Our backend is also hosted on the cloud using Flask and Render, allowing it to be easily accessed, shared, and updated when needed.

The frontend is being developed using Flutter, a framework that supports cross-platform app development for both Android and iOS. The goal is to offer a smooth and responsive user experience that works seamlessly on mobile devices. As development progresses, the frontend and backend are being integrated to enable real-time interaction between users and the image generator.

Originally, the project started with static images made using Python's Pillow library. It eventually proved to be more time-consuming, which led to the current changes, our dynamic heatmap generation. It now provides the accuracy and flexibility that we were originally aiming for. This shift made the tool more effective and adaptable for our users.

The long-term vision is to turn Geo Code into a game like learning platform, similar to WORDLE, where users guess the mineral percentage. This hands-on approach helps make mineral estimation more fun, interactive, and approachable, especially for students new to the topic. It's a creative blend of science, coding, and estimation.

Poster B8

Fractured Foundations: Exploring the impact of adverse childhood experiences (ACE'S)

Shaniqua Johnson

Mentor (s): Dr. Sue-Melissa Burgher
Kingsborough Community College

Adverse Childhood Experiences (ACEs) are traumatic events occurring during childhood, such as loss, abuse, or neglect. Research reveals a strong link between ACEs and increased risk of chronic diseases, mental health disorders, and social challenges in adulthood.

You may be curious about whether the impact of traumatic experiences continues into adulthood and how it affects your life. This study examines the connection between Adverse Childhood Experiences (ACEs) and their long-term effects on physical and mental health.

Research indicates that ACEs can lead to health risk factors and social challenges. For example, they can contribute to chronic diseases such as heart disease and certain types of cancer, metabolic disorders like obesity, and sleep disturbances. They may also hinder your ability to form new relationships.

Alarmingly, one in eight individuals experiences four or more ACEs. That is 67 percent of the population, and all have at least one ACE. For a self-reflective study on Adverse Childhood Experiences (ACEs), the methodology involves a qualitative exploration of personal experiences. Health and Trauma may not seem like your typical couple, but it is as big as any other health matter we encounter today. To prevent these health factors from worsening, why not begin at the shaky foundations of a person's life, which forms through allowing early intervention with those who have Childhood Adverse Trauma?

Poster B9

The Rise of LMS in Traditional Education: No One Left Behind

Maureen Sam-Okomgboeso

Mentor(s): Dr. Careen Purcell
Kingsborough Community College

Integrating Learning Management Systems (LMS) into education is essential for modern learning, yet it presents significant challenges, particularly for older adult learners. Often referred to as "digital migrants," these individuals encounter unique challenges when adapting to digital platforms, affecting their engagement, academic success, and overall learning experience. Research highlights that digital literacy is crucial for success in blended and online learning environments, yet older learners frequently struggle with technology-related anxiety, inadequate institutional support, and insufficient training. Addressing these challenges is critical to ensuring equitable access to education and fostering personal and professional growth.

This study aims to examine the barriers older adult learners (aged 40 and above) encounter in adopting LMS technology and to identify strategies that enhance digital literacy and reduce technology-related anxiety. We hypothesize that limited prior exposure to technology, lack of structured training, unclear instructions, and inadequate support significantly hinder LMS adoption, impacting academic self-efficacy.

Participants are being recruited from programs within a healthcare training institute that actively utilize LMS platforms. Data is being collected through surveys from learners aged 40 and above. Preliminary findings indicate that technology exposure, prior experience, and time constraints interplay with training gaps, insufficient support, and limited interactive learning opportunities to shape their LMS experience and academic confidence.

Further data collection is needed to achieve a sufficient sample size, allowing for a more comprehensive analysis. The study's findings will inform targeted interventions to support older learners, ensuring equitable access to education and preventing digital exclusion in an increasingly technology-driven learning environment.

Poster B10

Comparison of Protein Content of Fish available in NY Markets

William Smith

Mentor(s): Farshad Tamari, Ph.D.
Kingsborough Community College

Proteins are an important class of macromolecule playing extremely important functions in the body including roles in transport, as hormone receptor, and enzymes. In humans, proteins are composed of approximately 20 amino acids, with 9 amino acids being essential (not synthesized by the human body and obtained through one's diet). Fish are a great source of protein and therefore, essential amino acids, but the protein content of non-packaged fish is often not available nor displayed in markets.

The goal of this study is to quantify the protein content of fish found in a NY market. We hypothesize that different species of fish will possess different protein content. To complete this study, we secured 16 samples from a local Brooklyn market and performed preliminary experiments to optimize parameters such as quantity of fish sample (in mg) used for extractions. The preliminary experiments showed that a standard Bradford assay, using between 10 and 20mg of fish, with 1µL of each sample used for spectrophotometry with λ=595nm yielded optimal results. Between 14 and 18mg of each sample was extracted in 100µL of PBS, followed by centrifugation at 2500rpm for 5 minutes. 1µL (1/4 dilution) of the supernatant from each sample was used with three triplicates for this investigation. Our investigation shows that Scottish Salmon has the highest protein content (3.77 ± 0.41 µg/µL) accounting for 25.12% of the weight of the sample used; with the lowest protein content belonging to the Chilean Sea Bass (0.45 ± 0.07 µg/µL) accounting for 3.01% of the weight of the sample used. We are currently continuing our statistical analyses. Initial data analysis used MS

Excel, more advanced statistical analyses being performed using SPSS (IBM).

Poster B11

Characterization of Genomic Insertion Sites in Chlamydomonas Mutants

Sigournia Tait, Joshua Johnson

Mentor(s): Dr. Dmitry Y. Brogun
Kingsborough Community College

Chlamydomonas reinhardtii are single celled algae that are utilized as reference organisms for studies ranging from genetics to the in-depth analysis of photosynthesis in eukaryotes. The primary goal of our research is to extract and analyze DNA from the *Chlamydomonas reinhardtii* mutants which will enable us to map and characterize the genomic insertion site(s). This objective will be achieved by following a specific protocol that allows us to utilize bioinformatics tools for PCR mapping. The initial result from this experiment suggests that the insertion site will be found on chromosome 13 in the CMJ030 mutant LMJ.RY0402.189391. However, we hypothesize that the insertion site will be located on a different chromosome. Our approach consists of various phases: streak the initial strain provided on agar plates to encourage cell propagation and isolation into single colonies which will allow clear distinction of colonies formed; following that, DNA isolation from the colonies formed; PCR amplification at the loci of interest for both the mutant and wild type through the use of specific primers on agar plates to encourage distinct colony formation; PCR amplification using specific primers to target the loci of interest in both wild-type and mutant strains; cassette-genome junction's amplification; collecting the DNA sequences that are suggestive of the insertion sites through sequencing of the PCR products; and to conclude, we will observe the alignment of these sequences obtained against the reference genome which will help to validate the insertion site.

Poster B12

Bioinformatics Comparison of the Niemann-Pick Type C1 gene and gene product in Mammalian Species: A Proteomics Approach

Anastasiia Tarasova

Mentor(s): Farshad Tamari, Ph.D.

Kingsborough Community College

Niemann Pick Type C1 (NPC1) is an autosomal recessive genetic disorder, and results in hepatosplenomegaly, neurodegeneration and ultimately death at a relatively young age. Currently, NPC1 investigations use a mouse model, however, it is unclear whether a better animal model exists for studies that focus on this disease. For example, other candidate species may include rat, chimpanzee, pig, and rabbits, all of which possess an *NPC1* ortholog.

The goal of this study is to determine which of the above species' orthologs shows the most DNA and/or protein homology to the human *NPC1 gene and/or* protein, potentially making it a better candidate for studies that can translate to therapeutics in humans. We hypothesized that more evolutionary related mammalian species will show the most sequence homology to the human *NPC1* sequence. To achieve our goal, we downloaded DNA and protein sequences for all mammalian *NPC1* orthologs, as well as that of the chicken as an outgroup, and completed a sequences comparison to determine the degree of homology/difference between the orthologs. We used multiple alignment with Jalview and UGENE Unipro as bioinformatics software to complete the investigation. Our study indicated that there is too much sequence variability in the DNA to provide us with meaningful results. However, protein sequence comparisons were useful. The highest protein sequence identity was observed between the human and chimpanzee sequences at 97.7%, as expected. Also as expected, the lowest protein sequence identity was observed between the human and chicken protein sequences at 78.4%. Our results appear to support our

hypothesis that the more closely related species will have closer protein sequence identity for NPC1.

Poster B13

Nutrigenomics: Analyses of Genetic Variations to Personalize Diets for Optimal Weight Management

Sukhrob Ulugmuratov

Mentor(s): Roberto Mariani, PhD
Kingsborough Community College

The goal of these studies is to optimize health outcomes by using DNA tests to better understand personal diet, lifestyle, and supplement requirements. The role of genetic differences plays an essential role to weight maintenance and obesity prevention. It could provide insight into which diet type (low carbohydrate, low fat, or Mediterranean diet) would be most suitable for everyone according to their unique genetic makeup. Individuals unsuccessfully attempted several diet types to improve weight management outcomes. 20 gene variations are assessed that affect weight management. These genes are involved in regulation of energy expenditure**,** appetite, sugar addiction and overeating**,** insulin sensitivity**,** fat metabolism**,** and carbohydrate responsiveness. Understanding weight management is important because the majority (90% to 95%) of overweight and obesity is polygenic and multifactorial in nature. The up-to-date research in gene-diet interaction is trying to explain some of the complexities in translating genetics findings into practical dietary advice. DNA diet provides a novel approach to understand key areas for improved and sustainable weight loss outcomes. Looking at genetic results of several individuals one can categorize the impact of those mutations as no impact, low Impact, moderate impact, and high impact. Findings from a detailed genetic analysis indicate that personalized nutrition could have a huge promise to offer better health for individuals. It could be an improved strategy to manage weight and to reduce obesity-related diseases. Recent findings point out that the genes *FTO, MC4R*, and *RETN* may modulate body weight through appetite, insulin sensitivity, and response to specific nutritional intervention. These factors, along with epigenetic modulation and microbiome interaction, suggest the future of personalized or precision nutrition strategies in effectively managing and preventing obesity.

LAGUARDIA COMMUNITY COLLEGE

Poster B14

Leafcutter Ants at Work: Caste Collaboration Between Captive Majors and Media

Joianne Bittle

Mentor(s): Dr. Preethi Radhakrishnan
LaGuardia Community College

This ethogram study was a comparative analysis that focused on observing the territorial and communal behaviors of leafcutter ants, specifically the interactions between two caste groups of workers, the majors (soldiers) and media (leaf carriers), within a controlled enclosure at the American Museum of Natural History (c. AMNH 2023). The study aimed to observe the territorial behaviors between these two worker groups, given the majors' primary role in defense and the absence of external predators. Observations of additional interactions between majors and other worker groups were also included to understand the majors' potential impact on overall colony success in a captive environment.

Poster B15

Exploring Attitudes Towards Standard American English on a CUNY Campus

Elisse Caserez, Tania Japaloja, and Erick Zumba

Mentor(s): Monika Ekiert
LaGuardia Community College

This class project explored college students' beliefs about language variation in American English on one of the CUNY community college campuses. We defined Standard American English as "the language variety used in public broadcasting, publishing, government, and education" (Yule, 2017). Applying quantitative analysis to a survey of language beliefs, in this project we explored language views demonstrated by respondents from a wide range of sociocultural backgrounds. The anonymous survey was taken by 114 undergraduates students enrolled in an introductory course in linguistics. The survey consisted of 8 demographic and 7 attitude questions about Standard American English. We focused on the relationship between the home language spoken by the student and their birthplace, US or abroad and their beliefs about standard and non-standard varieties of American English, with a special focus on the variety appropriate for college work.

We hypothesized that students who do not speak English at home will agree that teachers think poorly of them, and that a person who was born abroad would not understand the distinct dialects of English. Our quantitative analyses of survey data revealed that 64% of those who do not speak English as their home language believe that teachers don't think poorly of students who speak other varieties of American English. For the survey respondents who speak English as their primary language at home, 56% believe that teachers don't think poorly of students who speak other varieties of English. We also found out that 50% of individuals born outside the U.S. view Standard American English (SAE) as the correct form of American English. The opinions of students born in the US were quite similar.

Our poster will summarize our key findings and provide our interpretations of the results. The results will emphasize the role of Standard American English in education and professional endeavors.

Poster B16

Keystroke Dynamics Authentication: Classifier Accuracy Under Data Constraints

Ei Paing Paing Htwe

Mentor(s): Alaa Darabseh
LaGuardia Community College

Keystroke dynamics authentication, which relies on analyzing an individual's typing patterns, offers a promising alternative to traditional password-based security systems. Despite its potential, widespread adoption remains challenging due to the need for extensive training data to achieve high accuracy. In this study, we assess the performance of five machine learning classifiers—Random Forest, K-Nearest Neighbors (KNN), Gradient Boosting, Support Vector Machines (SVM) and Linear Discriminant—under varying levels of training data. Beginning with 50 training samples, we systematically reduce the dataset by factors of 10 to evaluate model effectiveness with as few as 5 samples. Our analysis indicates that SVM demonstrates superior performance in low-data scenarios, achieving 83% accuracy even with minimal training data. These findings underscore SVM's potential for real-world applications where collecting large datasets is impractical. This research contributes to the advancement of keystroke dynamics authentication by identifying robust classifiers capable of functioning effectively with limited training data.

Poster B17

Implementing an Autonomous Drone Delivery System in New York City

Luis Fernando Laca, Ryan Joseph Dorestal, Miranda Holschneider Schrade

Mentor(s): Dr. Malgorzata Marciniak, and Vladimir Przhebelskiy
LaGuardia Community College

This research examines the feasibility of implementing an autonomous drone delivery system in New York City (NYC), focusing on how such technology could enhance safety, sustainability, and efficiency within the city's complex logistics network. As e-commerce continues to grow and consumer demand for rapid deliveries increases, traditional delivery methods have contributed to significant challenges, including traffic congestion, pollution, and delivery delays. Autonomous drone technology presents a promising alternative to address these issues and revolutionize last-mile logistics.

Our study involved a multifaceted approach. We designed and built a functional six-winged drone prototype capable of transporting small packages, particularly pharmaceuticals. The prototype featured a webcam for live monitoring and optional VR-enabled visualization to allow operators to oversee deliveries remotely. Stability and functionality were rigorously tested in controlled environments before moving to simulated urban settings.

In addition to technical development, we analyzed NYC's existing delivery infrastructure to identify inefficiencies and potential integration points for drone technology. Public perception was also a key consideration. We conducted surveys before and after live drone demonstrations to assess public attitudes toward the adoption of drones in urban areas.

The prototype testing showed that drones could significantly reduce delivery times for lightweight items when compared to traditional courier services, which are often hindered by traffic congestion. Preliminary autonomy tests demonstrated the feasibility of predefined route navigation, although further development is required for advanced obstacle avoidance and coordination with air traffic control systems.

Despite the promising results, several challenges must be addressed, including regulatory hurdles, infrastructure adaptations, and public acceptance. Potential solutions include collaborating with policymakers to develop updated regulations, designing noise-reduction technologies, and establishing designated drone corridors and landing zones.

Our findings contribute valuable insights into modernizing urban delivery systems and lay the groundwork for future research and policy discussions aimed at integrating autonomous drones into NYC's infrastructure.

Poster B18

Isolating Problems: How Childhood Isolation Affects College Socialization and Academics.

Lisa Maloney, Fahim Sarker, and Jorge Vasquez

Mentor (s): Dr Lara Beaty
LaGuardia Community College

Childhood isolation has been recognized as having a significant role in long-term development. Adverse Childhood Experiences (ACEs) are strongly recognized as critically influential to psychosocial and academic outcomes later in life, many years after they have been undergone. This ongoing study explores the relationship between college experiences, COVID-19 pandemic adversity, and different concepts of childhood adversity and college performance. Data will be analyzed to connect childhood isolation and its effects on college socialization and academics. Participant recruitment is ongoing. Current analysis will focus on over 100 participants who were recruited from First-Year Seminars (FYS) to complete a confidential Google Survey that consisted of 99 questions, including a Likert scale, checklists, and open-ended questions. In previous analysis, childhood neglect and college problems were moderately significant, $r(91)=.21$, $p=.047$, and

childhood isolation and childhood neglect were strongly correlated, r(91)=.68, p<.001. Thus childhood isolation may lead to other problems that affect college experiences. Previous analyses did not find any direct correlation between childhood isolation and college problems, happiness or grades, so this analysis will focus on dividing college problems between the more social and academic college problems. Specific categories of childhood adversity (e.g., emotional abuse, neglect, exposure to substance abuse) demonstrate distinct correlations with particular college adversities, highlighting nuanced pathways through which early experiences manifest during higher education. These findings underline the necessity of targeted interventions and support systems for students with high ACE exposure, to foster resilience, academic success, and nurture coping abilities.

Poster B19

Impact of Congestion Pricing on PM 2.5

Crystal Matos

Mentor(s): J. Jacob, Ph.D., I. Veras, Ph.D.
LaGuardia Community College

This study utilized two devices to monitor PM2.5 levels near LaGuardia Community College in an area influenced by traffic from the nearby Queensborough Bridge. MTA data showed that the number of vehicles using the Queensborough Bridge decreased during the PM rush hour following the introduction of congestion pricing (CP). The data from the devices was downloaded and analyzed. Data from December to March was collected and analyzed, both before and after CP went into effect. To assess changes in air quality, PM2.5 data recorded at 10-minute intervals during the afternoon commute across four selected Wednesdays was compared. Our findings suggest that congestion pricing may influence air quality in urban areas. These results highlight the importance of ongoing air quality monitoring in high-traffic areas and support the need for policies that reduce vehicle emissions in densely populated communities. By closely examining the relationship between traffic patterns and air pollution, this study adds to growing evidence that transportation policies like congestion pricing can play a key role in creating healthier, more sustainable urban environments.

Poster B20

College Success and Overcoming Adversity: The Impact of Parental Relations

Adriana Rampershad

Mentor(s): Dr. Lara Beaty
LaGuardia Community College

A larger ongoing study explores the relationship between college experiences and different types of adversities. This focuses on the role of parental relations and attachment in childhood in developing from adversity and gaining resilience as well as its overall impact on success in college. Students at LaGuardia Community College are diverse and at one point or another has had a caregiver or been a caregiver/parent themselves. The goal is to investigate the impact of attachment and parental relations on adverse childhood experiences (ACEs), resilience and college experiences. 92 students in first-year seminar (FYS) were recruited to participate in a confidential Google Survey consisting of 99 questions that included Likert scales, checklists, and open-ended questions. Data will be reanalyzed with additional participants. Pearson and Spearman Rank correlations were compared. Pearson results were childhood attachment and childhood adversity r(92)=-.50, p= .001. Parental relations and childhood adversity, r(91)= -.53, p= .001. Parental relations and childhood happiness, r(91)=.56, p= .001 and poor grade and parental relations r(91)= -.35, p= .001. Spearman Rank included, college problems and family mental illness: r(90)= .24, p=.022 and Course Interest and Family mental illness: r(90)=-.23, p=.027. Overall, parental relations impact adversity and college experiences tremendously. More mental health counselling services are needed,

and enforcement of better training practices amongst professors and college advisors on how to support students with challenges. Students, especially those who are parents, should be informed about ACEs and its intergenerational effects.

Poster B21

Exploring the Role of CG10177 in Locomotion in *Drosophila melanogaster*

Tabia Tarannum

Mentor(s): Claudette P. Davis, Ph.D.
LaGuardia Community College

CG10177 is an unstudied gene in *Drosophila melanogaster* that contains both a serine/threonine kinase domain and a doublecortin domain (DCX), suggesting potential roles in cellular signaling and microtubule dynamics. The DCX domain is found in proteins that bind tubulin, which help build and stabilize microtubules. In mammals, this domain plays a crucial role in neuronal growth and structural development, particularly during brain development. Mutations in DCX have been linked to neuron migration disorders. Although DCX is mainly studied in neurons, CG10177 is not highly expressed in the brain of *Drosophila;* instead, it is strongly expressed in the testes of adult males. This difference suggests CG10177 might play a different role in flies than it does in mammals. This unexpected expression pattern prompted us to investigate whether CG10177 has tissue-specific roles beyond the reproductive system, particularly in the context of movement. Locomotion requires proper coordination between muscles and neurons, making it a useful behavior for studying the function of these genes in these tissues. We hypothesize that silencing *CG10177* in neurons, muscles, or throughout the whole body will reduce climbing ability, with the most potent effects expected when the gene is silenced ubiquitously. Our results indicate that tissue-specific silencing of *CG10177* had no noticeable effect on climbing ability. Interestingly, when *CG10177* is ubiquitously silenced, a dramatic decline in climbing ability is observed.

Poster B22

Restoration of Spermatogenesis is Dependent on Activation of a SPRY4-ERK Checkpoint Following Germline Stem Cell Damage

Whitney Zi Yee Woo

Mentor (s):Dr. Liu Ying, Dr. Na Xu
LaGuardia Community College

Spermatogonial stem cells (SSCs) are essential for continuous sperm production, balancing self-renewal and differentiation to maintain fertility. The ERK signaling pathway plays a crucial role in this process, with Sprouty 4 (Spry4) acting as a key inhibitor. This study investigates how Spry4 deletion using the germline-specific Cre-loxP system affects SSC maintenance and proliferation during recovery after chemotherapy-induced damage. By conditionally deleting Spry4 in SSCs in adult mice, this study aims to determine the impact of ERK pathway dysregulation on SSC fate. Under the guidance of Dr. Liu, I performed genotyping by PCR analysis to confirm the presence of wild-type or floxed alleles of the Spry4 gene in experimental mouse models. Following chemotherapy treatment, immunostaining was performed for key markers, including GFRα1 (SSC marker), Ki67 (proliferation marker), and ERK pathway components. I also conducted quantitative reverse transcription-PCR (qRT-PCR) to compare gene expression levels between wild-type (WT) and Spry4 knockout (KO) SSCs isolated from mouse testes. Preliminary findings suggest that Spry4 deletion enhances SSC differentiation 10 days after injury, but deleting Spry4 over 6 weeks leads to a decline in the SSC population, revealing stem cell exhaustion within the long-term KO mouse testes. Quantitative analysis of immuno-stained samples revealed impaired SSC self-renewal during regeneration with a remarkable decrease in GFRα1+Ki67+ cells in KO mouse testes after injury. Furthermore, qRT-PCR results confirmed significant changes in gene expression in SSCs between KO and WT mice. Our study indicates an essential role for the SPRY4-ERK signaling as a molecular checkpoint in

securing SSC recovery and long-term homeostasis upon chemotherapy drug-induced germline damage, revealing how stem cells normally withstand environmental stress.

Poster B23

Investigating the Effects of Fluoroproline Substitution on Collagen Stability: A Computational Approach

Ella Luo Yee Woo

Mentor: Professor Midas Tsai
LaGuardia Community College

Collagen is a vital fibrous protein that provides mechanical support to tissues such as skin, tendons, bones, dentine, cornea, and sclera. Its structural integrity arises from its unique triple-helix formation which is held by hydrogen bonds, composed of three intertwined polypeptide chains. Each polypeptide chain features approximately 300 repeating amino acid sequences following the (Xaa–Yaa–Gly)n motif, with glycine occupying every third position. This study focuses on sequences in which both Xaa and Yaa positions are occupied by proline residues, forming the (Pro–Pro–Gly)n sequence—crucial for collagen's stability. Thermal stability increases when hydroxyproline is at the Yaa position.

Using molecular orbital theory and computational techniques, we investigate the effects of substituting proline with fluoroproline (Flp) on collagen stability. Molecular modeling was conducted using the Gaussian suite program. Fluoroproline was chosen due to its high electronegativity, which emulates the electronic behavior of hydroxy groups but lacks hydrogen-bonding capability. This allows us to isolate the electronic effects of substitution without the confounding influence of hydrogen bonding.

We systematically examined structural variations by introducing fluoroproline into the Xaa and Yaa positions, analyzing stereoelectronic configurations in both R and S enantiomeric forms and with their isomers. Our computational analysis provides insights into how specific amino acid substitutions influence collagen's structural and mechanical properties, offering implications for biomedical applications and advancing our understanding of collagen biochemistry.

LEHMAN COLLEGE

Poster B24

What the Bronx Forgot: Historicizing the Forgotten Role of Enslaved People in Shaping a Borough's Foundation

Audrey Adon-Rosario, Amna Ishaq, Anthony Johnson, Paula Swanzy-Ammisah

Mentor(s): Dr. Moyagaye Bedward
Lehman College

This collection of papers interrogates the structural and ideological underpinnings of slavery in colonial New York, challenging the common misconception that slavery was solely a Southern institution. The documents and analyses reveal how slavery in the North was deeply embedded in the legal, economic, and social frameworks of everyday life. Key themes include the commodification of human beings, the legal codification of ownership through wills and court cases, and the use of enslaved labor as a mechanism for wealth accumulation and generational transfer. Public records such as wills demonstrate how enslaved individuals were cataloged alongside land and livestock, reinforcing their status as property. Legal battles over escaped enslaved people reveal how colonial courts prioritized economic loss over human freedom, further normalizing the dehumanization of Black bodies. Reflections on runaway advertisements, estate inventories, and judicial proceedings illuminate how slavery in the North was not peripheral but central to the functioning of elite colonial households and institutions. These narratives also explore resistance—not just in the form of escape, but in everyday acts of survival, movement, and decision-making within constrained systems. By examining slavery through these conceptual lenses—ownership, value, resistance, and erasure—these works help reconstruct a more

accurate and complex understanding of Northern slavery. They also emphasize the importance of reclaiming these "hidden histories" in both academic and public discourse, highlighting the urgent need to integrate these stories into broader narratives of American history.

Poster B25

Between Heritage and Homeland: Ethnic Identity Formation Among First- and Second-Generation Montenegrin Immigrants in the United States

Ermina Gutic

Mentor(s): Dialika Sall
Lehman College

This thesis explores ethnic identity formation among first- and second-generation Montenegrin immigrants in the United States, focusing on how history, language, and religion influence their sense of belonging. Drawing on 134 survey responses and ten in-depth interviews with individuals of Montenegrin, Albanian, and Bosniak descent, the study employs a mixed-methods approach to analyze generational shifts in ethnic self-identification. Findings reveal that first-generation immigrants often maintain a fixed identity rooted in homeland narratives, religious traditions, and cultural continuity, while second-generation individuals construct more fluid, hybrid identities shaped by American cultural contexts and selective engagement with heritage. Key themes include the symbolic role of language, the evolving significance of religion and the complexities of belonging across borders. This research contributes to diaspora and migration studies by highlighting how ethnic identity is actively negotiated rather than passively inherited, offering insights into the lived experiences of Balkan immigrants navigating dual cultural landscapes.

Poster B26

Economy Smart Watch Fails to Accurately Monitor Blood Glucose Among Healthy Adults

Thinh Le, Adam Mohan

Mentor(s): DJ Oberlin

Lehman College

Monitoring and maintenance of blood glucose (BG) concentrations is of critical importance to individuals with diabetes mellitus. However, this often requires multiple finger-sticks and a glucometer, or the use of a prescription continuous glucose monitor (CGM). Recently, some smart watches have become available which claim to non-invasively monitor BG. This should not be confused with watches that pair with CGMs. Purpose: The purpose of this study was to assess whether the economy smart watches were capable of detecting BG changes among healthy individuals. Currently three participants have completed this study. Healthy young adults reported to the lab after a 4-6 hour fast to perform an oral glucose tolerance test (OGTT). The participants wore a Dexcom G7 CGM which is FDA approved and frequently prescribed for the monitoring of BG concentrations. In tandem, they wore the smart watch. Over the course of two hours, BG measurements were taken on both devices so that the changes could be compared. Results: During the OGTT there was a significant difference in the two devices measurements of BG over time (Λ=0.04, F=50.95, p=0.02). Due to currently low sample size, the difference across timepoints does not appear significant for either the CGM (F=7.83, p=0.09) or the smart watch (F=0.42, p=0.63). While the study is ongoing, it is already becoming clear that the smart watch is not accurate in its assessment of BG, and thus should not be endorsed for use in guiding any medical decision making.

Poster B27

Evrica: Enabling Fractional Ownership and Decentralized Enterprise via Blockchain to Redefine the Digital Economy

Emily Portalatin-Mendez

Mentor(s): Moyagaye Bedward

Lehman College

The future of ownership is being redefined. While money, real estate, and intellectual property are rapidly going digital, the mechanisms of ownership have remained outdated. Evrica Technologies offers a seamless solution for any business of any size through the tokenization of real-world assets, leveraging blockchain technology to unlock new levels of liquidity, accessibility, and security. By transforming tangible and intangible assets into blockchain-based tokens, Evrica empowers individuals to own, trade, and invest in assets previously reserved for institutions or high-net-worth individuals.

From fractional ownership of real estate to real-time trading of private shares, tokenization enables borderless, permissionless transactions that eliminate intermediaries and delays. Evrica's smart contract infrastructure provides the foundation for secure, automated asset management while ensuring regulatory compliance and reducing operational overhead. This shift democratizes investment and levels the playing field for entrepreneurs, businesses, and global investors alike.

In addition to asset tokenization, Evrica supports the creation and management of Decentralized Autonomous Organizations (DAOs), allowing communities and businesses to govern shared resources, operations, and decision-making processes transparently. By integrating DAO functionality, Evrica enables organizations to coordinate actions and allocate capital through programmable rules, removing the need for traditional hierarchies and manual oversight.

For startups and enterprises, these tools unlock new models of collaboration, fundraising, and stakeholder engagement. For investors, it means access to community-driven ventures with built-in transparency and governance. With Evrica, integrating digital assets and decentralized governance into existing workflows becomes effortless, accelerating the transition toward financial innovation and participatory economics.

As the global financial system embraces digitization, Evrica Intelligence stands at the forefront, bridging traditional finance with a decentralized future. This prototype demonstrates what is possible when tokenization and decentralized management become accessible to anyone in the world, regardless of scale or industry.

Poster B28

Discontinuities of Care? A Study Proposal of the Experience Transitioning from Medicaid to Private Health Insurance After College

Christina Porter

Mentor(s): Dr. Amy White

Lehman College

Changes in how individuals have health insurance, such as from Medicaid to employer-sponsored insurance, may impact an individual's ability to maintain continuity of care. Even for individuals who remain insured, variations in practice arrangements, cost sharing, and contracting networks could impede health care access. Continuity of care is critical for maintaining good health, but especially so for those with chronic health conditions. However, little is known regarding the experience of transitioning between types of insurance and the effects on continuity of care. College students and recent alumni can be particularly vulnerable to discontinuities of care, as they age out of their parents' insurance and/or no longer qualify for Medicaid when they out-earn income requirements. The objective of this study proposal is to add to the body of knowledge assessing the importance of continuous care while focusing on a specific understudied population: recent college graduates. Through the utilization of a validated survey instrument, an observational study will be conducted to determine the association

between continuities of care and changing from Medicaid to employer-sponsored private health insurance after college.

Poster B29

Speciation of Iron-Tributyl Phosphate and Their Influence on Solution Structure

Ashly Quezada Martinez, Joanna Cruz Esquivel, Montserrat Juan Rodriguez

Mentor(s): Benjamin Burton-Pye

Lehman College

Nuclear forensics plays a vital role in identifying and analyzing radioactive materials outside regulatory control, requiring precise characterization of metal-ligand interactions in complex chemical environments. A key process in nuclear fuel reprocessing and forensic analysis is liquid-liquid extraction, where metal ions partition between immiscible aqueous and organic phases. Understanding the coordination environment and solution structure of extracted species is critical for optimizing separation efficiency and forensic traceability.

In this study, we investigate the coordination chemistry of iron(III) [Fe(III)] with tributyl phosphate (TBP), a widely used extractant in the nuclear fuel cycle. Upon dissolution of $FeCl_3$ in TBP, intensely colored orange solutions form; containing $FeCl_4^-$ anions along with other Fe^{3+}-chloride species. To elucidate the bonding environment and solution structure, we employ Fourier-transform infrared (FTIR) spectroscopy, ultraviolet-visible (UV-Vis) spectroscopy, X-ray absorption near-edge structure (XANES), extended X-ray absorption fine structure (EXAFS), and multinuclear nuclear magnetic resonance (NMR) spectroscopy. Our results indicate that Fe(III) primarily interacts with TBP via direct Fe-O-TBP bonding, and coordination complexes of the general formula $[TBP_n(ReCl_{3-n})^{n+}n(FeCl_4)^-]$ are made. In terms of this, these complexes have significant implications for the long-range solution structure. We propose a systematic model for complex stoichiometries and formation mechanisms, providing insight into the behavior of Fe(III) in solvent extraction processes relevant to nuclear forensics and fuel cycle chemistry.

Poster B30

Growth and Distribution: Looking Ahead in the U.S. Economy

Isachard Rodriguez

Lehman College

Abstract: This project explores the long-term trends and future outlook of economic growth and income distribution in the United States. While real GDP has grown significantly since 1970, the benefits of that growth have not been evenly distributed. Drawing on data from the Federal Reserve Economic Database (FRED), the U.S. Census Bureau and Pew Research Center, this study examines how key indicators such as the Gini coefficient (measure of income or wealth inequality), real median household income, and income shares by quintile have evolved over time. The findings show that although aggregate economic output has increased, middle- and lower-income households have experienced slower income growth, while upper-income households have captured a larger share of national income. Using a simple time-series regression model, the project also presents a forecast suggesting that these trends may continue, with the Gini index likely to rise further and the middle class's share of income expected to decline. The presentation will take the form of an oral report featuring original data visualizations and analysis. Ultimately, this research underscores the importance of using more inclusive economic metrics and asks whether the current growth trajectory is sustainable without broader gains in household well-being.

Poster B31

The Impact of Media Representation on Racial Identity

Kathryn Shy

Mentor(s): Ian Sheinheit
Lehman College

As previous scholars have argued, representations of race have an impact beyond the fictionalized worlds that their characters inhabit (Caldwell 2022; Jacobs 2000; Mastro 2009). Further, these portrayals, as they attempt to appeal to specific audiences, often fail at reflecting those audiences' lived experiences. These mediated processes interact in important ways with racial culture and identity. In the current discourse, we often hear about a post-racial media landscape in which media platforms have overcome their ineptitudes around racial representation. These ideas have even led to discussions about diversity diminishing the quality of content. My media focused research, however, demonstrates that new and old forms of racial tropes and stereotypes are still rampant in the film and television industries. Through this project, I consider how racial identity is intertwined with media representations, and how media industry insiders think about and define racial representation. Lastly, I explore and clarify three key concepts to understand mediated racial representation: stereotypes, tokenism, and gatekeeping.

LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION (LSAMP)

Poster B32

Cadmium Uptake and Translocations in Bread Wheat

Audrey Adon-Rosario, Reem Albarati, Amna Ishaq

Mentor(s): Renuka Sankaran
Lehman College

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that is characterized by symptoms such as inattention, hyperactivity, impulsivity, and difficulty focusing. The underlying cause of ADHD is not fully understood but is believed to involve dysfunction in the dopaminergic system, which plays a crucial role in regulating attention, memory, motivation, and other cognitive functions. The treatment of ADHD often involves medications that increase dopamine levels in the brain. Phytotherapy, treatment of medical conditions using plants, is considered as an alternative approach. Our objective is to conduct literature survey to create a library of the herbaceous aromatic plants (HAPs) reported to positively affect dopamine synthesis and/or transmission, as such plants could potentially serve as therapeutics for ADHD. Our long-term goal is to use the library in a machine learning modeling to enable identification of novel (not yet reported) HAPs with therapeutic properties for ADHD treatment. We hypothesize that HAPs with potential to treat ADHD share common chemical compounds. Our preliminary literature quarry has identified four HAPs shown to have beneficial effects on ADHD: sage, rosemary, lemon balm, and lavender, all from the botanical family Lamiaceae. According to our hypothesis, other HAPs containing these compounds may also potentially treat ADHD. We will expand on these preliminary data to build a full library of HAPs with therapeutic properties and

characterize in detail compound composition of these plants. This knowledge will be critical for our long-term goal of building a machine learning platform for identification of new HAPs with potential to treat ADHD.

Poster B33

From Prescription to Addiction: A College Student's Observation of Patient Use and Misuse of Xanax

Saba Alkobadi

Mentor(s): John Lonie
New York City College of Technology

This research explores the dual role of Xanax (Alprazolam), a commonly prescribed benzodiazepine, in both treating anxiety disorders and contributing to addiction and dependency among patients. Through clinical observation, academic review, and patient behavior analysis, this project highlights how a medication intended for relief can become a source of harm when misused or overprescribed. The study aims to raise awareness about the balance between therapeutic benefit and potential risk, especially from the perspective of a health management and policy student seeking to promote safer prescribing practices and patient education.

Poster B34

Understanding of the Impact of Climate Change on Building Energy Consumption

Rashiek Barber, Ferasuddin Siddiqui, Abdellah Gessra, Christopher Sanchez, Takoda Nestor

Mentor(s): Prof. Daeho Kang
New York City College of Technology

To effectively understand and assess the impact of climate change on building energy consumption, gaps in existing energy research and climate modeling need to be filled. The poor communication and collaboration in these two topics have led to a lack of understanding on the connection of climate change to building energy consumption. This study focuses on connecting the research of climate change to building energy consumption, helping understand the real impact of climate change on building energy consumption. Our study looks into emission scenarios, general circulation modeling and downscaling method in order to analyze future weather data and its effect on building energy consumption. It was found that the rise of global warming increases the demand of the HVAC systems. The growing demand leads to a decrease in efficiency and higher operating cost, worsening climate change and its effects. This research will help with the development of different strategies to reduce energy consumption in buildings. Future research is required where a bigger database can be used to improve accuracy.

Poster B35

Molecular Characterization of Mptp: Investigating ATAD3A as the Core Component of the Permeability Transition Pore Using Liposome Patch Clamp Electrophysiology

Gissele Cuanenemi

Mentor: Pablo Peixoto
Baruch College

Mitochondrial dysfunction is a hallmark of numerous life-threatening conditions, including heart attack, stroke, and neurodegenerative diseases. A key event in these pathologies is the opening of the mitochondrial permeability transition pore (PTP), a large, non-selective channel in the inner mitochondrial membrane. When PTP opens under stress conditions (e.g., calcium overload, oxidative damage), it triggers mitochondrial swelling, rupture, and ultimately programmed cell death. Despite decades of research, the molecular identity of mPTP remains unknown, severely limiting the development of targeted therapies. Recent work in our lab suggests that ATAD3A, an inner mitochondrial membrane AAA+ ATPase, may be a

structural component of mPTP. ATAD3A is essential for mitochondrial function and interacts with proteins previously linked to mPTP regulation. However, whether ATAD3A alone can form an ion channel remains unclear—a critical question in determining its role in mPTP formation.

Poster B36

Group Behavior of X-Ray Photons After Scattering from Ionic Salt Filters as They Pass Through Hydrogen-Bonded Medium

Achlyn Genao, Jasper Cheung, Xionghui Wu, Natalya Tomskikh, Ali Algemsh, Andre Ngono, Taro Suzuki, Daler Djuraev

Mentor(s): Subhendra Sarkar
New York City College of Technology

This study investigates how X-ray beams are influenced by starch-based filters and a water column simulating soft tissue. Three types of filters were used: NaCl + Iodine (NaCl + I), NaCl without Iodine (NaCl – I), and Plain starch, both with and without a water column. When the water column was present, NaCl + I caused the most attenuation, blocking the highest number of photons, while Plain starch with water allowed the fewest photons to pass, resulting in lower photon counts in the region of interest (ROI). Without the water column, all filters transmitted more photons, with Plain starch allowing the most to pass through, and NaCl + I showing a slight increase in photon counts, possibly due to secondary emissions like Auger electrons. Key findings show that with water, iodine in NaCl + I reduced X-ray transmission the most, while Plain starch blocked the most photons, and without water, Plain starch allowed the most photons to pass, with NaCl + I showing a slight increase in photon output. At low kVp settings, the images contained mostly low photon counts, while at higher kVp settings, the photon distribution was more balanced. Starting with low or high energy photons clearly showed that Auger effects in mostly watery tissue require higher energies—around 30 kV—to maintain an adequate pool of high-energy photons that can penetrate tissue. In contrast, low-energy photons in the 20 kV range, which are Auger-free, do not produce enough new photons to reach the detectors effectively. This suggests that secondary electron generation typically occurs at the deeper, farthest end of body tissue.

Poster B37

Investigating B Cell Clonality and Cross-Patient Antibody Reactivity in Hidradenitis Suppurativa

Talla Hamouche

Mentor(s): Catherine Pei-ju Lu
Baruch College

Hidradenitis suppurativa (HS) is a chronic inflammatory skin disorder characterized by the formation of highly inflammatory intradermal epithelial tunnels, pustular nodules, and Immune dysregulation. Our lab has recently revealed the expansion of autoreactive B cell clones within TLS^{+} HS lesions, producing IgG1 antibodies that target terminally differentiated keratinocytes. This project investigates the conservation of B cell reactivity across patients and explores whether dominant antibody-producing clones recognize shared antigenic targets or reflect patient-specific immune responses. Preliminary findings suggest a mixture of conserved and individualized antibody profiles, indicating that both shared and divergent B cell clonotypes may contribute to disease pathogenesis. These insights advance our understanding of humoral immunity in HS and point toward new targets for personalized intervention in treatment-resistant patients.

Poster B38

Unveiling Implicit Bias in AI: A Focus on the Impact on Marginalized Communities

Maya Jean, Jay Alvarez, Gloria Amankwah, Jonathan Luna, Jorge Sanz

Mentor(s): Lauren Wolf
Hostos Community College

Beliefs inherently shape our social systems and influence interpersonal interactions. As technological innovation accelerates, it becomes imperative to scrutinize how social biases permeate artificial intelligence (AI), potentially perpetuating systemic inequities. This study delves into the manifestation of implicit biases within AI systems, particularly focusing on their adverse effects on marginalized populations. Drawing from Patrick K. Lin's "Machine See, Machine Do," we explore the notion that the proliferation of algorithms in public institutions stems from societal discomfort with uncertainty, leading to over-reliance on ostensibly objective AI systems. However, these systems often mirror existing prejudices, thereby reinforcing discrimination. Furthermore, through the lens of Virginia Eubanks' "Automating Inequality," we examine the deployment of AI in assessing recidivism risks, highlighting how embedded biases disproportionately target and disadvantage economically disadvantaged individuals and communities of color. By critically analyzing these dynamics, our research aims to illuminate the ethical implications of biased AI and advocate for more equitable technological practices.

Poster B39

The Hidden Danger of PM 2.5 Pollution

Victor W. Carrion Jimenez

Mentor(s): Dickens Saint-Hilaire

Bronx Community College

Particulate matter smaller than 2.5 micrometers (PM 2.5) represents one of the most pervasive and harmful pollutants in the atmosphere, often invisible to the naked eye yet capable of penetrating deep into the human respiratory system. This report examines the sources, concentration levels, and health impacts of PM 2.5 pollution, with an emphasis on its effects on respiratory and cardiovascular health. Drawing on recent data from urban and industrial regions, the study highlights correlations between PM 2.5 exposure and increased incidence of asthma, lung cancer, heart disease, and premature mortality. The analysis also explores disparities in exposure across different populations and geographic regions. By uncovering the "hidden danger" in the air we breathe, this paper underscores the urgent need for stronger regulatory policies, public awareness, and international cooperation to mitigate the health risks posed by PM 2.5 pollution.

Poster B40

A Novel in Silico Model to Investigate Neuronal Ca^{2+} Uptake and Its Effects on Mitochondrial Function in Alzheimer's Disease

Alvi Khan

Mentor(s): Pablo Peixoto
Baruch College

Alzheimer's disease (AD) is a neurodegenerative disease affecting over 7 million Americans every year. AD is characterized by symptoms such as memory loss, dementia, social dysfunction, and more. Much research has been done on the

pathogenesis and molecular biology of AD, but its effects on neuronal metabolism and spatial behavior remain largely unknown. Previous studies suggest that mitochondria (MT) regulate intracellular Ca^{2+} by acting as a buffer which, if overloaded, can lead to sustained mitochondrial permeability-transition pore (mPTP) opening and subsequent mitochondrial Ca^{2+}-induced Ca^{2+} release (mCICR). mCICR is an early sign of AD and, if not addressed properly, can lead to neuronal death. To investigate this, we developed a novel in silico model of neuronal mitochondrial dynamics that reflects neural activity at various frequencies (from 10 to 100 Hz). From our model, we extracted the Ca^{2+} concentrations at which MT undergo mPTP and how much Ca^{2+} accumulates in the cytosol after mCICR. Although the model is still work-in-progress, these findings reflect a viable computational model to study mitochondrial dynamics and can inform at least basic neural activity with respect to MT.

Poster B41

Mechanism of H_2O_2 Transport Across the Mitochondrial Inner Membrane

Ronard Lebron, Michaela Kokkinos

Mentor: Pablo Peixoto
Baruch College

Emission of reactive oxygen species from mitochondria (mROS) has been associated with oxidative stress which leads to dysfunction. However, in recently conducted studies, mROS has been shown to act as a signaling molecule to regulate a growing list of cellular functions. For example, H_2O_2 was shown to be released from presynaptic mitochondria induce activity dependent short-term plasticity (Stavrovskaya et al., 2024). This finding prompts several questions, with a focus on the mechanisms by which mitochondrial H_2O_2 is released from these organelles. Being more polar than water (2.26 vs. 1.86 dipole moment), H_2O_2 is not freely permeable across lipid bilayers, and studies suggest that peroxiporins; a subclass of aquaporin channels that transport H_2O_2, may form the pathway for release into the cytosol. Additional studies suggest that peroxiporins expressed in the inner membrane of the brain, liver, pancreas, and spermatozoa. It is important to note that, there is no direct demonstration of H_2O_2 release through mitochondrial inner membrane and the release pathway remains to be identified. Here a method has been adapted to measure H_2O_2 transport in synthetic liposomes by spectrofluorimetric analysis. This is the first study to directly measure H_2O_2 transport across the inner mitochondrial membrane, possibly through aquaporin. Throughout the first study, it was shown that Hydrogen Peroxide does in fact have a higher release in yeast mitochondrial Inner membrane and it can be inhibited by mercury chloride. The next steps are to see if the results that were obtained can be replicated in mammalian mitochondria using inner membrane from insulin secreting cells.

Poster B42

Effect of Arbs on the Progression of Diabetic Nephropathy

Veronica Livetsky

Mentor(s): Muhammad Zia
College of Staten Island

Diabetic nephropathy is a severe complication of diabetes mellitus, affecting 30–40% of individuals with diabetes globally, with an incidence rising 3% annually, making it a leading cause of chronic kidney disease (CKD) and end-stage renal disease (ESRD). It is characterized by hyperglycemia and hypertension, which damage the kidney's glomerular filtration system. The renin-angiotensin-aldosterone system (RAAS) plays a critical role, with angiotensin II causing efferent arteriole constriction, increasing glomerular pressure, leading to proteinuria and declining kidney function. Angiotensin-converting enzyme (ACE) inhibitors and angiotensin II receptor blockers (ARBs) are commonly used to reduce glomerular pressure and slow disease progression. This review analyzes clinical data from 28 studies on patients with type 1 or type 2 diabetes, aged 18–85 years, with or without nephropathy, excluding individuals outside

this age range or without diabetes. Key parameters assessed include proteinuria (urinary protein levels), serum creatinine (kidney filtration efficiency), glomerular filtration rate (GFR) (kidney function), serum electrolytes (potassium and sodium) (renal electrolyte balance), lipid profiles (cardiovascular risk), and HbA1C (long-term glucose control). By evaluating these factors, this study aims to provide a comprehensive assessment of ARBs' effectiveness in slowing diabetic nephropathy progression.

Poster B43

The Heat We Breathe: Spatial Correlations Between Surface Temperature and Asthma in East New York

Hailah Nagi

Mentor(s): Marzieh Azarderakhsh
New York City College of Technology

Asthma is a chronic lung disease that results in inflammation and narrowing of the airways that pass air from the nose and mouth into the lungs. Asthma can be activated by different factors such as dust, air pollution, smoking, bacteria, and viruses, or it could be genetic too. For some people, it may be triggered by animals and other household chemicals. If not treated properly, it can lead to death in severe cases. Recent studies show that, in addition to these factors, urban heat islands can add more harm to people with asthma, as exposure to high temperatures can trigger asthma symptoms. This research aims to show how extreme heat is a factor of triggering asthma symptoms, it will focus on areas in New York City, such as Brooklyn, specifically East New York, that experience high numbers of asthma cases and emergency visits. It will also look at heat vulnerability index in East New York as well the Bronx, and their correlation with asthma rates and er visits. The research will include data on asthma rates, emergency visits, and heat vulnerability in East New York and the Bronx, analyzing the relationship between increasing heat and asthma symptoms over time. East New York and the Bronx have high asthma rates and emergency visits, which is a result of high heat vulnerability. The increase in extreme heat events over the years has been shown to worsen asthma symptoms and drive more people to the emergency room. Overall, this research will detail the impact of extreme heat on asthma in areas like East New York and the Bronx, focusing on air pollution and allergens.

Poster B44

Heat Monitoring in New York City Subway Systems

Damilola Babs-Ogundeji, Malique Paul

Mentor(s): Abdou Bah
New York City College of Technology

Climate change has had a major effect on New York City causing challenges for reducing trapped heat. The underground transportation system is heavily impacted by the changing climate, and the issue is more severe during summer when heat waves are common. The goal of this research is to identify stations that are heavily impacted by these environmental conditions and evaluate them to help with developing heat mitigation strategies. Each researcher was assigned to a train service in Brooklyn, NYC to measure the relative humidity and air temperature at both the subway platform and street level. To conduct this project, humidity and temperature data loggers were used to measure, store, and record data inside stations and at street level to be shown in a presentable way. This data will then be used for analysis in determining which stations in Brooklyn are impacted more heavily than others by heat, furthermore, helping with reducing hot temperatures underground. From previous research, specifically during July 2024, when the city experienced three continuous heat waves which kept the average temperatures of the Brooklyn subway stations ranging from high eighties and low to mid ninety degrees Fahrenheit. The research continued through the winter starting in early February, and the weather conditions were nearly opposite compared to the summer readings. Where summer was sunny, humid, and hot through the duration of the collection process. Winter has been

overcast, rainy, and cold. From our collective data, we noticed the air temperature and humidity were both higher at the platform level compared to the street level. Although efforts are being made towards climate resilience, the implementation of needs to be swift and concentrated on the stations more impact. Climate change effects are significant, and this research will help with heat mitigation initiatives that can be implemented now to reduce warming effects in the future.

Poster B45

Sponge Mimetic Tubules (SMT) to Explore Biomorph Templated Evolution of Animal Life and for Bioengineering Applications

Destiny Richard

Mentor: Krishnaswami Raja
College of Staten Island

One of the lingering mysteries in science is the process by which single-celled organisms evolved into the early forms of multicellular animals. Sponges are regarded as the earliest animal life forms; their inherent structure is a tubular scaffold made of an intercalating framework of protein with calcium silicate/carbonate. This multicellular organism (sponge) consists of choanocytes (sponge cells) that are attached to this framework. The choanocytes in sponges bear a close resemblance to the unicellular organism, choanoflagellates. There are numerous accounts in scientific literature regarding natural tubular biohybrid structures found at hydrothermal vents (Stromatolites) formed by mineralized cyanobacteria. This observation has inspired our current work to explore how the scaffolding of tubular sponges resembles the natural chemical gardens discovered in hydrothermal vent systems in their construction. We have reimagined the traditional “chemical garden” experiment to explore the potential for bio template assisted development of ocean sponges. We have created biopolymer-intercalated silicate phosphate tubules that mimic stromatolites and tubular sponge scaffolds, referred to as Sponge-mimetic tubules (SMTs).

Poster B46

Enhancing Dental Care Access for Veterans: Addressing Gaps in Insurance and Oral Health Services

Stefanie Rivera

Mentor(s): Susan Schroeder-Davide
New York City College of Technology

Veterans have access to a multitude of medical benefits through the Veterans Affairs (VA) health care system (VAHCS) however this does not necessarily include dental benefits. Approximately 82%, or 7.4 million veterans, are ineligible for dental care benefits. This is a significant number of people who are not able to receive dental treatment because they do not meet specific requirements. The 6-part classification system declares that the veteran must either have a dental ailment that is service connected or qualify based on other, very specific criteria. This system is difficult for many veterans to navigate and determine their eligibility status. Those who do not meet eligibility must secure private insurance through other means such as other work, through a spouse, a Medicare Advantage Plan, or funding available for veterans that provide free or low-cost care from nonprofits and state programs. The purpose for this research project is to investigate veterans’ VA dental coverage status, VAHCS navigation, access to dental care, and satisfaction of benefits by surveying veteran students.

Poster B47

Identification of Herbaceous Aromatic Plants as Phytotherapy for ADHD

Marilin Rodriguez, Miram Fidelis, Jasmin Sanchez

Mentor(s): Anna Ivanova
Hostos Community College

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that is characterized by symptoms such as inattention, hyperactivity, impulsivity, and difficulty focusing. The underlying cause of ADHD is not fully understood but is believed to involve dysfunction in the dopaminergic system, which plays a crucial role in regulating attention, memory, motivation, and other cognitive functions. The treatment of ADHD often involves medications that increase dopamine levels in the brain. Phytotherapy, treatment of medical conditions using plants, is considered as an alternative approach. Our objective is to conduct literature survey to create a library of the herbaceous aromatic plants (HAPs) reported to positively affect dopamine synthesis and/or transmission, as such plants could potentially serve as therapeutics for ADHD. Our long-term goal is to use the library in a machine learning modeling to enable identification of novel (not yet reported) HAPs with therapeutic properties for ADHD treatment. We hypothesize that HAPs with potential to treat ADHD share common chemical compounds. Our preliminary literature quarry has identified four HAPs shown to have beneficial effects on ADHD: sage, rosemary, lemon balm, and lavender, all from the botanical family Lamiaceae. According to our hypothesis, other HAPs containing these compounds may also potentially treat ADHD. We will expand on these preliminary data to build a full library of HAPs with therapeutic properties and characterize in detail compound composition of these plants. This knowledge will be critical for our long-term goal of building a machine learning platform for identification of new HAPs with potential to treat ADHD.

MACAULAY

Poster B48

Under Pressure: The Disproportionate Burden of Burnout on Premedical Students

Yashaswi Manneru

Mentor(s): Professor Logan McBride and Professor Elizabeth Reis
Macaulay Honors at the City College of New York

Burnout is a significant issue affecting various populations, particularly in the medical field. The demanding nature of work, limited opportunities for self-care, and high expectations placed on healthcare professionals contribute to burnout, often characterized by emotional exhaustion, depersonalization, and reduced personal accomplishment. While much research has focused on burnout among medical students and physicians, there is limited exploration of its impact on premedical students, especially those from underrepresented backgrounds. This study examines the disproportionate impact of burnout on premedical students, with a focus on the unique challenges they face in balancing academic rigor and personal responsibilities. I hypothesize that systemic barriers such as financial insecurity, lack of mentorship, and insufficient mental health resources exacerbate burnout and disproportionately harm students' well-being. To test this hypothesis, I conducted surveys among CUNY premedical students to measure burnout levels, stressors, and coping strategies. Furthermore, qualitative interviews were done and provided deeper insights into students' experiences. Results revealed that over 70% of respondents reported moderate to high levels of burnout. Key factors included financial insecurity, cited by 60% of students, and a lack of effective mentorship and mental health resources. Interviews also highlighted unique challenges, such as balancing demanding academic schedules with familial responsibilities, working part-time jobs to finance education, and navigating systemic barriers like imposter syndrome and insufficient institutional

support. By focusing on premedical students, this research addresses a critical gap by exploring how burnout develops early in students' medical education journeys. Engaging medical educators to foster supportive environments can help mitigate burnout and promote resilience during training. Reducing premedical burnout may improve retention in medical programs, enhance physician health outcomes, and create a more equitable pathway for underrepresented students in healthcare.

Poster B49

The Native Artist's Brain: The Neuroscience of Indigenous Art Practices

Malia Morioka

Mentor(s): Lisa Brundage, Zohra Saed
Macaulay Honors College at the City College of New York

Indigenous people from around the world have recognized the healing power of art for centuries, seeing it as an interwoven part of their identity, heritage, and connection to the land. However, the western "invention" of art therapy by Adrian Hill in 1941, does not recognize the far earlier established indigenous art practices, and detaches from the crucial aspect of community healing found in Indigenous-based methods. While western forces colonized countless Indigenous groups, they also attempted to replace Indigenous beliefs systems and art forms with their own mode of existence, which they deemed superior. It is from these lasting repercussions of colonization and generational trauma that cause systemic mental health inequities in Indigenous populations within the United States to this day. Furthermore, forms of western medicine are not always beneficial to repair the psychological trauma experienced by Native people, as they belong to the same system that continues to oppress, displace, and erase Indigenous identity. In this thesis, I will argue the benefits of various mediums of Indigenous art forms for improving psychological trauma symptoms through the neuroscience lens. Since the western imperialist system undermines the language of Native people, I will also communicate the benefits of Indigenous-based art practices using a western discipline, the language of neuroscience. It is through this modality of neuroscience that the integrity of indigenous-based art therapy can be verified to those questioning its legitimacy, and subsequently be utilized to further promote and expand indigenous art practices in the United States. This thesis will explore a variety of indigenous art forms, each with its own particular benefits. The art forms explored will range from the use of fine-motor movements to whole-body movements, those being: drawing, tattooing, clay, beading, dance, chanting and drumming.

Poster B50

Hidden Girls: Unveiling the Underdiagnosis of Autism in Girls and Women

Jaymie Paredes

Mentor(s): Dr. Lisa Brundage and Dr. Zohra Saed
Macaulay Honors at City College of New York

Autism research has historically been dominated by male participants, yet evidence acquired from this biased sample continues to inform the current understanding of the characteristics of autism. Consequently, a larger proportion of women receive an autism diagnosis in adulthood than men, suggesting differential diagnostic outcomes on the basis of gender. Clinicians, parents, and teachers learn to recognize autistic characteristics in young boys but often fail to detect these traits in young girls. Overlooking autistic girls in childhood deprives them of access to early intervention, support, and services that could enhance their quality of life. Receiving a diagnosis in adulthood often leads to a lifetime of social ostracization and isolation. At its worst, a late diagnosis can leave adult-diagnosed autistic women susceptible to a host of health conditions, including cardiovascular, gastrointestinal, nutritional, and sleep disorders.

It is imperative to bridge the gender gap in childhood autism diagnoses to grant girls and women equal access to autism-informed support as boys and men. This paper first compiles

observational studies to better understand the gender-based differences in autism presentations. This is followed by studies that delve not only into the damaging effects of a late diagnosis but also into the flip side—how an early diagnosis can be a transformative experience. Furthermore, anecdotes from autistic women are included to amplify their perspectives of early or late diagnoses. Finally, this paper explores various supplemental diagnostic tools that can be implemented in tandem with current gold-standard diagnostic tools to adequately account for gender differences in autism presentations. Ultimately, this paper advocates for better health and quality of life outcomes for autistic girls and women.

Poster B51

Pain and Prejudice: Exploring Gender Bias in the Treatment of Women's Pain

Zuzanna Pula

Mentor(s): Dr. Lisa Brundage and Dr. Zohra Saed
Macaulay Honors College

Women too often walk into the emergency room seeking treatment only to be met with skepticism. Countless women across the world continue to suffer in pain as they are disbelieved by a system that is meant to heal them, perpetuating a deadly mistrust in healthcare. Several retrospective studies analyzing patient records have consistently proven that gender disparities exist across a variety of types of pain. Women are more likely to have their symptoms dismissed, experience delays in treatment, and receive inadequate care as compared to men. History has long trivialized women's pain as a psychological manifestation rather than a legitimate physiological concern. The result is socio-cultural stereotypes which teach healthcare providers that women are more likely to exaggerate their pain.

This paper utilizes a feminist lens to elucidate the factors which continue to drive the gender disparities in pain management for women. Through the integration of personal anecdotes, evidence-based medical research, and sociocultural reflection, this paper argues that the Gender Pain Gap is not a theory, rather it is a systemic failure initiated by historical misogyny and perpetuated by modern medical practice. Addressing this issue requires a multifaceted approach that takes into account both the healthcare system and society. Educating providers on how to recognize their own gender biases, implementation of qualitative pain scales, and the usage of patient-centered approaches to medicine are all changes that must take place if we are to ever achieve gender equality for women in pain. As a society, we must raise awareness about the persistence of the gender pain gap in the healthcare system, empowering women to advocate for themselves and making gender-specific research a priority. Only through these steps will we one day be able to achieve gender equity for all women in pain.

MEDGAR EVERS COLLEGE

Poster B52

Identification of Anti-Cancer Activity Mauby (Colubrina Elliptica) Extract Using PC3 Prostate Cancer Cells

Janelle Addison

Mentor(s): Ijaz Ahmed, and Alam Nur-E-Kamal
Medgar Evers College

Colubrina elliptica, commonly called mauby. Mauby contains various compounds with pharmacological activity. This plant is widely grown in tropical and subtropical areas, such as Southeast Asia, South America, and the rainforests of Africa. Different parts of mauby have different activities. The bark extracts are used to treat cystitis, headaches, insomnia, and cancer. In this project, I treated prostate cancer (PC3) cells with bark extract of mauby. It was found that bark extract of mauby inhibits growth of PC 3 cells.

We seeded PC3 cancer cells into 24-well culture dishes and incubated overnight at 37^{o}C in standard culture condition. Then mauby extract was added at various concentrations. Cell growth was monitored by MTT assay after 24 hours. We determined IC_{50} for the mauby extract.

It was found that mauby extract induced PC3 cell death. We also demonstrated that cell death was associated with induction of apoptosis. We will present the results obtained from this study.

Our results indicated that mauby extract induces preferential death of PC3 cells. Our results indicate that mauby could be used as an anti-cancer drug. Further studies are required to purify the active compound present in mauby extract and its potency as an anti-cancer agent.

Poster B53

Assessing the Impact of Airport-Related Pollution on Water Bodies in New York City

Uyi Amadasu, Jalisa Johnson, Aderemi Adeyemi

Mentor(s): Oluwaseun Salako, Omoniyi Pereao

Medgar Evers College

While the environmental impacts of airports—particularly noise and air pollution—are well-documented, the effects on nearby water bodies remain understudied. This project investigates the presence and concentration of jet fuel additives in ponds, lakes, and rivers within a 5-mile radius of three major New York City airports: John F. Kennedy International Airport (JFK), LaGuardia Airport (LGA), and Westchester County Airport. Water samples will be collected from key sites, including Oakland Lake, Meadow Lake, Kissena Lake, and major urban rivers (East River, Harlem River, Bronx River), and analyzed for additives such as tetraethyl-lead (anti-knock agent), alkylated phenols (gum inhibitors), 2-methoxyethoxy ethanol (icing inhibitor), and N,N'-bis(salicylidene)-1,2-propanediamine (metal deactivator). The study aims to determine contamination levels and assess potential ecological risks, with follow-up collaboration from a marine biologist to examine bioaccumulation in aquatic organisms. Findings will contribute to understanding the broader environmental consequences of aviation-related pollutants on urban water systems.

Poster B54

Visualizing Health Inequities: Exploring Wealth Disparities, Life Expectancy, and Chronic Diseases in NYC

Idrissa Bah

Mentor(s): Dr. Rosa Zavala-Gutierrez

Medgar Evers College

This project will explore the intersection of wealth and health outcomes in New York City using publicly available datasets from the NYC Open Data portal. By focusing on indicators such as income levels, neighborhood demographics, life expectancy, and prevalence of chronic diseases (e.g., diabetes, hypertension, asthma), the project will develop interactive data visualizations to reveal spatial and statistical patterns of health disparities across the city. The goal is to make systemic inequalities more visible and accessible to the public, policymakers, and educators, highlighting how economic conditions correlate with—and potentially contribute to—health outcomes in urban communities. Ultimately, the project aims to support data-informed advocacy and decision-making for more equitable public health interventions.

Poster B55

Assessment of Heavy Metal and Black Carbon Concentration Changes Before and After Congestion Pricing Implementation

Thierno Abdoul Diallo

Mentor(s): Jin Young Shin, Defne Sener

Medgar Evers College

This study investigates the impact of congestion toll pricing on air quality in Chinatown, Manhattan, with a focus on changes in particulate matter (PM2.5), black carbon, and heavy metals. As a high-traffic area near major bridges and tunnels, Chinatown serves as an ideal location to assess the effects of traffic reduction policies. Air samples were collected 10 days before and after the policy's

implementation using a low-volume air sampler and an Aethalometer AE-51 to monitor pollutant levels. Heavy metal concentrations were quantified through acid digestion followed by ICP-MS analysis. This study aims to determine whether congestion pricing effectively reduces pollution, providing valuable insights for traffic management, urban planning, and public health initiatives.

Poster B56

Understanding the Mechanistic Relationships in Gene Expression Following Viral Infection in the Cave Nectar Bat *Eonycteris Spelaea* using MENTOR Analysis

Anthony Garcia

Mentor(s): Dr. William Carr

Medgar Evers College

With methods of analyzing research findings advancing, we can identify novel functional relationships between genes not previously observed. This is key in assessing transcriptomic responses to viral infections. Using data previously generated from “Single-cell transcriptome analysis of the in vivo response to viral infection in the cave nectar bat Eonycteris spelaea” by Gamege et al 2022, we employed MENTOR(Multiplex Embedding of Networks for Team-Based Omics Research), to examine the functional relationships between Differentially Expressed (de) genes by using “Random Walk with Restart (RWR)”, to identify connections between random nodes(or genes) and their neighboring nodes to examine topological similarity in functional associations. We filtered the data using a parameter sweep to reduce the number of DE genes from 13,265 to 1,134 and then analyzed this set of genes with a Log2FC value of 0.5 and a p-adjust value of 0.01. MENTOR separated these genes into different clades based on functional relationships, and ChatGPT was used to examine the functional relationships among these genes. As MENTOR indicated whether or not the genes were upregulated or downregulated by cell type we include this as well. Using this information we observed novel interactions between de genes in the Eonycteris spelaea. In one functional clade, we found a novel relationship showing how viral infection positively regulates innate immune response by identifying and degrading viral RNA and how at the same time genes for the regulation of cell structure and cell signaling are positively regulated. In the same functional clade we also observed a novel relationship showing the positive regulation of transcriptional repressors and HNRNPH1 which regulates aspects of mRNA metabolism. This has implications for medical research, namely developing antiviral therapies. This work was supported in part by the CIRE Program of the City University of New York.

Poster B57

Studies on AntiCancer Properties of Maubi Plant (Colubrina Elliptica) Bark Extract Using V-Ras Transformed Cancer Cells

Nadisha Hall

Mentor(s): Ijaz Ahmed, Alam Nur-E-Kamal

Medgar Evers College

Maubi is a plant that has been used for various medicinal purposes for centuries. Thus, it has been investigated for its potential anti-cancer properties. In this research, the methanol extract from the bark of the maubi plant was tested for its effects on the v-Ha-Ras cancer cell line. The cells were cultured in a 24-well cell culture plate and treated with the methanol extract for a day- 24 hours. Consequently, the morphological changes in the cells were observed under a microscope, and cell growth was assessed using the MTT assay. The findings demonstrated that the methanol extract of maubi induced morphological changes in the v-Ha-Ras cells, including cell rounding. The MTT assay shows that the extract inhibited cell growth in a dose-dependent manner. This suggested the presence of compounds in Maubi bark that induce cancer cell death. Future studies are needed to isolate and identify the chemical structures of these potential anti-cancer compounds.

Poster B58

Green Antibiotics: Isolation and Antibiotic Potential of Plant-Derived Proteins from Curry Leaves, Thyme, Rosemary and Neem

Reem Issa

Mentor(s): Harsha Rajapakse
Medgar Evers College

The rise of antibiotic-resistant bacteria necessitates the exploration of alternative antimicrobial agents. This study investigates the antibiotic potential of plant-derived proteins extracted from curry leaves (*Murraya koenigii*), thyme (*Thymus vulgaris*), rosemary (*Rosmarinus officinalis*), and neem (*Azadirachta indica*). Initial extractions focused on low molecular weight proteins from curry leaves, which demonstrated antibacterial activity. However, attempts to visualize these proteins using SDS-PAGE gel electrophoresis were unsuccessful, likely due to their small size. To address this limitation and explore additional mechanisms of antibacterial action, we shifted our focus to hydrophobic proteins, which are hypothesized to disrupt bacterial membranes due to their affinity for lipid bilayers. Hydrophobic protein extracts from the selected plants were tested for antibacterial efficacy, and the proteins exhibited measurable activity, with a minimum inhibitory concentration (MIC) of approximately 250 µg/mL. These findings support the potential of plant-derived hydrophobic proteins as promising candidates for the development of green antibiotics.

Poster B59

Investigation of Protein PhytoDefenders in Mint, Basil and Mango Leaves

Somaia Issa

Mentor(s): Harsha Rajapakse
Medgar Evers College

In response to the growing concern over antibiotic resistance, this study investigates the antimicrobial potential of *Protein PhytoDefenders*—bioactive proteins extracted from mint (*Mentha spp.*), basil (*Ocimum basilicum*), and mango (*Mangifera indica*) leaves. These protein extracts exhibited antibacterial activity, with a minimum inhibitory concentration (MIC) of approximately 250 µg/mL. To further understand the mode of action, bacterial membrane lipids were successfully isolated from *Escherichia coli*. Ongoing work involves analyzing the interaction between these plant proteins and *E. coli* lipids using Monolith X Microscale Thermophoresis (MST) and Spectral Shift techniques. These analyses aim to reveal membrane-binding affinities and potential mechanisms by which plant-derived proteins disrupt bacterial function. This study contributes to the growing field of green antibiotics and the development of plant-based solutions to combat resistant pathogens.

Poster B60

Determine the Cellular effects of Potential Cross Talks Between H3K27 Acetylation and Methylation

Rheann Alena Johnson, Adanna Smith

Mentor(s): Shiraz Mujtaba
Medgar Evers College

The lysine 27 on human histone H3 (H3K27) can undergo acetylation (H3K27ac) by CREB-Binding Protein (CBP) as well as trimethylation (H3K27me3) by Enhancer Of Zeste 2 Polycomb Repressive Complex 2 (EZH2). While CBP-mediated H3K27ac leads to activation of downstream genes, H3K27me3 leads to repression of downstream target genes. The H3K27ac versus H3K27me3, which are mutually exclusive epigenetic events orchestrate genes that regulates growth, development and differentiation. Any aberrations in this biochemical process can potentially lead to cancers and developmental disorders. In this project, we will use small molecules targeting acetylation and trimethylation activities of CBP and EZH2 to study the cellular effects on prostate cancer cells. Both CBP and EZH2 play a crucial roles in growth and development of Prostate cancer. In this project, we will investigate the effects of CBP and Ezh2

inhibitors alone or in combination on the growth of PC3 cells that is a prostate cancer cell line.

Poster B61

Experimental Verification of Faraday's Law of Electromagnetic Induction

Lovely Joseph

Mentor**(s)**: Andrii Lurov
Medgar Evers College

Faraday's Law of Induction states that electromagnetic force (EMF) induced in a circuit is proportional to the rate of change of magnetic flux throughout the circuit. Mathematically, Faraday's Law is represented **as:**
$\epsilon = -N \ \Delta\Phi/\Delta t$.

ϵ = The electromagnetic force (EMF)
N = The number of turns in the coil
$\Delta\Phi$ = The change in magnetic flux
Δt = The change in time.

Here we experimentally validate the law's mathematical expression between magnetic flux and induced voltage. We test whether increasing the number of coil turns or changing the magnetic field more rapidly results in a greater induced EMF. This helps confirm the law's mathematical and physical validity.

NEW YORK CITY COLLEGE OF TECHNOLOGY

Poster B62

Building for Energy Efficiency: Innovation in Sustainable Healthcare Facility Design

Rashiek Barber

Mentor(s): Dave Gosine
New York City College of Technology

This report explores innovative methods for enhancing energy efficiency in healthcare and other facility types through sustainable design and advanced science. As climate change intensifies and resource consumption increases, a growing emphasis is placed on energy conscious architecture. The integration of quantum mechanics, smart building systems, and renewable energy sources has led to revolutionary approaches in retrofitting and new construction alike. Kaiser Permanente San Diego stands as a premier example of a healthcare facility implementing next generation energy strategies that drastically reduce consumption while maintaining occupant comfort and functionality. By leveraging passive design, smart controls, and quantum inspired innovations, facilities can reduce environmental impact and operational costs. This paper outlines strategic methods and evaluates their outcomes across different facility types, offering scalable models for sustainable infrastructure.

Poster B63

Blending Traditional Storytelling with Modern Technology

Samuel Cheung, Tshari Yancey

Mentor(s): Professor David Smith
New York City College of Technology

For our research project at New York City College of Technology, we focused on combining digital tools, design skills, and fabrication techniques to

support the development of a collaborative shadow puppet production. Our work explored how artificial intelligence can assist the creative process without replacing the value of human input. Drawing on skills developed throughout college—including animation, visual storytelling, and prompt engineering—we collaborated closely with AI models to generate early concepts for puppet characters and virtual backgrounds.

Using a background development workflow, we engineered visual prompts that allowed AI to create detailed scenic environments. These AI-generated backgrounds were then reviewed, edited, and refined carefully to better match the tone and themes of the production. Our goal was to create visual environments that supported the story and blended naturally with puppet movement and dialogue on stage.

Character design followed a similar process. With guidance from Puppet Design documentation, we used AI tools to generate basic puppet templates. These templates were adapted into hand-drawn illustrations and prepared for fabrication using a laser cutter and traditional materials. This hybrid approach allowed us to bring AI-generated concepts into physical form, demonstrating how digital and traditional techniques can complement each other.

Throughout the project, we maintained a strong balance between AI assistance and human creativity. While AI helped generate early ideas and accelerate certain processes, the final outcomes relied heavily on manual refinement, personal judgment, and hands-on craftsmanship. This project demonstrates how AI can enhance—but not replace—the creative process, and how students can use accessible tools and strategies to bridge the gap between virtual design and real-world storytelling.

Poster B64

Data Analysis of the Oath Keepers' Members

John Estrella

Mentor: Boyan Kostadinov
New York City College of Technology

This project analyzes approximately 38,000 membership records of the Oath Keepers, a far-right anti-government militia, spanning the years 2008 to 2018. Using time series analysis, we examined trends and identified anomalous periods of rapid membership growth, often corresponding to major political events. We conducted a geographic analysis by mapping members' locations across the United States, highlighting abnormal concentrations at the county level. Additionally, we explored subscription types and pricing tiers to understand the organization's membership perks and strategies. A word cloud analysis of members' self-reported skills provided insights into their occupational and professional backgrounds. Together, these analyses offer a data-driven perspective on the composition, growth, and dynamics of the Oath Keepers, contributing to a broader understanding of extremist group membership patterns.

Poster B65

Cultural Barriers and Communication: South Asian Experiences in Health Care Settings

Sabahat Moughal

Mentor(s): Sarah Price, Ph.D.
New York City College of Technology

Communication is a fundamental part of integrating into American society, yet for immigrants—particularly South Asian immigrants—it often becomes a site of struggle, especially within the health care system. This research explores the complex dynamics of cross-cultural communication between South Asian patients and their healthcare providers, highlighting barriers related to language, culture, ethnicity, and differing health beliefs. The study uses in-depth, open-ended interviews—conducted via Zoom or in person and voice-recorded without identifying information—to collect narratives from both patients and providers. It focuses on assessing verbal and non-verbal communication styles, culturally specific expressions, symbolic practices, and regional understandings of health and illness. Fieldwork also includes informal interviews and observational research, particularly following a "Compassionate Connected Care" workshop at Wyckoff Heights Medical Center (WHMC), led by Press Ganey. This

workshop, attended by program directors, attendings, and residents, emphasized relationship-centered care and techniques for more empathetic provider-patient interactions. Physician participants were invited to share personal takeaways from the workshop in follow-up conversations. The study is currently awaiting Institutional Review Board (IRB) approval from both CUNY and the WHMC IRB committee, which would permit collaboration with interns and residents in WHMC's residency programs.

This presentation will report on formative research which involves needs assessment, site selection, capacity building, instrument design, human subjects' protection and data protocols. Like other qualitative research in the social sciences, this project contributes to societal understanding by documenting the lived experiences of underrepresented populations. By centering South Asian voices and revealing personal stories and insights, the study challenges stereotypes and encourages compassionate, culturally attuned health care. These narratives offer policymakers and providers a broader, more humanized picture of patient care that moves beyond statistics.

Poster B66

Traumatic Brain injury Modeling by Chemical Mass Transfer

Vanessa Robinson, Xionghui Wu, Jakiya Akter, and Kyuhyung Chae

Mentor(s): Mary Alice Browne, Subhendra Sarkar
New York City College of Technology

Traumatic brain injury (TBI) is a structural and physiological disruption of brain function caused by a forceful blow or an impactful external force. TBI is sustained in two phases, with a primary injury resulting in the stretching of white and gray matter axons and a secondary injury responsible for endoplasmic reticular stress, mitochondrial dysfunction, and the buildup of reactive oxygen species. The secondary injury not only causes the neurological dysfunction of the brain but also alters the flow of cerebrospinal fluid (CSF), breakdown of the blood-brain barrier (BBB), and temporarily affects the sleep, wake, and circadian circuit of the brain. The rapid stretching of the axons causes irregulation of sodium (Na^{+}) and potassium (K^{+}) ion concentration outside and within the axons, which in turn causes the increased concentration of calcium (Ca^{2+}) within the axons. The combination of the destruction of the brain tissue, the collapse of the blood-brain barrier, and the regional neuroinflammation leads to increase of iron (Fe^{2+}) from the blood into the brain parenchyma. Iron overload and ferroptosis, which is a form of regulatory cell growth is highly involved in the pathophysiological process of secondary brain injury. Both the increase of calcium and iron can lead to cell death within the brain.

Poster B67

Understanding of the Impact of Climate Change on Building Energy Consumption

Ferasuddin Siddiqui, Abdellah Gessra, Rashiek Barber, Christopher Sanchez, Takoda Nestor

Mentor(s): Prof. Daeho Kang
New York City College of Technology

To effectively understand and assess the impact of climate change on building energy consumption, gaps in existing energy research and climate modeling need to be filled. The poor communication and collaboration in these two topics have led to a lack of understanding on the connection of climate change to building energy consumption. This study focuses on connecting the research of climate change to building energy consumption, helping understand the real impact of climate change on building energy consumption. Our study looks into emission scenarios, general circulation modeling and downscaling method in order to analyze future weather data and its effect on building energy consumption. It was found that the rise of global warming increases the demand of the HVAC systems. The growing demand leads to a decrease in efficiency and higher operating cost, worsening climate change and its effects. This research will help with the development of different strategies to reduce energy consumption in

buildings. Future research is required where a bigger database can be used to improve accuracy.

Poster B68

Blended Shadow Puppetry: The Use of AI

Tshari Yancey

Mentor(s): Prof. David Smith, Prof. Christopher Swift
New York City College of Technology

Blended Shadow Puppet (BSP) is an expansive cross-disciplinary meta-project that explores shadow puppetry as an artistic method combined with AI technology. Originating in an initial production in Spring 2024 that merged traditional Wayang Kulit Shadow performance with 21st century technology, the BSP meta-project also serves as a test bed to evaluate the Balanced Blended Space through the development of an open-source Blended Reality Performance System. The project showcased advanced video projection and animation to create immersive backgrounds, dynamic sceneries, and interactive elements that interact with the physical shadow puppets. These digital enhancements will allow the narratives to unfold in a visually stunning environment, adding additional layers of meaning and engagement beyond the conventional puppetry performance. In honoring the Javanese puppetry, a lot of the stories are from the Mahābhārata and Rāmāyana. Drawing inspiration from narrative plots in those stories created a new tale of two poor brothers who go on an adventure to change their lives for the better. The backgrounds were produced using prompts and artificial intelligence. AI is one of the fascinating topics, we researched how to use it as a partner rather than just a tool. Also, how to incorporate its art into modern entertainment to create an immersive experience that allows people to explore our fictional world. In the future we hope to expand this project to the following additional narrative opportunities like Comic Books/Graphic Novels, Virtual Reality (VR) Performances, Film and Animation, Museum Exhibits, and Mobile Apps.

QUEENSBOROUGH COMMUNITY COLLEGE

Poster B69

Probing the Nanostructure of Hydroxyl Functionalized Imidazolium Ionic Liquids

Leesha Ansar

Mentor(s): Sharon Lall-Ramnarine and James F. Wishart
Queensborough Community College

Ionic liquids (ILs) are liquid salts with melting points below 100°C. Their attractive properties include low volatility, low flammability, high conductivity, wide liquid ranges and wide electrochemical windows. These tunable properties make them valuable as alternative solvents in enzymatic catalysis, supercapacitors, and various industrial processes, enhancing reaction yields, separations, and energy storage. However, fully harnessing their potential requires a deeper understanding of their nanostructure, which influences their bulk properties. Techniques such as X-ray scattering and molecular dynamics simulations are useful for investigating the structures of ionic liquids (ILs), but they have certain interpretational limitations. To address these issues, this project involves the synthesis and analysis of ILs capable of hydrogen bonding and utilizes Solid- State NMR and neutron scattering techniques, which employ hydrogen-deuterium substitution to study the molecular interactions that define the nanostructure of ILs. The authors report here on the syntheses and characterization of ionic liquids comprised of imidazolium cations bearing hydroxyl side chains of varied lengths coupled with bis(trifluoromethylsulfonyl)imide and bis(fluorosulfonyl)imide anions. The structures of ionic liquids were confirmed using ^{1}H, ^{13}C and ^{19}F NMR spectroscopy. Preliminary results indicate that solvent-free and microwave-assisted reactions give higher yields of ILs with hydroxyl-terminated side chains. Physical characterization analysis showed higher viscosities and lower conductivities for

hydroxyl-substituted ionic liquids compared to their alkyl- analogues, suggesting that inter- and intramolecular interactions are impeding ionic mobility. The outcomes of this work are expected to significantly contribute to the design and understanding of ILs tailored for specific applications.

Poster B70

Effect of TRPV Chemical Inhibitors on Cnidocyte Discharge and the Feeding Response in Hydra

Kristina Dujic

Mentor(s): Dr. Susan McLaughlin
Queensborough Community College

Hydra is a fresh-water cnidarian regarded as an ideal model organism in developmental and neurobiology due to its unique regenerative abilities and specialized cell types like cnidocytes, which are involved in prey capture and defense. Previous investigations by others indicated that the genome of the anthozoan cnidarian *Diadumene lineata* contains TRPV-related channels, and their experiments with chemical TRPV inhibitors (GSK2193847, HC-067047, RN-1734) implicated TRPV channels in cnidocyte discharge in this organism. Hydra also harbors genes that code for TRPV-related channels, which are primarily expressed in cnidocytes. Based on this information, TRPV inhibitors (see above) were tested to determine if they would inhibit Hydra cnidocyte discharge. All three TRPV inhibitors activated the hydra feeding response, resulting in an increase in the number of cnidocytes discharged, in contrast to the results seen in *Diadumene lineata*. These findings may point to the differences between feeding responses and cnidocyte activation in anthozoan cnidarians versus hydrozoan cnidarians. Further experiments examining the effect of TRPV agonists on Hydra feeding behaviors and cnidocyte discharge will be conducted. Results from this study could expand our understanding of molecular mechanisms underlying sensory function and behavior in Hydra, with broader implications for studying evolutionarily conserved sensory pathways.

Poster B71

Predicting Personality Using Machine Learning: Comparison of MBTI vs OCEAN Models

Brett Hirsch

Mentor(s): Guozhen An
Queensborough Community College

Personality is an often overlooked but significant aspect of our lives. It drives our everyday decision making and can even help us understand compatibility between one another. There exist many indexes for personality categorization, the most popular being the Myers–Briggs Type Indicator (MBTI). This information can be used in a variety of different jobs and fields such as therapy, teaching/tutoring, policework, customer service, hiring managers. However, it is difficult to properly accurately detect someone’s personality from the testing options that are publicly available. My project aims to predict the personality type of someone by analyzing their speech patterns in text. The MBTI is split into four fields, each with 2 different outcomes, for a total of 16 possible personalities. The four fields are as follows: Introversion vs Extroversion, Sensing vs Intuition, Thinking vs Feeling, and Judging vs Perceiving. Using Python, along with a dictionary from the Linguistic Inquiry and Word Count (LIWC) tool, I have performed feature extraction from a publicly available textual dataset. This derives numerical values based on perceived key words in a sentence and then assigns each word to a different category that matches a predefined list of relevant categories. I then used python’s Scikit-Learn library to perform Machine Learning to train a model using various algorithms, to predict each of the four different categories of the MBTI based on these extracted values. The results of this predictive analysis have been ambiguous, as the accuracy seems to range around the 50% mark for each model. I plan to revise the feature extraction method to use other

tools, and to also implement deep learning to improve the accuracy of predictions.

Poster B72

Predicting Structures of Viral Proteins Using AI

Weiheng Jiang

Mentor(s): Urszula Golebiewska
Queensborough Community College

AlphaFold is an AI protein structure prediction software developed to predict the three-dimensional protein structure from the amino acid sequence with high speed and accuracy and at a low cost. Structural biology methods to determine the protein structure including NMR, X-Ray diffraction and Cryo-EM are time consuming and expensive. Thus, having structural predictions readily available can expedite treatment developments. We first used AlphaFold with a protein of known function – holin, there are homologs of holin with structures solved by NMR in the protein data bank. We used two different AlphaFold servers: Google and Benchling to test the consistency of AI prediction. We found that the predicted structures are about 79% similar. We also compared the AlphaFold predicted structures to the homolog solved by NMR. The comparison revealed similar alpha-helix folds. Next, we used AlphaFold to predict the 3D structure of several unknown proteins that are in the last portion of Aquarius phage genome. Aquarius infects Cutibacterium, that causes acne and is in the BU cluster of phages. The largest diversity among the BU cluster is in that region. Different members of the cluster have different numbers of short proteins in that region with 30-40% similarity. However, the structures predicted by AlphaFold are very close, indicating the same function. Another BU phage Wizzo has a protein in that region that looks like a fusion of two shorter proteins from Aquarius. AlphaFold predicts structure that is sum of the two shorter proteins from Aquarius. Taken together these findings show that AlphaFold provides interesting insights about protein content of viral genomes.

Poster B74

Proinflammatory Cytokines are Differently Regulated by STAT3 in Trained Innate Immunity

Masiel Nunez, Anhad Kataria, Jacqulyn Persaud, Humayra Nasita

Mentor(s): Sarbani Ghoshal, Andrew V. Nguyen
Queensborough Community College

Macrophages are important cells of innate immunity and were recently shown to be the main cell of the trained innate immunity, a concept in which a primary challenge can alter macrophage's secondary response to a similar or different stimulus. Macrophages have many pattern recognition receptors known as Toll-like Receptors (TLRs) on their surface, allowing them to recognize a number of pathogen-associated molecular patterns (PAMPs). Activation of the toll-like receptors on the surface of macrophages leads to the activation of the intracellular NF-kB, a well-known transcriptional factor known for proinflammatory cytokine production. Recent data has shown that the transcription factor, Signal Transducer and Activator of Transcription 3 (STAT3) is associated with the NF-kB signaling downstream of TLR4. However, the roles of STAT3 downstream of other TLRs are not well defined. The goal of our project is to study the functions of STAT3 downstream of TLR signaling, when treated specifically with LPS (lipopolysaccharides) and LTA (lipotechoic acid) as well as its role in trained innate immunity. To address the goal of the project, stat3-/- (knock out/KO) RAW 264.7 macrophages were generated, and trained first with Bacillus Calmette-Guerin (BCG) and after seven days with a secondary stimulus like LPS, LTA. Our data shows that role of STAT3 for the expression of proinflammatory cytokines, nitric oxide (NO) and super oxide dismutase 2 (SOD2) in macrophages with and without training with BCG. Additionally, RAW264.7 cells with functional STAT3 were found to translocate to mitochondria upon BCG training, an observation not found in the KO cells. Our data suggests an important role of STAT3 in trained immunity. We are further investigating

mitochondrial functions in trained innate immunity, as well as the role of M1 and M2 macrophages in STAT3 mediated production of pro-inflammatory cytokines.

Poster B75

NMDA Receptor Encephalitis in Humans and Other Mammals - Molecular and Structural Investigations

Hsu Wadi Nwel

Mentor(s): Urszula Golebiewska
Queensborough Community College

The N-methyl-D-aspartate (NMDA) receptor is a glutamate receptor essential for synaptic plasticity, learning, and memory. Its structural and functional conservation across species suggests an early evolutionary appearance and a fundamental biological role. We focused on the NR1 subunit and in particular its Amino-Terminal Domain (ATD) domain. This portion of the receptor is the target of anti-NMDA receptor encephalitis, an autoimmune disorder with both human and cross-species relevance. We used BLAST and NCBI data base to understand the evolutionary relationship of the NMDAR in primates, other animals, plants, and bacteria. The results revealed sequence conservation of the NR1 subunit across mammals and limited similarity in plant sequences. We also compared the sequence of NMDAR with primate and other mammalian species. Of most interest was comparative analysis between human and polar bear NR1 subunits, since there is one known example of NMDAR encephalitis in an animal from zoological garden. Structural comparison showed high similarity in the ATD domain between humans and polar bears, particularly in regions implicated in antibody binding. Next, we used PyMOL and AutoDoc to get insights into the structures of the NR1 domain, the antibody and how they might interact with each other. Particularly, how the antibody targets the NMDA receptor's binding site. Antibody docking models highlighted potential contact points critical in autoimmune interactions. Additionally, recent literature reveals that anti-NMDA receptor encephalitis can affect infants, raising concerns about early-onset neurodevelopmental impairment and the importance of timely diagnosis. Genetic studies suggest that certain HLA variants may increase susceptibility to autoimmune encephalitis, offering new insights into inherited risk factors. Structural modeling and genetic insight together suggest potential therapeutic targets, including potential for targeted plasmapheresis and dialysis.

Poster B76

Stage Managing *HIT THE WALL*

Ash Rutella

Mentor(s): Jess Kreisler, C. Julian Jiménez, Heather Huggins
Queensborough Community College

Every semester, the Theatre Program at Queensborough Community College creates and produces live performances. Each project is a collaboration between students, faculty, staff, and guest artists. In this multimedia poster presentation, Ash Rutella will share their experience serving as Stage Manager for the Spring 2025 production *HIT THE WALL* written by Ike Holter, directed by C. Julian Jiménez, and presented at QCC's Shadowbox Theater.

Ash's responsibilities began when students auditioned for the production in Dec 2024. As the semester began in late January, Ash facilitated regular rehearsals with the cast, director, assistant director, and stage management team. While in rehearsals, Ash documented the research process for the company, including noting character's actions and movement (blocking) for the cast and director and creating reports to communicate with production team members about any decisions or questions related to the collaboration. Ash also assisted students and faculty in developing and honoring a community agreement. Ash attended biweekly meetings of the production team, communicating with guest designers, technical directors, and student technicians about the project. To prepare for technical theatre rehearsals, when

design elements were integrated into the production, Ash met with the guest lighting designer and their faculty mentors. During technical rehearsals in late March, Ash guided the company through the script to bring the production to life, collaborating with designers, student technicians, and student cast. Then, for each dress rehearsal and public performance in April, Ash led the team, cuing their peers over a headset.

Ash will share how this project supported their development in leadership, collaboration, critical thinking, and communication. The presentation will incorporate a video excerpt of the production and Ash's prompt book with production paperwork, including contact sheets, sign-in sheets, rehearsal reports, a blocking script, and a calling script.

This applied project was mentored by Professor Jess Kreisler through advanced technical theatre coursework: Production Practicum II (TH-232) and an Independent Study in Theatre (TH-901). Ash also mentored peers enrolled in Actor's Workshop I & II (TH-122 & TH-222, mentored by Professor C. Julian Jiménez) and Production Practicum I (TH-132, mentored by Professor Jess Kreisler). These courses support QCC's A.S. in Theatre which is accredited by the National Association of Schools of Theatre.

Poster B77

Enhancing Pattern Accuracy Metric in Candlestick Pattern Mining for Stock Price Forecasting

Sabina Ruzieva

Mentor(s): Yusuf Danisman
Queensborough Community College

Stock market prediction, once considered impossible due to unpredictable price movements, has become more promising with the advancement in pattern mining and machine learning. Recent research on forecasting methods relies on matching candlestick patterns, visual representations of stock price changes indicating future trends, to patterns with the highest "pattern accuracy" scores. However, this metric has limitations as it can produce high scores even if patterns only appear once in historical data, reducing reliability. This study proposes a set of weighted accuracy metric methods considering the frequency and significance of patterns in historical data to improve forecasting accuracy. The refined pattern accuracy metrics are then applied to a diverse set of S&P 500 stocks to analyze the performance of the forecasting model. While the proposed methods improve predictive performance for many stocks compared to the original metric, further gains may be achievable through deeper theoretical refinement of the weighting approach.

Poster B78

Extending Candlestick Encoding for Improved Stock Price Prediction

Iman Zahid

Mentor(s): Dr. Yusuf Danisman

Queensborough Community College

Stock price predictability has traditionally been dismissed by the Efficient Market and Random Walk hypotheses, which claim that stock prices are inherently random. However, recent advancements in artificial intelligence and computational power are challenging this perspective, with emerging studies indicating that stock market behavior may indeed possess a level of predictability.

This project explores the predictive potential of candlestick patterns, which visually represent stock price movements through four key values: high, close, open, and low. Traditional candlestick encoding comprises twelve distinct codes, generated by comparing these values. We propose an extension of this encoding by categorizing the relative size of the difference between open and close values as small, medium, or large, based on historical data. This refined encoding aims to capture additional nuances in stock price movement patterns.

Preliminary results suggest that models trained on the enhanced encoding demonstrate improved performance in identifying short-term trends compared to models using standard encoding. These findings support the idea that incorporating pattern size information can increase the accuracy of stock

price predictions, offering a potential challenge to the assumptions of market randomness.

THE CITY COLLEGE OF NEW YORK

Poster B79

A Method to Reduce Area Requirements of an Artificial Neural Network Implementation in Hardware

Robert Cabrera, Abhisek Limbu

Mentors: M. Umit Uyar, Hakan Pekcan

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Using programmable integrated circuits known as Field Programmable Gate Arrays (FPGAs), a semiconductor-based system is designed to implement an Artificial Intelligence (AI) model called an Artificial Neural Network (ANN). After the structure of the ANN is designed, its parameters (i.e., weights and biases) are computed externally using sample inputs and outputs, a process known as training. One goal of an ANN is to classify an input as one of the output groups. Once trained, the ANN weights and biases are loaded onto the FPGA, which is then ready to receive a new input to be classified.

The FPGA implementation of the ANN includes multipliers, adders, and other hardware blocks needed to perform the computations of an ANN structure. A novel approach has been developed for implementing an ANN computational unit on an FPGA such that hardware resource usage is reduced. It is shown that, although it increases the computation time to generate a prediction, it significantly reduces the area requirements of an ANN implemented in an FPGA framework.

Poster B80

Recurrent Neural Networks For Computations

Arjun Sarker Dibya

Mentor(s): Manuel Beiran, Ashok Litwin-Kumar
The City College of New York

Recurrent Neural Networks (RNNs) serve as mathematical models to explain dynamic neural interactions, offering insights into neural population activity, stability, and cognitive functions. Building on foundational work in computational neuroscience, particularly Hopfield's associative memory model (1982), this project seeks to examine how various connectivity structures within RNNs enable specific neural computations. By analyzing different types of neural connectivity, we aim to understand how these patterns influence the stability and computational capabilities of neural networks.

We constructed RNNs with various connectivity structures to simulate dynamic neural interactions and assess their computational capacities. Via numerical simulations using Python as a programming language, we generated the neural activity that corresponded to the different connectivity structures. A primary task involved associative memory functions, enabling the network to retain and retrieve specific activity patterns. Additionally, we focused on decision making tasks that require implementing a winner-take-all mechanism through recurrent connectivity.

Our experiments demonstrated that specific connectivity patterns in RNNs, such as recurrent feedback loops, facilitate memory retention and competitive dynamics within neural populations. Through visualization and matrix representations, we observed that RNNs with structured connections could effectively model stable neural population activity and perform memory retrieval tasks. Notably, our findings show that RNNs with tailored connectivity structures exhibit specialized computational functions, supporting the hypothesis that connectivity types directly influence network functionality. These results contribute to

understanding the role of neural architecture in supporting various computational tasks.

This study underscores the significance of structured neural connectivity in enabling specialized computations within neural networks. By identifying the connection patterns that support specific functions, we gain insights into the architecture required for memory and stability in neural systems. In future work, particularly in the Fall 2024 semester, we plan to extend this research by assessing what types of structure in connectivity emerge in RNNs that solve cognitive tasks. This involves training RNNs on additional tasks and further analyzing how connectivity patterns adapt over time. Our goal is to deepen understanding of functional adaptations within RNNs as they learn, ultimately contributing to computational models that can better emulate complex neural processes.

This research was supported by Simons Foundation.

Poster B81

LiDAR-like Surround-View Imaging Radar

Shaedil Dider

Mentor(s): Arno Thielens, Kevin Gu
The City College of New York

This research addresses critical automation shortfalls in industries reliant on traditional optical sensors like LiDAR and cameras, which often fail in adverse conditions like fog, dust, and smoke. We explore a novel LiDAR-like surround-view Radio Frequency (RF) imaging system designed to overcome these limitations by leveraging the unique propagation characteristics of millimeter waves. The system utilizes a rotating four-chip commercial millimeter-wave radar featuring 86 multiple-input multiple-output (MIMO) antennas oriented vertically. Combined with novel signal processing techniques, this rotation creates a virtual cylindrical array with a 1.4-degree resolution in both azimuth and elevation, significantly improving on prior RF systems that often provided only 2D mapping or lower resolution.

Unlike 3D LiDAR, this RF approach enables robust imaging capabilities in optically challenging environments, including dense smoke, through glass structures, and in poor lighting conditions. The system demonstrates the capability to image complex structures and detect objects with high detail, addressing key sensing gaps where optical methods falter. Experiments conducted indoors and outdoors validated these capabilities, confirming the system's ability to produce detailed 3D point cloud visualizations of its surroundings. Key results highlight the capture of fine environmental features such as individual steps on a staircase, the detection of humans and structures obscured by smoke, and precise imaging through glass walls and doors, capabilities often challenging for purely optical systems.

Future work includes incorporating motion compensation to mitigate point cloud smearing inherent in mobile applications and improving the signal-to-noise ratio to detect ceilings and floors better. Subsequent steps involve testing the system on mobile robots incorporating real-time motion estimation (AoA, Doppler). This system demonstrates significant potential for advancing RF imaging in demanding environmental sensing applications across robotics, autonomous navigation, and safety systems, particularly in sectors like logistics, mining, and construction.

Poster B82

Exploring the Role of Highly Networked Residues in PTP1B Activity Using Site-Directed Mutagenesis

Shakhriyor Djuraev

Mentor(s): Dr. Daniel Keedy
The City College of New York

Protein Tyrosine Phosphatases (PTPs) are enzymes critical in cell signaling by dephosphorylating tyrosine residues on proteins and thus regulating processes such as cell growth and metabolism. Dysregulation of PTPs is linked to diseases such as diabetes, obesity, and certain cancers. Among the PTP family, Protein Tyrosine Phosphatase 1B (PTP1B) is of interest due to its negative regulation of insulin and leptin signaling, affecting glucose metabolism and energy balance. Previous studies indicate that increased PTP1B activity is linked

with metabolic disorders and cancer progression. This study aims to analyze highly connected and networked residues within PTP1B using site-directed mutagenesis (SDM). Selected residues were M109, L260, and T230 due to their higher-than-typical connectivity within the protein structure's internal network. These residues were mutated to alanine to assess changes in protein function and structure. After designing SDM primers, performing polymerase chain reaction (PCR), and conducting bacterial transformation, Sanger sequencing was used to confirm if the mutations took place. Sequencing analysis indicated that each of the three mutations were present within PTP1B. Following sequencing analysis, the purified plasmids of the mutations were selected to undergo protein expression. The protein expression products were then utilized for protein purification through ion exchange chromatography and size exclusion chromatography. After purification, enzyme kinetic assays were conducted and Michaelis-Menten plots were generated to assess how each mutation affects PTP1B function. Future steps include obtaining crystal structures through X-ray crystallography to assess the effects of the three mutations on the structure of PTP1B.

Poster B83

Improving Electrochemical Properties of Ether-Functionalized Glyme-Based Ionic Liquid Electrolytes for Lithium Metal Batteries

Martina Hove

Mentor(s): Dr. Elizabeth Biddinger
The City College Of New York

Lithium (Li)-metal batteries offer higher energy density than Li-ion batteries but face significant commercialization challenges due to issues such as flammability and dendrite formation. These challenges can be mitigated by using electrolytes that exhibit high ionic conductivity, low flammability, and the ability to form stable solid electrolyte interphases (SEI). Ionic liquids (ILs), which are salts that remain in a liquid state below 100 °C due to their irregularly shaped cations and bulky, asymmetric anions that hinder crystal lattice formation, present a promising alternative to conventional volatile organic electrolytes. ILs are advantageous for battery systems because of their high thermal stability, negligible vapor pressure, and broad electrochemical windows. Solvate ionic liquids (SILs), a subclass of ILs, are formed when lithium salts are solvated by a polyether molecule such as tetraglyme, resulting in stable complexes with the general formula $[Li(glyme)]^+[X]^-$. Both ILs and SILs exhibit favorable electrochemical properties such as high conductivity, non-flammability, and high thermal and oxidative stability, which can be enhanced through ternary IL–SIL mixtures. This study examines mixtures of ether-functionalized pyrrolidinium ILs ((EO)MmPyrr X^-) and SILs ,($[Li(G4)]^+[X]^-$) where X^- = FSI^-, $TFSI^-$, $BETI^-$, to investigate how IL cation–anion interactions affect $[Li(G4)]^+$ solvation environment and electrolyte properties.

Poster B84

Synthesis and Characterization of Lawsone-Derived Electrode Materials for Aqueous Zinc Organic Batteries

Noah Jaggernauth

Mentor(s): Dr. George John, Ph.D., Dr. Harrison Asare, Ph.D.
The City College of New York

The demand for sustainable energy storage solutions has driven the search for alternatives to lithium-ion batteries, which rely on environmentally hazardous materials like cobalt. Organic electrode materials from biomass sources offer a safer, cost-effective, and eco-friendly option. Here, we build on past work and synthesize 3 lawsone dimers with para-substituents, 1 meta-substituted nitro dimer, and two oligomers via condensation with substituted aromatic aldehydes. Two para-substituted dimers, nitrodilawsone (NDL) and methoxydilawsone (MODL) previously demonstrated intriguing electrochemical performance in zing batteries, motivating further exploration of functional group effects. We optimize synthesis, characterize structures using infrared and nuclear magnetic resonance spectroscopy, and

analyze the impact of electron donating and withdrawing functional groups on electrochemical properties. Our findings provide insights into the structure-property relationships of quinone-based electrodes, contributing to the design of sustainable, high performance organic battery materials.

Poster B85

Detecting Donor–Acceptor Emission Patterns in hBN Photoluminescence Spectra

Aidan Jimenez

Mentor(s): Dr. Gabriele Grosso
The City College of New York

Single-photon emitters (SPEs) in solid-state materials are foundational for emerging quantum technologies and enabling applications in communication, computation, and nanoscale metrology. Hexagonal boron nitride (hBN) has attracted attention as a two-dimensional material known to host bright, stable, and room-temperature SPEs. However, progress has been limited by challenges in identifying the microscopic nature of its emitters and interpreting its complex spectral emission. Recent research has identified several optical transitions in hBN that exhibit discrete energy jumps that have been attributed to donor–acceptor pair (DAP) recombination. Thus, the detection and understanding of DAP spectral signatures is an important step toward uncovering the mechanisms behind quantum emission in hBN. In this project, I focused on understanding and applying a recently developed algorithm for the identification of DAP emission patterns in experimental emission data from hBN. There is ongoing work to improve the algorithms robustness to varying material parameters and experimental noise so that this DAP analysis can be performed on other materials.

Poster B86

Dirty Talk: The Racialized Language of Dirt in Black Women's Digital Navigation

Lushmere Menard

Mentor(s): Varnica Arora
The City College of New York

Dominant societal narratives often construct femininity through a framework of purity, morality, and cleanliness, marginalizing those who fail to conform. Black women, in particular, are frequently positioned outside of traditional femininity, labeled as masculine, hypersexual, or "dirty" in both literal and figurative senses. This study explores discursive usage of the word "dirty" within a Black women-centered space on Twitter. Using a detailed content analysis of tweets from Eve Gene, a Black women-only community requiring moderator verification, and Insufferable Women Uncensored, a broader women-only community, this research examines how Black women navigate, resist, and redefine what it means to be “dirty”. Preliminary findings indicate that "dirty" appears in multiple contexts, including narratives of betrayal ("being done dirty"), hygiene, and sexuality. By analyzing the conversations, this study seeks to understand how Black women strategically respond to stereotypes of physical and moral dirtiness. The findings contribute to broader discussions on digital identity performance, intersectionality, and the role of language in shaping gendered perceptions of race and femininity.

Poster B87

The Effect of Overexpressing the Acetyl-CoA Transporter SLC33A1 on Myelinating Cells

Nyasia McDale-Kelly

Mentor(s): Patrizia Casaccia, MD, PhD; Sami Sauma, PhD
The City College of New York

Specialized glial cells of the central nervous system, called oligodendrocytes, are responsible for generating the myelin sheath that wraps axons and facilitates nerve conduction. Developmental myelination and adult myelin maintenance require the synthesis of high levels of lipid and specialized proteins. This is performed on the outer surface and inner lumen of the endoplasmic reticulum (ER) and relies on the central metabolite acetyl-CoA. Acetyl-CoA is transported into the ER lumen by the SLC33A1 protein, which is expressed at high levels in myelinating oligodendrocytes. We therefore hypothesized that increasing the level of SLC33A1 in oligodendrocytes during development will increase myelin protein and lipid production and enhance myelin structure and function. To test our hypothesis, we utilized a Tet-OFF model to overexpress a human *SLC33A1* transgene in oligodendrocytes. Tissues were harvested for MALDI imaging, electron microscopy, myelin purification, immunohistochemistry and immunoblotting, and assessed for lipid abundance, myelin structure and integrity, and myelin protein expression, respectively. MALDI imaging results suggest SLC33A1 overexpression exerts differential effects on metabolites of lower and higher molecular weight classes. Results of our purified myelin immunoblots did not provide evidence for enhanced myelin protein levels, suggesting the need for additional studies to understand how SLC33A1 overexpression affects oligodendrocyte development. Finally, we aim to assess myelin and axonal ultrastructure with electron microscopy image analysis. This work aims to elucidate an underexplored relationship between the central metabolite involved in lipid and protein biochemistry, acetyl-CoA, and myelination. Future work includes expanding sample sizes, performing lipidomics and proteomics.

Poster B88

EvapoFlex

Michael Monsalve Ramirez, Sheikh Alif, Georgina Tobon-Hernandez

Mentor(s): Ahu Aydogan, Xi Chen
The City College of New York

Water-responsive materials offer a promising approach to sustainable energy generation by converting humidity changes into mechanical motion. Our research focuses on understanding how these materials work and how they can be used in energy-harvesting actuators. We have developed an early-stage engine prototype that transforms water evaporation into mechanical energy by creating differences in humidity. These differences cause tension changes within the water-responsive materials, leading to the asymmetric displacement of attached masses and driving continuous rotation. My contributions to this project include assisting in building the prototype, selecting materials to improve efficiency, and using laser-cutting technology to refine its structural components. By harnessing natural humidity variations, this system provides a low-cost, scalable alternative for energy generation, expanding the possibilities for evaporation driven energy harvesting in sustainable technology.

Poster B89

Frontal Alpha Asymmetry in Women with High versus Low Body Dissatisfaction

Nahila Nzina, Ajla Kastrat, Perla Encarnacion, Dyamanta Duverge, Andrew Ciprian, Zobia Jamal, Manhur Hossain

Mentor(s): Robert Melara, Ph.D
The City College of New York

Body image dissatisfaction (BID) is defined as a persistent negative evaluation of an individual's body image (Roosen and Mills, 2013). The internalization of the thin ideal body image through social media exacerbated body image dissatisfaction in young women. This internalization lead to decline in mental health, leading to eating disorders, anxiety and depression (Mond et al 2013). While various studies explored the impact of social media on body image through a cognitive-behavioral lens, literature on the neural and emotional markers are becoming more prevalent. In our study, we are interested in exploring frontal alpha asymmetry (FAA) and attentional bias. Frontal alpha asymmetry (FAA) is the difference in alpha power for the left vs right side of the brain and has been used to measure emotional processing. Left frontal activity is associated with approach motivation while right frontal activity is associated with withdrawal motivation (Hewig et al 2004). Women with high BID are predicted to demonstrate withdrawal motivation when presented with a thin body while those with low BID would exhibit approach motivation. There is a lack of research examining FAA in females with BID, and we investigated the difference in FAA. Female participants from the City College of New York were required to complete a Demographics Form, Body Shape Questionnaire, Eating Attitudes Test-26 and a social media usage survey. Afterwards, they completed the Modified Eriksen Flanker Task measuring their attentional bias towards different body types (small, neutral and large). They were asked to determine whether the target stimulus was horizontal or vertical while ignoring the body distractors. Findings suggested that highly body dissatisfied females demonstrated avoidance motivation towards thin body types in the early and late stages of processing. In addition, they displayed a strong behavioral and neural reaction to small and large body types.

Poster B90

Characterizing Terrestrial Surface Hydrodynamics with Synthetic Aperture Radar: NISAR Mission Science Addressing Land Surface Inundation

Anais Ortega, Marilyn Lopez, Emely Nuñez Rodriguez

Mentor: Dr. Kyle McDonald
The City College of New York

The NASA-ISRO Synthetic Aperture Radar (NISAR) mission is designed to significantly advance the scientific understanding of global environmental dynamics, with a specific emphasis on the characterization of wetland ecosystems. This investigation establishes comprehensive calibration-validation (Cal/Val) frameworks for NISAR at two ecologically distinct wetland sites: the tropical inland Pacaya Samiria National Reserve (Peru) and the temperate coastal Wheeler Marsh (Connecticut, USA). A primary objective is the development of a high-fidelity processing chain for the generation of Land Surface Inundation Time Series Maps (LSITSM) derived from Synthetic Aperture Radar (SAR) imagery, targeting a minimum accuracy of 80% for the future validation of NISAR-derived data products. These workflows will be implemented to demonstrate NISAR capabilities after the satellite launches in summer 2025.

At the Pacaya Samiria test site, Sentinel-1 SAR backscatter data (Operational Radiometric Terrain Corrected; OPERA RTC) is being employed to simulate NISAR sensor characteristics. This is augmented by in situ measurements of water depth, soil moisture content, and temperature acquired from a recently implemented low-power wide-area network (LoRaWAN) sensor array, operational since August 2023. Complementary ground-based and airborne optical surveys, along with terrestrial laser scanning, provide ancillary geospatial context. For the Wheeler Marsh site, analogous modeling

and workflow development are being conducted utilizing Phased Array type L-band Synthetic Aperture Radar (PALSAR) data. This poster elucidates the experimental designs and preliminary implementation phases at both study locations, emphasizing the methodologies employed for NISAR data simulation and the algorithmic development for inundation mapping. The overarching scientific objective is the proactive creation of a transferable and robust workflow for the validation of inundation maps generated from NISAR's temporal radar observations across a spectrum of wetland environments.

Poster B91

Efficient Simulation of Quantum Circuits via Classical Circuits à la Gottesman-Knill: Beyond the Clifford Gates?

Jason Perez

Mentor(s): James Myer
The City College of New York

What truly distinguishes quantum computation from classical computation? The Gottesman-Knill theorem guarantees a quantum circuit constructed from only Clifford gates, e.g. the entangling circuit constructed from the Hadamard & CNOT gates in e.g. the Deutsch-Jozsa algorithm, is efficiently simulated via classical computer. Thus, the Gottesman-Knill Theorem leaves a small class of quantum algorithms plausibly genuinely faster than their classical counterparts. Could there be some quantum gates beyond the Clifford gates admitting a similar efficient simulation via classical computer? Where to look for such gates? Ori Parzanchevski and Peter Sarnak inspired study of a small set of groups of quantum gates similar to (and including) the group of Clifford gates, known as the Super-Golden Gates. One of these groups is the Icosahedral Group of rotational symmetries of an icosahedron, famously studied by Felix Klein. We investigate whether gates constructed from the Icosahedral Group admit efficient simulation via classical computer. Neither the singular value decomposition of the unitary matrix equivalent to the quantum gate, nor that of an L1 approximant distinguish gates known to admit efficient simulation via classical computer from those not known to admit efficient simulation via classical computer.

Poster B92

A Data-Driven Look at AI, Jobs, and Small Business Growth

Sanjida Sanju

Mentor: Ouafaa Hmaddi
The City College of New York

Imagine a small bakery in a quiet neighborhood using the same cutting-edge technology as a Fortune 500 tech firm – predicting customer preferences, automating orders, and managing staff schedules with the help of artificial intelligence. This might've sounded like fiction not long ago, but now it's becoming reality as AI tools grow cheaper, smarter, and easier to use. While AI promises growth and innovation, it also raises important questions: Who truly benefits from this digital revolution, and at what cost?

This research offers a data-driven look at how AI adoption is affecting small businesses in the U.S., with a focus on business performance and labor. Using 31 weeks of national and regional data from the U.S. Census Bureau, along with insights from recent academic studies, I analyzed patterns in AI usage, workforce trends, and performance outlooks. What I found is both promising and complex - AI adoption is growing, but its short-term impact on jobs and performance varies by region and industry.

For instance, regional data shows that the West is leading in AI use, while the South maintains the steadiest employment trends. Regression and correlation analysis reveal a strong link between current and future business performance, and a moderate connection between current and future AI use. However, there's no clear evidence that AI leads to immediate business success or sudden labor changes. By sector, the contrast becomes clearer: tech and retail are seeing early benefits, while healthcare and manufacturing lag behind.

Ultimately, AI's impact takes time, and it's not felt equally across industries. To make this shift

more inclusive, small businesses need more than access to tools. They need real support: funding, training, and policies that level the playing field. With sufficient support, AI has the potential to help Main Street thrive, not just Wall Street.

Poster B93

EvapoFlex

Georgina Tobon Hernandez, Michael Monsalve-Ramirez, Sheikh Alif

Mentor(s): Xi Chen
The City College of New York

Water-responsive materials offer a promising approach to sustainable energy generation by converting humidity changes into mechanical motion. Our research focuses on understanding how these materials work and how they can be used in energy-harvesting actuators. We have developed an early-stage engine prototype that transforms water evaporation into mechanical energy by creating differences in humidity. These differences cause tension changes within the water-responsive materials, leading to the asymmetric displacement of attached masses and driving continuous rotation. My contributions to this project include assisting in building the prototype, selecting materials to improve efficiency, and using laser-cutting technology to refine its structural components. By harnessing natural humidity variations, this system provides a low cost, scalable alternative for energy generation, expanding the possibilities for evaporation driven energy harvesting in sustainable technology.

Poster B94

Analysis of Help-Seeking Behaviors Among South Asian College Students

Madison Zaldivar

Mentor(s): Adriana Espinosa, PhD
The City College of New York

One in five South Asian individuals report experiencing anxiety and other mood disorders (South Asian Public Health Association, 2016). The Bridging Identity, Norms, Disparities, and Adjustment Among South Asians (BINDAAS) study, conducted by the Applied Research in the Health and Adaptation of Minority Populations (ARHAMP) lab directed by Adriana Espinosa, Associate Professor of Psychology, examines how sociocultural factors such as internalized sexism, parental expectations, and discrimination inform health and health-related behaviors among South Asian college students. The current literature broadly acknowledges the significance of culture and stigma for informing help-seeking behaviors in minoritized populations. Yet, the South Asian population remains significantly understudied. The BINDAAS project aims to fill in this gap by identifying the cultural factors associated with health in this population.

To date, a total of 175 students across campuses from the City University of New York (CUNY) (i.e., City College, Hunter College, and Baruch) have responded to an online survey assessing multiple related constructs and mental health outcomes. Upon the completion of data collection, this project will conduct a secondary data analysis to examine factors associated with help-seeking behaviors among BINDAAS participants. Specifically, this project examines the degree to which study participants are more likely to seek out help from formal (i.e., mental health professionals, doctors, religious) relative to informal (i.e., friends and family) settings. We propose that cultural orientation and perceived parental expectations (i.e. academic, social, and extra-curricular) will be important correlates of help-seeking outcomes. Balancing traditional and Western values may heavily impact South Asian college students,

resulting in confusion about when and how to seek help. We expect that South Asian college students with higher ethnic identity and perceived parental expectations will be more likely to seek informal help. The findings will offer valuable insight into the current literature on South Asian college students and the cultural factors influencing help-seeking behaviors among this group.

Poster B95

Neurodegenerative Reprogramming of Microglia in Alzheimer's Disease

Anna Vikatos

Mentor(s): Dr. Pinar Ayata
Macaulay Honors at the City College of New York

The brain's primary immune cells, microglia, are a leading causal cell type in Alzheimer's disease (AD). Yet, the mechanisms by which microglia can drive neurodegeneration remain unresolved. Here, we discover that a conserved stress signaling pathway, the integrated stress response (ISR), characterizes a microglia subset with neurodegenerative outcomes. Autonomous activation of ISR in microglia is sufficient to induce early features of the ultrastructurally distinct ‘‘dark microglia’’ linked to pathological synapse loss. In AD models, microglial ISR activation exacerbates neurodegenerative pathologies and synapse loss while its inhibition ameliorates them. Mechanistically, we present evidence that ISR activation promotes the secretion of toxic lipids by microglia, impairing neuron homeostasis and survival in vitro. Accordingly, pharmacological inhibition of ISR or lipid synthesis mitigates synapse loss in AD models. Our results demonstrate that microglial ISR activation represents a neurodegenerative phenotype, which may be sustained, at least in part, by the secretion of toxic lipids.