CUNY Research Scholars Program

CUNY Immersive Research Experience

CRSP/CIRE SYMPOSIUM 2025

July 8th and 9th
LaGuardia Community College

Presented by
The CUNY Office of Research

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The CUNY Office of Research thanks the City of New York for funding the CUNY Research Scholars Program (CRSP) and the State of New York for funding the CUNY Immersive Research Experience (CIRE).

Thank you to all of the mentors and college-based directors who have made CRSP and CIRE research possible.

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TABLE OF CONTENTS

CRSP/CIRE SYMPOSIUM 2025

Day 1

Tuesday, July 8, 2025

LaGuardia Community College

31-10 Thomson Avenue
Long Island City, NY 11101

TIME	EVENT	LOCATION
8:45 am – 9:30 am	**Registration and Light Breakfast**	**E-Atrium**
9:30 am – 10:00 am	**Opening Remarks** Dr. Ron Nerio, CRSP Director (CUNY Central) Dr. Nathan Hosannah and Dr. Roman Senkov, CRSP Directors (LaGuardia) **Welcome Addresses** Dr. Rosemarie Wesson, Associate Vice Chancellor for Research (CUNY Central) Dr. Billie Gastic-Rosado, Provost (LaGuardia)	**Little Theater**
10:00 am – 11:10 am	**Featured Student Presentations A** (Baruch, BMCC, BCC, Brooklyn, CCNY, CSI-CIRE)	**Little Theater**
11:25 am – 12:25 pm	**Poster Session A** (CSI-CRSP, Hostos, Hunter, John Jay, Lehman)	**E-Atrium**
12:30 pm – 1:45 pm	**Lunch**	**Poolside Cafe**
1:45 pm – 2:45 pm	**Poster Session B** (Baruch, BMCC, BCC, Brooklyn, CCNY, CSI-CIRE)	**E-Atrium**
2:55 pm – 3:55 pm	**Featured Student Presentations B** (CSI-CRSP, Hostos, Hunter, John Jay, Lehman)	**Little Theater**
3:55 pm – 4:05 pm	**Best Poster and Best Featured Speaker Awards**	**Little Theater**

This event is organized and sponsored by the CUNY Office of Research. CRSP is funded by the Mayor's Office of the City of New York. CIRE is funded by the State of New York.
If you have questions, please write to veer.shetty@cuny.edu.

CRSP / CIRE SYMPOSIUM 2025

Day 2

Wednesday, July 9, 2025

LaGuardia Community College

31-10 Thomson Avenue
Long Island City, NY 11101

TIME	EVENT	LOCATION
8:45 am – 9:30 am	**Registration and Light Breakfast**	**E-Atrium**
9:30 am – 10:00 am	**Opening Remarks** Dr. Ron Nerio, CRSP Director (CUNY Central) Dr. Nathan Hosannah and Dr. Roman Senkov, CRSP Directors (LaGuardia) **Welcome Address** Dr. Kenneth Adams, President (LaGuardia)	**Little Theater**
10:00 am – 11:00 am	**Featured Student Presentations A** (Guttman, KCC, LAGCC, MEC-CIRE, NYCCT-CIRE)	**Little Theater**
11:15 am – 12:15 pm	**Poster Session A** (NYCCT-CRSP, MEC-CRSP, Queens, QCC, York)	**E-Atrium**
12:20 pm – 1:35 pm	**Lunch**	**Poolside Cafe**
1:35 pm – 2:35 pm	**Poster Session B** (Guttman, KCC, LAGCC, MEC-CIRE, NYCCT-CIRE)	**E-Atrium**
2:50 pm – 3:50 pm	**Featured Student Presentations B** (NYCCT-CRSP, MEC-CRSP, Queens, QCC, York)	**Little Theater**
3:55 pm – 4:05 pm	**Best Poster and Best Featured Speaker Awards**	**Little Theater**

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CRSP DIRECTORS

CUNY Office of Research	Ron Nerio
Borough of Manhattan Community College	Odaelys Pollard and Venita Andrews
Bronx Community College	Katherine Acevedo-Coppa
College of Staten Island	Alfred Levine and Maria Ivanova
Guttman Community College	Chulsung Kim
Hostos Community College	Yoel Rodriguez
Kingsborough Community College	Farshad Tamari and Frances Samuel
LaGuardia Community College	Nathan Hosannah and Roman Senkov
Medgar Evers College	Mohsin Patwary
New York City College of Technology	Hamid Norouzi
Queensborough Community College	Regina Sullivan

CIRE DIRECTORS

CUNY Office of Research	Ron Nerio
Baruch College	Anthony Maniscalco
Brooklyn College	Theodore Muth
The City College of New York	Christine Banks Calderón
College of Staten Island	Laxmi Ramasubramanian
Hunter College	Nancy Greenbaum
John Jay College	Edgardo Sanabria-Valentín
Lehman College	Ryan Raaum
Medgar Evers College	Sandie Han
New York City College of Technology	Hamid Norouzi and Susan Davide
Queens College	Nathalia Holtzman
York College	Ruel Desamero

WELCOME ADDRESSES

Dr. Rosemarie Wesson
Associate Vice Chancellor for 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 Chancellor and the Interim Executive Vice Chancellor and University Provost, she leads strategic initiatives to foster and support research activities throughout CUNY.

Under Dr. Wesson's leadership in the Office of Research, Hunter College was designated as a Research 2 Institution by the American Council on Education and the Carnegie Foundation, while seven CUNY colleges were given new designations as Research colleges and universities. The Graduate Center and City College of New York also retained their Research 1 status. 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 a BS 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.

President Kenneth Adams, LaGuardia Community College

Dr. Kenneth Adams is the president of LaGuardia Community College. Since taking the helm in 2020, President Adams has led the college's efforts to improve student success, strengthen its commitment to diversity, equity, and inclusion, and increase government and philanthropic support. In 2021, he launched a campaign to raise funds to help LaGuardia students and Queens residents rise and recover from the COVID-19 pandemic. The "Tomorrow Campaign" reached its $15 million goal in March 2021.

Prior to joining CUNY, President Adams spent more than 20 years leading economic and workforce development organizations in New York State. He served as acting commissioner of the NYS Department of Taxation and Finance, president and CEO of Empire State Development, and commissioner of the NYS Department of Economic Development. He previously led the Business Council of New York State and the Brooklyn Chamber of Commerce. He was also the founding executive director of New York Cares.

Provost Billie Gastic Rosado, LaGuardia Community College

Billie Gastic Rosado is Provost and Senior VP of Academic Affairs at LaGuardia Community College in New York City. She came to that role from NYU's School of Professional Studies, where she was associate dean, after a series of other positions in education and the nonprofit sector. Dr. Gastic Rosado has led or contributed to several research projects, including serving as a principal investigator on a Safe Schools/Healthy Students Initiative, funded by the U.S. Departments of Health and Human Services, Justice, and Education. She has published numerous articles in peer-reviewed publications and given presentations at professional associations and has served as co-editor of The Education of the Hispanic Population: Selected Essays. In 2019 she was named one of 25 Aspiring Leaders by the Penn Center for Minority-Serving Institutions. Her volunteer leadership roles have included membership on the boards of Connecticut CASA (prior to 2022) and of the Domestic Violence Crisis Center. She earned a Ph.D. in the Sociology of Education and M.A. in Sociology from Stanford, an Ed.M. from Harvard, and a B.A. in Economics from Yale.

FEATURED STUDENT PRESENTATIONS

Tuesday, July 8th, 2025

Day 1: Featured Presentations A
10:00 am to 11:10 am, Little Theater

Baruch College: Kaylen Su

Mentor: Professor Baofu Qiao

"Exploring Plastic Degradation through Computational Chemistry"

Kaylen Su recently graduated from Baruch College with a B.A. in biological sciences. As a CIRE fellow with an interest in computational chemistry, she conducted research on enzyme-ligand systems to enhance enzymatic plastic biodegradation using molecular dynamics simulations to test enzyme stability under conditions that replicate plastic manufacturing environments. Kaylen plans to pursue a career in medicine and biomedical research, aiming to bridge science and technology to address global health and environmental challenges.

Bronx Community College: Jingnan Chen

Mentor: Professor Diane Banks

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

Jingnan (Jin) Chen grew up with dreams of becoming a medical professional, specifically a surgeon. However, during their first round of college at Michigan State University, they discovered that they could become something even greater, a medical laboratory scientist. Jin has dedicated the last ten years pursuing this field and dream. The CRSP program at Bronx Community College has been instrumental to Jin's career as it has provided a kaleidoscope of insight into the exciting possibilities of medical research.

Borough of Manhattan Community College: Akshara Desai

Mentor: Professor Christopher McCarthy

"AI and Efficiency (How to Build an AI and Make it More Efficient)"

Akshara Desai is majoring in math at Borough of Manhattan Community College and works full-time as a data analyst. She loves learning about differential equations, linear algebra, and the gradient descent theorem that are the building blocks of artificial intelligence. Akshara will be continuing her studies in the fall at Columbia University and hopes to continue building on her research.

Day 1: Featured Presentations A
10:00 am to 11:10 am, Little Theater

Brooklyn College: Mar Mayrata

Mentor: Professor Maria Contel

"Exploring the Stability and Anticancer Properties of Ru-IM, a Ruthenium-Based Chemotherapeutic for Triple-Negative Breast Cancer"

Mar Mayrata is majoring in biology with a concentration in neuroscience at Brooklyn College. She is passionate about the intersection of medicine and research and plans to pursue graduate studies in biomedical engineering. As a multilingual student originally from Spain, she is also deeply interested in global health, clinical innovation, and science communication across diverse communities.

The City College of New York: Dominick Gordon

Mentor: Professor Tushar Jois

"Tesseract: Smart Home Security and Privacy without Physical Hubs"

Dominick Gordon is a computer science student at The City College of New York with a strong focus on cybersecurity and data science research. His work spans secure multiparty computation for smart home IoT systems and environmental data analysis using low-cost air quality sensors. He has contributed to research initiatives at institutions like Harvey Mudd College and CCNY and currently leads a pilot project with Mount Sinai through the CarbonCLAIR venture.

College of Staten Island (CIRE): Colin Alarcon

Mentor: Professor Leora Yetnikoff

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

Colin Alarcon is a recent Macaulay Honors at College of Staten Island graduate with a B.S. in psychology studying the intersection of psychology, neuroscience, and psychopathology. His research investigates the effects of chronic social isolation on dopamine terminal structure in the corpus callosum, and its implications for axo-glial interactions in this region. Committed to bridging science and mental health support, Colin will continue his studies as a clinical psychologist who provides culturally competent and person-centered care.

Day 1: Featured Presentations B
2:55 pm to 3:55 pm, Little Theater

College of Staten Island (CRSP): Patrick Gerges

Mentor: Professor Alan Lyons

"Investigating the Role of Peroxides in Prolonged Antibacterial Activity of Singlet Oxygen"

Patrick Gerges is an undergraduate student at the College of Staten Island pursuing a career in dentistry. He is currently conducting research focusing on antibacterial mechanisms in light curing therapy, examining the role of hydrogen peroxide in prolonged bacterial killing for potential applications in wound care. Patrick is actively involved in the Pre-Dental Society at CSI and is particularly passionate about bridging science and patient care.

Hostos Community College: Marilin Rodríguez-Martínez

Mentor: Professor Anna Ivanova

"Identification of Herbaceous Aromatic Plants as Phytotherapy for ADHD"

Marilin Rodríguez-Martínez is pursuing an A.S. in liberal arts and sciences at Hostos Community College. Marilin's undergraduate research seeks to identify herbaceous aromatic plants as phytotherapy for ADHD. Her experiences as a case worker inspired her to pursue a career in public health. She was recently accepted into Columbia University's Mailman School of Public Health where she will continue her studies.

Hunter College: Moises Acero

Mentor: Professor Steven Greenbaum

"Hexagonal Boron Nitride Ionogels: A Potential Alternative to Lithium-ion Battery Electrolytes"

Moises Acero was born in Mexico and is a first-generation college graduate, having completed his bachelor's degree at Hunter College this past May. He will now be pursuing a PhD in physics at the CUNY Graduate Center. His goals are to become a theoretical physicist specializing in understanding the universe at its most fundamental levels and to communicate the essence of science to as many people as he can reach.

Day 1: Featured Presentations B
2:55 pm to 3:55 pm, Little Theater

John Jay College of Criminal Justice: Olsmaël Mérisier

Mentor: Professor Peter Diaczuk

"The Effects of Over-Lubrication of a Gun Barrel on Discharged Cases and Bullets"

Olsmaël Mérisier was born in Haiti and moved to America when she was nine years old. She chose to attend John Jay because of their focus on criminal justice and the research opportunities offered to students. During college, Olsmaël was the Cadet Wing Commander in her AFROTC detachment. She was recently commissioned as a Second Lieutenant in the Air Force and will train to be a special agent in the Office of Special Investigations, one of twelve officers to receive this offer this year.

Lehman College: Tri Dinh

Mentor: Professor Stephen Redenti

"Exploration of Cell Cycle Reactivation in Post-Mitotic Retinal Neurons"

Tri Dinh is a biomedical science student with experience in basic, translational and clinical research, signal processing, and health tech. During his freshman year at Lehman, Tri interned at the Hospital for Special Surgery, where he studied the role of M2 macrophage during macrophage polarization in immortalized bone marrow derived macrophage using qPCR analysis. His current research at Lehman explores the relationship between cell cycle activation and apoptosis and investigates the modulation of cell cycle gene in post-mitotic neurons.

FEATURED STUDENT SPEAKERS

Wednesday, July 9th, 2025

Day 2: Featured Presentations A
10:10 am to 11:10 am, Little Theater

Guttman Community College: Nicolli Mesquita

Mentor: Professor Jihyun Kim

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

Nicolli Mesquita is an undergraduate student at Guttman Community College pursuing a B.S. in biology with a focus on ecology. She is passionate about the intersection of environmental science and social justice. Nicolli hopes to have a career in research exploring sustainable agriculture, agroecology, and how to improve our food systems.

Kingsborough Community College: Faruq Anjorin

Mentor: Professor Steven Jaret

"Micro-Raman Imaging of High-Pressure Phases in Gujba Meteorite: Insight into Shock Metamorphism"

Faruq Anjorin is majoring in surgical technology at Kingsborough Community College, where he is an active member of the Honors Community and Phi Theta Kappa, and has made the Dean's List for academic excellence. Outside of school, he works at Lenox Hill Hospital, assisting in a range of surgical procedures. Faruq is also a participant in the NASA H2O program and is preparing to present his research at the upcoming Lunar and Planetary Science Conference. After graduating from KCC, Faruq plans to transfer to The City College of New York to continue his studies, with a goal of becoming a physician assistant.

Day 2: Featured Presentations A
10:10 am to 11:10 am, Little Theater

LaGuardia Community College: Joianne Bittle

Mentor: Professor Boris Zakharov

"Morphology, Microscopy and Mapping the Spider Genus Zelanda (Araneae: Gnaphosidae)"

Joianne Bittle graduated from LaGuardia Community College, where she studied environmental and animal sciences. She also holds a BFA in printmaking and fine arts with a minor in art history from Indiana University. Last summer, Joi was invited by Bronx Community College to study abroad in India, exploring sustainable farming practices with students from the Kalinga Institute of Industrial Technology at an ecovillage near Mumbai. Joi's research focuses on the connections between invertebrate animal species and how we see ourselves living alongside them.

Medgar Evers College (CIRE): Idrissa Bah

Mentor: Professor Rosa Zavala-Gutierrez

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

Idrissa Bah is a biology student at Medgar Evers College with a strong interest in addressing health inequities in underserved communities. His current research focuses on leveraging health-related and environmental datasets to uncover and communicate patterns of health inequity in New York City. In 2024, Idrissa's research was recognized with the Best Poster Award at the annual CUNY Undergraduate Research Celebration Day for his project, "Visualizing Health-Related and Environmental Data to Tell a Story."

New York City College of Technology (CIRE): Yadira Vazquez

Mentors: Professor Nadia Kennedy, Professor Ariane Masuda

"Enhancing High School Computational Thinking through Unplugged and Plugged Activities using Manipulatives"

Yadira Vazquez is a math education student dedicated to making math engaging and accessible for all learners. She focuses on integrating computational thinking and hands-on manipulatives into lesson planning to support conceptual understanding. As a New York City Men Teach and Teacher Opportunity Corps scholar, Yadira has gained experience in tutoring, peer mentoring, and teacher training programs. As a future educator, she is committed to empowering students to develop strong problem-solving and collaborative skills through dynamic learning experiences.

Day 2: Featured Presentations B
3:00 pm to 4:00 pm, Little Theater

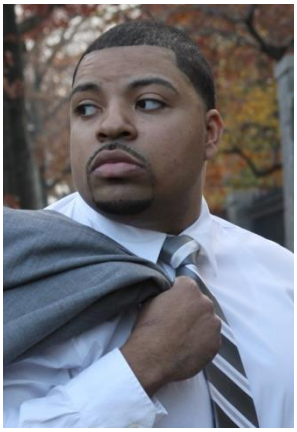
Medgar Evers College (CRSP): Lovely Joseph

Mentors: Professor Andrii Iurov, Professor Liubov Zhemchuzhna, Professor Godfrey Gubms, Professor Danhong Huang

"Finding Long-Range Low-Damped Plasmon Excitations in a Pseudospin-1 Lieb Lattice"

Lovely Joseph is a junior at Medgar Evers College majoring in biology. Although her research is focused on physics, her dream is to become a pediatric oncology nurse. Once she completes her bachelor's degree at Medgar Evers College she plans on further pursuing her education in nursing school.

New York City College of Technology (CRSP): Rashiek Barber



Mentors: Professor Daeho Kang, Professor Melanie Villatoro

"Understanding the Impacts of Climate Change on Buildings Energy Consumption"

Rashiek Barber is a first-generation college student, a father of two, and a full-time undergraduate researcher majoring in Facilities Management at NYCCT with a minor in Environmental Control Technology. With over two decades of engineering experience and a strong passion for sustainable innovation, Rashiek has dedicated his research to exploring energy efficiency and climate resilience in building design. Despite facing various hardships and personal challenges, he remains committed to academic excellence, mentorship, and advocacy for underrepresented students in SSTEM.

Queens College: Selassie Mawuko

Mentor: Professor Maral Tajerian

"Astrocytic and Microglial Morphological Responses in Hippocampus and Prefrontal Cortex Following Peripheral Inflammatory Injury"

Selassie Mawuko is a pre-med student with a focus on biology, neuroscience, and health equity. She conducts research in the Tajerian Lab, investigating pain, brain inflammation, and glial cell responses. A former NIH Bridges scholar, she brings experience in data analysis, literature review, and research writing. Multilingual and committed to culturally responsive care, Selassie aims to become a physician who bridges science and community service.

Day 2: Featured Presentations B
3:00 pm to 4:00 pm, Little Theater

Queensborough Community College: Ieesha Ansar

Mentors: Professor Sharon Lall Ramnarine, Professor James F. Wishart

"Probing the Nanostructure of Hydroxyl Functionalized Imidazolium Ionic Liquids"

Ieesha Ansar just graduated with an A.S. in chemistry from QCC and next will be pursuing a bachelor's degree in biochemistry from Stony Brook University. Since January 2024, Ieesha has been conducting research through CRSP at QCC and is continuing her research this summer with a Community College Internship at Brookhaven National Lab. She is the winner of the Jack Kent Cooke Transfer Scholarship and the Excellence in Chemical Sciences Award from New York's American Chemical Society.

York College: Ngawang Samdrup

Mentor: Professor Abu Kamruzzaman

"Prompt Engineering: Unlocking Better Responses from Large Language Models"

Ngawang Samdrup recently graduated as the Valedictorian of the Class of 2025 from York College with a degree in information systems management. His research interests include generative AI and ethics and privacy in cybersecurity. He enjoys working with technologies like Python, C++, GitHub, and Figma, and is passionate about using technology to solve real-world problems and drive positive changes. Ngawang will begin his career working in the tech industry and plans to pursue a PhD in the future.

POSTER SESSIONS

Day One Session A

Day One Session B

Day Two Session A

Day Two Session B

POSTER JUDGES

The CUNY Office of Research and the CRSP and CIRE programs thank the following faculty, staff, postdocs, and graduate students for serving as judges during the symposium:

Rezan Akpinar, Queensborough Community College
Khaled Al Hilli, New York University
Favour Awah, City College
Punita Bhansali, Queensborough Community College
Miao Lan Chen Weng, Queens College
Donette Cherry, Central Office
Susan Davide, City Tech
Sunil Dehipawala, Queensborough Community College
Krista Dobi, Baruch College
Ossama Elhadary, City Tech
Sherie Holder, Central Office
Shah Huq, Medgar Evers College
Abu Kamruzzaman, Queensborough Community College
YangHyun Kim, Central Office
Ellie Knutson, Central Office
Sharon Lall-Ramnarine, Queensborough Community College
Martin Lee, CUNY Central Office
Syeda Maryam Azeem, Hunter College
Rejitha Nair, LaGuardia Community College
Brian Nguyen, Central Office
Chinaecherem Okafor, School of Medicine
Chizurum Oluigbo, School of Medicine
Greg Phillips, College of Staten Island
Anupam Pradhan, Kingsborough Community College
Baofu Qiao, Baruch College
Marcia Ribeiro, Hostos Community College
Taylor Rubin, Queens College
Melida Sanchez, Queensborough Community College
David Sarno, Queensborough Community College
Regina Sullivan, Queensborough Community College
Mangala Tawde, Queensborough Community College
Ezekiel Willerson, Queens College
Nathalie Zarisfi, Central Office
Chester Zarnoch, Baruch College

INDEX OF STUDENT ABSTRACTS

Day One, July 8				
Name (First)	**Name (Last)**	**College**	**Poster #**	**Page #**
Moises	Acero	Hunter College	A32	15
Michael	Adamov	John Jay College	A44	21
Shomaiya	Alam	Hunter College	A35	16
Colin	Alarcon	College of Staten Island	A1	1
Gianna	Albano	College of Staten Island	A2	1
Shaima	Alhirdi	Borough of Manhattan Community College	B7	30
Christopher	Alley	John Jay College	A44	21
Ambar	Alvarenga	College of Staten Island	A12	6
Jay	Alvarez	Hostos Community College	A14	7
Gloria	Amankwah	Hostos Community College	A14	7
Lily	Ameling	Bronx Community College	B27	39
Hadia	Amin	Borough of Manhattan Community College	B7	30
Vanessa	Arcos Borja	Hunter College	A39	18
Alexis	Ayala	Bronx Community College	B20	36
Milton	Baquedano	Bronx Community College	B20	36
Klaudia	Baran	John Jay College of Criminal Justice	A40	19
Marlee	Barnes - Henry	Bronx Community College	B21	37
Lyrick	Batista	Lehman College	A50	24
Angelina	Bittan	College of Staten Island	A3	2
Jade	Blando	Hostos Community College	A20	9
Anna	Bochneva	College of Staten Island	A8	4
Evan	Brown	Hostos Community College	A15	7
Taylor	Bueno	College of Staten Island	A7	4
Sue-Moura	Burke	Bronx Community College	B27	39
Megan	Caldwell	College of Staten Island	A1	1
Victor	Carrion	Bronx Community College	B27	39
Genesis	Castro	College of Staten Island	A4	2
Jingnan	Chen	Bronx Community College	B22	37
Nasheed	Choudhury	Brooklyn College	B29	40
Mohamed Bachir	Cisse	Hostos Community College	A16	7
Franyeli	Contreras	Hostos Community College	A17	8
Joel	Corona	Hostos Community College	A18	8

Day One, July 8				
Name (First)	**Name (Last)**	**College**	**Poster #**	**Page #**
Chanell	Cuevas	Lehman College	A51	24
Frankie	Davila	Bronx Community College	B22	37
Madelyne	Dayan	Baruch College	B1	27
Akshara	Desai	Borough of Manhattan Community College	B8	30
Ayanna	Dickinson	Hunter College	A33	15
Tri	Dinh	Lehman College	A52	24
Fatou	Dione	Bronx Community College	B20	36
Emelie	Dominique	Hunter College	A35	16
Sarah Maria	Dos Santos	The City College of New York	B33	42
Lauren	Ferguson	College of Staten Island	A5	3
Wilmar	Ferreiras	Bronx Community College	B23	37
Miram	Fidelis	Hostos Community College	A27	12
Patrick	Gerges	College of Staten Island	A6	3
Egli	Gjuzi	Hostos Community College	A19	9
Nagib	Gonzalez	Bronx Community College	B24	38
Anthony	González	Hostos Community College	A19	9
Dominick	Gordon	The City College of New York	B34	42
Morgan	Guidry	Borough of Manhattan Community College	B7	30
Leidy	Gutierrez	Bronx Community College	B25	38
Ashli	Hamilton	John Jay College of Criminal Justice	A41	19
Aminul	Haque	Hunter College	A34	16
Adelia	Harrison	Brooklyn College	B30	40
Hamida	Hassan	Bronx Community College	B25	38
Lisa	Haye	John Jay College of Criminal Justice	A42	20
Sharna	Hines-Thomas	Bronx Community College	B25	38
Elsa	Holguin	Hostos Community College	A20	9
Susan	Hu	Hostos Community College	A21	10
Gerald	Hysenaj	Hostos Community College	A31	14
Anisa	Jagnarayan	Brooklyn College	B31	41
Maya	Jean	Hostos Community College	A14	7
Rahimul	Karim	Hostos Community College	A22	10
Ashley	Kaswer	John Jay College of Criminal Justice	A43	20
Alvi	Khan	Baruch College	B2	27
Wasit	Khan	Borough of Manhattan Community College	B9	31
Jennifer	Lai	Baruch College	B3	28

Day One, July 8				
Name (First)	Name (Last)	College	Poster #	Page #
Rasheed	Larry	Hostos Community College	A29	13
Michael	Lawrence	Bronx Community College	B24	38
Ryan-Alexa	Liquori	John Jay College	A47	22
Amy	Lui	Borough of Manhattan Community College	B10, B11	31, 32
Jonathan	Luna	Hostos Community College	A14	7
Clamont	Mack	Baruch College	B4	28
Daniel	Manderson	College of Staten Island	A7	4
Sarah	Marks	John Jay College of Criminal Justice	A44	21
Gabriel	Martinez	John Jay College of Criminal Justice	A44	21
Chris	McDermott	Hunter College	A35	16
Shane	McGlone	Hunter College	A36	17
Yovely	Mena Garcia	Hostos Community College	A23	11
Olsmaël	Mérisier	John Jay College of Criminal Justice	A45	21
Maisha	Mumtaz	Borough of Manhattan Community College	B16	34
Sofya	Murina	Hunter College	A39	18
Homayra	Nabilah	Hunter College	A37	17
Minji	Nam	Hostos Community College	A24	11
Nora	Nesimi	College of Staten Island	A8	4
Loveline	Nwankwo	Hostos Community College	A25	11
Katrina	O'Brian	Borough of Manhattan Community College	B11	32
Duncan	Occhiogrosso	Borough of Manhattan Community College	B7	30
Faija	Onjila	Borough of Manhattan Community College	B12	32
Xia Jie	Ou	College of Staten Island	A9	4
Nayelle	Pace	John Jay College of Criminal Justice	A46	22
Harry	Pacheco	Lehman College	A53	25
Yakira	Padilla	Hostos Community College	A29	13
Rosa	Paredes	Hostos Community College	A22	10
Most	Parvin	Hunter College	A38	18
William	Perea	Hunter College	A39	18
Luis-Angel	Perez-Gomez	Bronx Community College	B27	39
Corrine	Pieper	Bronx Community College	B26	39
Z-Quana	Powell Jones	Lehman College	A54	25
Mishal	Rahman	Hunter College	A35	16
Christian	Rasmussen	The City College of New York	B35	43
Chrislynn	Rodriguez	Hostos Community College	A22, A26	10, 12

Day One, July 8				
Name (First)	**Name (Last)**	**College**	**Poster #**	**Page #**
Marilin	Rodríguez-Martínez	Hostos Community College	A27	12
Selvia	Rofail	College of Staten Island	A10	5
Jose Gabriel	Rosario Vargas	Hostos Community College	A28	13
Stalin	Rozario	Borough of Manhattan Community College	B13	33
Janom	Saha	Hunter College	A39	18
Joseph	Sahap	Borough of Manhattan Community College	B15	34
Ariel	Salvador	Borough of Manhattan Community College	B14	33
Jasmin	Sanchez	Hostos Community College	A27	12
Jorge	Sanz	Hostos Community College	A14	7
Nadia	Shahzad	Hostos Community College	A29	13
Joseph	Sollitto	College of Staten Island	A11	5
Donique	Spencer	Bronx Community College	B27	39
Patricia	St. Fleur	John Jay College of Criminal Justice	A47	22
Tyler	Stewart	Lehman College	A55	26
Kaylen	Su	Baruch College	B5	29
Kenneth	Suen	Borough of Manhattan Community College	B10	31
Marcus	Swa	Borough of Manhattan Community College	B15	34
Abigail	Tenenbaum	Brooklyn College	B32	41
Imani	Thomas	John Jay College of Criminal Justice	A48	23
Juliana	Tjornhom	Borough of Manhattan Community College	B16	34
Sambou	Toure	Bronx Community College	B27, B28	39
Melina	Turco	College of Staten Island	A12	6
Jannis	Tyson	Hostos Community College	A30	14
Jerlyne	Umana	Borough of Manhattan Community College	B17	35
Matt	Uy	Hostos Community College	A31	14
Andrew	Vargas	John Jay College of Criminal Justice	A49	23
Ronniel	Vasquez	Borough of Manhattan Community College	B18	35
Georgios	Vernardos	Lehman College	A50	24
Daniel	Voyevoda	College of Staten Island	A13	6
San Yun	Wadi	Borough of Manhattan Community College	B14	33
Ashley	Wallace	College of Staten Island	A8	4
Rachel	Xie	Baruch College	B6	29
Owen	Zacarias	John Jay College	A44	21
Hong	Zhao	Borough of Manhattan Community College	B19	36
Xin Yan	Zhu	College of Staten Island	A1	1

INDEX OF STUDENT ABSTRACTS

Day Two, July 9				
Name (First)	**Name (Last)**	**College**	**Poster #**	**Page #**
Janelle	Addison	Medgar Evers College	B44	87
Aderemi	Adeyemi	Medgar Evers College	B46	88
Ezia	Aka-Nama	Medgar Evers College	B45	87
Nadim	Ali	Guttman Community College	B1	67
Uyi	Amadasu	Medgar Evers College	B46	88
Garnett	Anderson	Medgar Evers College	B47	88
Faruq	Anjorin	Kingsborough Community College	B8	70
Ieesha	Ansar	Queensborough Community College	A18, A20	52, 53
Lisa	Ansvananda	Guttman Community College	B2	67
Solomon	Asotie	Kingsborough Community College	B9	70
Wyche	Auguste	Kingsborough Community College	B10	71
Tareq	Awawdeh	Kingsborough Community College	B11	71
Idrissa	Bah	Medgar Evers College	B48	88
Rashiek	Barber	New York City College of Technology	A1	44
Joianne	Bittle	LaGuardia Community College	B25	79
Elizabeth	Brandwein	New York City College of Technology	A2	44
Fernanda	Brevil	Medgar Evers College	B49	89
Luis	Campos	Queensborough Community College	A36	60
David	Cen Cen	Queensborough Community College	A19	53
Jinzhi	Chen	Queensborough Community College	A20	53
Hui Meng	Chen Li	LaGuardia Community College	B26	79
Rinzin	Chhomu Lama	LaGuardia Community College	B27	80
Brian	Chin	Queensborough Community College	A21	54
KinFung	Chou	LaGuardia Community College	B28	80
Suchi	Chowdhury	New York City College of Technology	A3	45
Emiliano	Corte	Guttman Colllege	B6	69
Mireya	Cortes	Kingsborough Community College	B12	72
Christopher	Cruz	Guttman Community College	B3	68
Tiffany	Cruz	Queens College	A11	48
Rachel	Dawidowicz	New York City College of Technology	A4	45
Enmanuel	De La Nuez Carvajal	LaGuardia Community College	B29	80
Thierno	Diallo	Medgar Evers College	B50	89
Sreya	Dias	LaGuardia Community College	B29	80
Judithe	Dorelus	Medgar Evers College	B51	89

Day Two, July 9				
Name (First)	Name (Last)	College	Poster #	Page #
Ryan	Dorestal	LaGuardia Community College	B35	83
Thomas	Ely	New York City College of Technology	A9	47
Onyinyechi	Erondu	LaGuardia Community College	B30	81
Greg	Fayz	York College	A41	63
Justen	Gallagher	LaGuardia Community College	B29	80
Anthony	Garcia	Medgar Evers College	B52	90
Abdellah	Gessra	New York City College of Technology	A1	44
Mariana	Gvazava	LaGuardia Community College	B32	82
Nadisha	Hall	Medgar Evers College	B53	90
Kevin	Hernandez	New York City College of Technology	A5	46
Shayna	Herszage-Feldan	Queens College	A14	50
Brett	Hirsch	Queensborough Community College	A22	54
Sumaiya	Husain	Queesnborrough Community College	A20	53
Swan Yi	Htet	Queens College	A12	49
Ei Paing Paing	Htwe	LaGuardia Community College	B31	81
Md Rashedul	Islam	Queensborough Community College	A23	55
Reem	Issa	Medgar Evers College	B54	90
Somaia	Issa	Medgar Evers College	B55	91
Iyonce	Jackson	LaGuardia Community College	B32	82
Daniel	Jacobson	Medgar Evers College	B52	90
Tanzeela	Jahangir	Kingsborough Community College	B13	72
Ashley	Jaime	Queensborough Community College	A24	55
Ejatu	Jalloh	Guttman Community College	B4	68
Nalaika	Jean Francois	Medgar Evers College	B49	89
Jalisa	Johnson	Medgar Evers College	B46	88
Joshua	Johnson	Kingsborough Community College	B14	73
Rheann	Johnson	Medgar Evers College	B56	91
Alyssa	Johnson	New York City College of Technology	A6	46
Keisha	Joseph	Medgar Evers College	B57	92
Lovely	Joseph	Medgar Evers College	B58	92
Rajwant	Kaur	LaGuardia Community College	B33	82
Afzal	Khan-Narain	Queensborough Community College	A25	56
Win Yuya	Khin	Queensborough Community College	A26	56
Niroj	Koirala	York College	A42	64
Olivia	Kornhiser	LaGuardia Community College	B34	82

Day Two, July 9				
Name (First)	Name (Last)	College	Poster #	Page #
Junho	Kwon	Queensborough Community College	A36	60
Luis	Laca	LaGuardia Community College	B35	83
David	Lee	Queensborough Community College	A27	56
Thomas	Legbandt	New York City College of Technology	A9	48
Jiale	Lin	LaGuardia Community College	B27, B29	80
Daniel	Lin	Queensborough Community College	A28	57
Phoebe	Macdowell	Queens College	A14	50
Sujal	Mahaseth	LaGuardia Community College	B36	83
Hasib	Mahmood	New York City College of Technology	A7	47
Toulik	Maitra	Queensborough Community College	A36	60
Nathalia	Marmol	Guttman Community College	B5	68
Selassie	Mawuko	Queens College	A13	49
Kimberly	McLaurin	New York City College of Technology	A8	47
Thilleli	Mehrazi	LaGuardia Community College	B37	84
Melanie	Mejia	Queens College	A14	50
Natalia	Mejia	Queens College	A14	50
Julissa	Mendez	New York City College of Technology	A9	47
Nicolli	Mesquita	Guttman Community College	B6	69
Adam	Moulé	Queensborough Community College	A36	60
Sana	Naseri	Queensborough Community College	A29	57
Takoda	Nestor	New York City College of Technology	A1	44
Jalen	Nicolas	Queensborough Community College	A30	58
Joseph	Ogden	York College	A43	64
Doha	Omer	Kingsborough Community College	B16	74
Oluwafemi	Oroyemi	LaGuardia Community College	B38	84
Miguel	Pacheco	LaGuardia Community College	B39	84
Wilber	Paiz Valenzuela	Queensborough Community College	A31	58
Grace	Park	Queens College	A15	51
Gigi	Perez	Queensborough Community College	A32	59
Jacqulyn	Persaud	Queensborough Community College	A33	59
Lorenzo	Progonati	Kingsborough Community College	B17	74
Keoni	Quiroz	Guttman Community College	B7	69
Tahsinur	Rahman	New York City College of Technology	A9	47
Adriana	Rampershad	LaGuardia Community College	B40	85
Deianeira	Rodriguez	Queens College	A14	50

Day Two, July 9				
Name (First)	Name (Last)	College	Poster #	Page #
Shira	Russell-Giller	Queens College	A14	50
Sabina	Ruzieva	Queensborough Community College	A34	60
Nabina	Sambahamphe	LaGuardia Community College	B41	85
Ngawang	Samdrup	York College	A45	65
Maureen	Sam-Okomgboeso	Kingsborough Community College	B18	75
Christopher	Sanchez	New York City College of Technology	A1	44
Mykyta	Satanovskyy	Kingsborough Community College	B19	75
Miranda	Schrade	LaGuardia Community College	B29, B35	80, 83
Melvin	Schwartzbart	LaGuardia Community College	B29	80
Gabriela	Sedano	Queens College	A16	51
Sonia	Seehra	Queens College	A14	50
Shaniqua	Simmons	Kingsborough Community College	B20	76
Mekahla	Simpson	Queensborough Community College	A35	60
Elijah	Singh	Queens College	A14	50
Niharika	Singh	Kingsborough Community College	B21	76
Sahilpreet	Singh	LaGuardia Community College	B42	86
William	Smith	Kingsborough Community College	B22	77
Isaac	Steltzer	Queensborough Community College	A36	60
Declan	Sung	Queens College	A14	50
Md Rashidul	Sunny	York College	A44	65
Lorasia	Swift	Kingsborough Community College	B15	73
Sigournia	Tait	Kingsborough Community College	B14	73
Anastasiia	Tarasova	Kingsborough Community College	B23	77
Phone Min	Thant	Queensborough Community College	A37	61
Khine Zin	Thaw	LaGuardia Community College	B43	86
Alice	Townsend	Medgar Evers College	B52	90
Sukhrob	Ulugmuratov	Kingsborough Community College	B24	78
Yadira	Vazquez	New York City College of Technology	A10	48
Nayla	Walters	Queensborough Community College	A38	61
Yonghua	Wu	New York City College of Technology	A9	47
Megan	Wuerz	Queensborough Community College	A39	62
David	Young	Queens College	A17	51
Iman	Zahid	Queensborough Community College	A40	62
Tianyi	Zhao	New York City College of Technology	A9	47

DAY ONE, JULY 8
POSTER SESSION A

COLLEGE OF STATEN ISLAND

POSTER A1
The Effects of Social Isolation at Different Developmental Timepoints on Corpus Callosal Dopamine Terminal Innervation

Colin Alarcon, Megan Caldwell, Xin Yan Zhu

Mentor: Leora Yetnikoff
College of Staten Island

Oligodendrocyte lineage cells play a crucial role in the regulation of axon myelination. Recent evidence from our lab has demonstrated that oligodendrocyte progenitor cells (OPCs) interact with dopamine axons in the anterior corpus callosum, implicating dopamine's role in the regulation of myelin activity. The precise relationship between oligodendrocytes and dopamine neurons is still being explored. Social isolation, a behavioral manipulation shown to induce hypomyelination and alter dopamine function, could further our understanding of these interactions in the corpus callosum. However, we don't know how chronic social isolation affects dopamine terminal architecture in the corpus callosum. To explore this question, we examined the effects of social isolation at two separate ages; mice were either singly housed starting from P21 to adulthood or from early adulthood (P56) to later adulthood and compared to age-matched group housed (2-5/cage) mice. Dopamine axons were labeled using tyrosine hydroxylase (TH) immunofluorescence, imaged with a Leica DM6 THUNDER microscope, and quantified using the Imaris software. Our results indicate that social isolation starting at either age results in a greater density of dopamine axons in the anterior corpus callosum relative to age-matched group housed controls. These findings indicate that dopamine axon terminal density in the anterior corpus callosum changes in response to prolonged social isolation further implicating dopamine's role in experience-dependent myelination.

POSTER A2
The Effects of Chronic Social Isolation on Oligodendrocyte Progenitor Cells in the Anterior Corpus Callosum

Gianna Albano

Mentor: Leora Yetnikoff
College of Staten Island

The corpus callosum, the largest white matter tract of the brain, is composed of crossing cortical nerve fibers. This tract allows our brain's left and right hemispheres to communicate through signals that coordinate everyday activities, functioning as a bridge between both hemispheres. Axons within the corpus callosum are myelinated (giving the tract its "white" appearance) through oligodendrocytes, which produce a lipid-protein substance that wraps around the axons, enabling rapid transmission of action potentials. Oligodendrocytes are continuously produced throughout the lifespan by the proliferation of non-myelinating oligodendrocyte precursor cells (OPCs). It was recently discovered that myelination exhibits plasticity, changing in response to neural activity and behavioral stimuli such as social conditions. For instance, social isolation reduces the volume of the corpus callosum and causes hypomyelination in this region. However, the mechanisms underlying this effect are not clear. This study investigates whether prolonged social isolation during adulthood leads to hypomyelination by decreasing the number of OPCs. To investigate, male and female adult PDGFRa-GFP mice were either group-housed or socially isolated for two months. These mice

express a green fluorescent protein (GFP) in OPCs, enabling easy quantification. Cells are identified by immunofluorescence and quantified using IMARIS software. Preliminary analysis demonstrates no difference in OPC density between socially isolated and group-housed mice. However, analyses are ongoing, and this result may change as the sample size increases. By understanding the relationship between myelination and social isolation, the data can contribute to understanding how environmental factors impact brain health and function.

POSTER A3

Extrapolation of Digital Holograms for Enhanced Reconstruction Using Deep Learning

Angelina Bittan

Mentor: Shuqun Zhang
College of Staten Island

Digital holography is a technique that captures three-dimensional information as a two-dimensional interference pattern using a digital camera, and reconstructs it computationally. It has a wide range of applications, including security and authentication, 3D displays and augmented reality, biomedical imaging and microscopy, and deformation inspection and measurement. However, due to the limited size of image sensors, high-spatial-frequency components diffracted at large angles from the object cannot be recorded. This truncation of the optical field introduces artifacts and significant speckle noise, resulting in low-quality, low-resolution reconstructions. To address this limitation, a deep learning method is employed to extrapolate digital holograms and recover the wavefront beyond the actual detector size. A synthetic image dataset is generated for model training and testing, which can also serve future deep learning-based digital holography research.

POSTER A4

Pathological Tau–Induced Changes in Protein and Receptor Expression in the Mouse Brain

Genesis Castro

Mentor: Alegandra Alonso
College of Staten Island

Pathological human tau (PH-tau) commonly refers to a hyperphosphorylated version of the tau protein associated with neurodegenerative diseases. Tau stabilizes microtubules which support cell structure. A transgenic mouse model expressing PH-tau was used to investigate how abnormal tau impacts the subcellular localization of proteins such as Tom 20 (mitochondrial marker) and TDP-43 (transcription factor normally localized in the nucleus). The proteins were labeled with fluorescent tagged antibodies and visualized using confocal microscopy. In the PH-tau expressing mice, TDP-43 was mis-localized to the cytoplasm, and changes in TOM-20 expression were observed, indicating signs of neurodegeneration. To further assess how PH-tau affects neuronal signaling, we examined the expression of GABA-A and Muscarinic (M2) receptors. GABA-A receptors regulate inhibitory neurotransmission, while M2 Muscarinic receptors are part of the excitatory system involved in cognitive functions such as memory. Compared to control tissue, both receptor types were upregulated in the transgenic mouse brain. However, the increase in M2 receptor expression was more present than GABA-A. This imbalance suggests a shift toward excitatory signaling.

POSTER A5

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

Lauren Ferguson

Mentor: 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 A6

Investigating the Role of Peroxide in Prolonged Antibacterial Activity of Singlet Oxygen

Patrick Gerges

Mentors: Alan Lyons, Chathuna Bodahandi
College of Staten Island

Many bacterial killing treatments use light to activate molecules that produce a special form of oxygen, called singlet oxygen, which can kill bacteria. However, singlet oxygen has a short lifetime, and cannot travel far in liquids, which limits its ability to provide long-lasting effects or kill thick biofilms. This study investigates if peroxides, which are formed as a byproduct of singlet oxygen reactions with proteins, are responsible for prolonged antibacterial activity.

To test this, histidine, an amino acid, was reacted with singlet oxygen to produce organic peroxides. A light-absorbing dye, which is known as a photosensitizer, is used to cause the reaction to start under LED light. By measuring peroxide levels at different time intervals, the aim of this study is to determine how long these peroxides persist in water and how effective they are in killing bacteria over time. E. coli was the bacteria used to quantify the antibacterial properties of the formed peroxides and results were compared to standard hydrogen peroxide solutions.

If the photo-generated peroxides play a major role in extending bacterial killing, this could improve light-based antibacterial treatments. These findings may provide better methods for fighting bacterial infections, especially those caused by antibiotic-resistant bacterial strains. By further collecting data and understanding how peroxides affect antibacterial activity, this study could help develop more effective treatments for infections, medical sterilization methods, and dental applications.

POSTER A7

Are Prosodic Phrase Length and Speech Planning Related?

Daniel Manderson, Taylor Bueno

Mentor: Jason Bishop
College of Staten Island

Psycholinguistic models of speech production planning have long assumed that planning upcoming chunks of speech requires working memory capacity (WMC), a mechanism for short-term memory storage and attentional processing of verbal and non-verbal information. But what is the nature of the chunk that is planned? In the present study, we explore the hypothesis that prosodic phrases serve as planning chunks. Presenting both pilot and preliminary data, we test whether individual differences in WMC predict individual differences in prosodic phrase length in a group of neurotypical English speakers. Our basic prediction, based on previous work and theory, is that speakers with greater WMC will tend to produce longer prosodic phrases (counted in syllables) in read-aloud speech.

POSTER A8

Speaker Adjustments to English Voiceless Stop Consonants

Nora Nesimi, Ashley Wallace, Anna Bochneva

Mentor: Jashon Bishop
College of Staten Island

An important insight of modern approaches to phonetics is that speech production patterns are sensitive to perceptual considerations. We call this *the listener-directed speech hypothesis* (LDSH). According to this hypothesis, speakers make both conscious and unconscious adjustments to their speech to make it easier for listeners to hear and perceive words. In the present study, still in progress, we are investigating how speakers produce the consonant sounds /p/, /t/, and /k/ in different contexts. These sounds are referred to as "stop" consonants, due to their involving a brief but complete blocking of airflow in the vocal tract (mouth) and then a burst of high-pressure air upon release. According to the LDSH, if speakers do not release the stops (and therefore do not provide the salient information in the release that can distinguish these three sounds), they are predicted to compensate by producing other cues. To test this hypothesis, we are making acoustic measurements about (a) release burst duration; (b) stop closure duration; and (c) preceding vowel duration. Based on the LDSH, we predict unreleased stops will have longer preceding vowels and/or longer closure durations. We also explore differences between /p/, /t/, and /k/ in their rate of release.

POSTER A9

Video-Based Heart Rate/Stress Estimation: A Non-Contact or Invasive Approach to Real-Time Pulse Analysis

Xia Jie Ou

Mentor: Sos Agaian
College of Staten Island

Physical activities refer to any movement that activates muscles while consuming energy. Human physical and mental health requires steady exercise participation. Individuals exercise across different locations from their house to rehab centers and fitness facilities, but they require suitable methods to track their progress. The traditional body-worn sensor monitoring techniques restrict movement and develop skin irritations as they are connected through body sensors. These modern non-contact monitoring systems eliminate earlier technology problems to provide greater comfort and monitoring accessibility. This research examines video-based technology that tracks vital signs, such as heart rate, while people exercise in different lighting environments without using touch-based sensors. Video analysis allows for the detection of facial appearance, followed by processing changes in

facial color that correspond to blood flow patterns to determine heart rate measurements accurately. The objective is to build real-time monitoring systems that track stress indicators along with non-contact solutions for healthcare and fitness purposes to help tracking stress and heart rate become effective for all users. Future research will continue investigation of heart rate pattern analysis for stress level detection and optimizing this technology.

POSTER A10

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

Selvia Rofail

Mentor: Shiryn Sukhram
College of Staten Island

Hispanic adults in the United States face a disproportionate burden of type 2 diabetes, with more than half expected to be affected over their lifetime. In New York City (NYC), diabetes prevalence reflects not only biomedical risk factors but also broader social and economic inequities affecting Hispanic communities. This study analyzed data from the 2020 NYC Community Health Survey to assess the relationship between diabetes diagnosis and sociodemographic factors among Hispanic adults residing in socioeconomically deprived neighborhoods. Weighted logistic regression models were used to estimate the odds of diabetes diagnosis in relation to age, gender, obesity, high blood pressure, educational attainment, neighborhood poverty levels, and psychological distress.

Lower levels of educational attainment and residence in areas with elevated poverty were significantly associated with higher odds of diabetes diagnosis. Obesity and high blood pressure demonstrated strong associations with diabetes, while psychological distress was also independently associated with higher risk. Females exhibited slightly lower odds of diagnosis compared to male participants. The findings emphasize the critical influence of social determinants of health on diabetes risk in Hispanic populations, extending beyond individual lifestyle factors. Structural inequities in education, healthcare access, and mental health resources contribute to the burden of chronic disease management. Community-centered interventions that include accessible adult education programs, culturally tailored diabetes education, and integrated bilingual mental health services may help reduce these disparities and improve diabetes prevention and management among Hispanic adults in NYC.

POSTER A11

Factors in Major League Baseball Team Valuations

Joseph Sollitto

Mentor: 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 A12

Integrating Fibrotic Collagen and Immune Gene Signatures to Predict Patient Survival and Guide Therapeutic Strategies in Glioblastoma Multiforme (GBM), Breast Cancer (BC), and Lung Cancer (LC)

Melina Turco, Ambar Alvarenga

Mentor: Nancy Liu-Sullivan
College of Staten Island

Collagen-rich desmoplasia in the glioblastoma multiforme (GBM) microenvironment creates a dense physical barrier that impedes penetration of chemotherapeutic drugs and ionizing radiation. In our previous work, we systematically analyzed key desmoplastic collagen genes (COL3A1, COL4A1, COL5A1) and showed low-grade gliomas (LGG) and melanoma, high levels of the genes COL3A1, COL4A1, and COL5A1 are linked to poorer survival outcomes. This means that when these genes are active in LGG and melanoma, patients tend to have a lower chance of long-term survival and is an indicator of tumor progression. In glioblastoma (GBM), the activity of these genes doesn't seem to impact survival as much, likely because the tumor genetic complexity and its microenvironment characterized by the blood-brain barrier and intricate immune/stromal interactions diminish the effects of collagen. These findings imply that collagen expression could serve as a prognostic marker and therapeutic target in LGG and melanoma, while GBM may require more comprehensive treatment strategies that address multiple pathways. Building on those findings, our current study shifts focus to the immune compartment of desmoplastic stroma—recognizing that antigen presentation is decisive for anti-tumor immunity. We highlight HLA-DQA1, an MHC class II molecule that, in healthy tissue, presents extracellular peptides to T- lymphocytes. To assess its prognostic power more broadly, we compare HLA-DQA1 expression and survival side-by-side in GBM, breast cancer, and lung cancer, two malignancies prone to brain metastasis. Strikingly, high HLA-DQA1 levels are consistently linked with longer overall survival across all three cancers. These patterns suggest HLA-DQA1 as a strong immune prognostic marker connected to desmoplasia driven therapy resistance. In addition to positioning HLA-DQA1 as a promising prognostic biomarker, these results further underscore the critical role that immune mechanisms play in cancer progression and therapy response.

POSTER A13

Visual Cryptography in Modern Healthcare

Daniel Voyevoda

Mentor: Sos Agaian
College of Staten Island

As healthcare goes digital and data breaches become more common, protecting patient data has never been more critical. Medical images—X-rays, MRIs, and CT scans—carry sensitive information that needs secure transmission. This study examines how visual cryptography can secure medical image sharing, preserving both patient privacy and image integrity. Unlike traditional encryption, which relies on software and complex math, visual cryptography lets you decrypt images by overlaying shares and using your eyes—no specialized tools needed.

We begin with binary visual cryptography: each image is split into two random-looking shares that reveal the original when aligned. Next, grayscale bit-plane decomposition breaks images into eight layers, one for each bit of pixel intensity, boosting security and letting you control access by choosing which layers to share. Finally, we extend this to color images by separating channels (RGB or CMY) and decomposing each channel into bit planes, producing layered color shares.

A key advantage is distributing shares across multiple parties—doctors or medical centers—so that reconstructing the image requires collecting all shares. That way, no single entity

can access the data alone. And because decoding only needs human vision, it integrates smoothly into existing processes.

We implemented these methods in Python and tested them on real medical images. To evaluate how well the encryption hides details, we use histogram analysis: simple graphs showing pixel-intensity distributions for original and encrypted images in both grayscale and each color channel. Comparing these histograms lets us quantify how effectively the encryption disguises content.

By using clear examples and straightforward explanations, this research bridges cryptographic theory and practical healthcare applications. Visual cryptography offers a lightweight, eye-powered solution for securing medical images and enabling safe, privacy-preserving data sharing. Decoding requires no computational resources at the decryption stage. It also scales well for community-wide deployments and small clinics.

HOSTOS COMMUNITY COLLEGE

POSTER A14

Explaining Explicit Bias in the Black Box of AI

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

Mentor: Lauren Wolf
Hostos Community College

AI decision-making has a harmful impact on the lives of marginalized communities across the globe. In Examining the Implicit Bias in the Black Box of AI we were looking at not the issue of data being misinterpreted but the bias in data collection and flawed automation. For this portion of the research, we look into the different types of groups affected by the Bias, black and indigenous communities, immigrants and the undocumented, women, trans, non gender conforming, and sexual minorities, religious groups, and disabled individuals. We also look into how people have been negatively impacted in a variety of different ways, from unjust court sentencings, loss of healthcare, housing, and foodstamp benefits, targeting in the hiring process, and more. As well as looking into the potential ways of diminishing the biases such as, new training programs, counter bias algorithms, and working with affected communities to counter the negative impact.

POSTER A15

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

Evan Brown

Mentor: 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 A16

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

Mohamed Bachir Cisse

Mentor: 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.

POSTER A17

Exploring the Role of Modified PNA in Binding to DNA or RNA

Franyeli Contreras

Mentor**:** Anna K. Manukyan
Hostos Community College

This proposal details a comprehensive exploration of the chemical, biophysical, structural, and biological attributes of the Peptide Nucleic Acid (PNA) molecule, with a specific focus on studying the differences in the efficiency of cpPNA and thfPNA. Early studies showed that adding cyclopentane (cp) groups to the aegPNA backbone helps make the structure more rigid, causing it to take on a right-handed helical shape. This shape improves its ability to bind to complementary nucleic acids. However, the cp rings, being hydrophobic, do not improve solubility. This challenge led to the rationale for incorporating a more polar five-membered ring, such as the tetrahydrofuran (thf) group, which could counteract the limitations of cpPNA. This addition gave rise to a tetrahydrofuran-derived PNA, called thyclotides. Recent studies have demonstrated that thyclotides, containing tetrahydrofuran (thf) at every position in a PNA sequence, exhibit extraordinary cellular uptake and potent inhibitory effects on miRNA targets. Our goal is to lead to a more refined understanding of this innovative strategy’s potential to advance PNA-based therapeutics, addressing possible challenges related to cytotoxicity and achieving effective target sequence inhibition.

POSTER A18

Sediment Sources to the Agulhas Current Change with Climate During and After the Mid-Pleistocene Transition

Joel Corona

Mentor: Allison Franzese
Hostos Community College

The Mid-Pleistocene Transition (MPT), occurring between 0.7 and 1.2 million years ago, marked a shift in Earth's glacial cycles, extending their cycle duration from 41,000 to 100,000 years. The reason for this change is still an active area of research, with ocean circulation playing a critical role in its dynamics. The Agulhas Current, a western boundary current off the east coast of South Africa, is important in global ocean circulation through a process known as Agulhas Leakage, where warm, salty water from the Indian Ocean retroflects into the Atlantic. Understanding the past behavior of this leakage provides insight into climatic changes during the MPT.

To achieve this, sediment cores from Site U1474 have been analyzed for their geochemical composition. These sediments, from approximately 600,000 to 700,000 years ago, provide a record of material transported by the Agulhas Current. Geochemical tracers, specifically potassium (K) and argon (Ar) allow researchers to track the provenance of these sediments and study past variations in Agulhas Current. An important step in this analysis is the separation of sediments smaller than 2 microns. The sample preparation process involves the removal of carbonate material, specifically biogenic materials, using acetic acid. Followed by treatment with hydroxylamine hydrochloride (HH acid) to eliminate oxides that are present in the sample. This leaves behind the terrigenous fraction, from which the <2-micron fraction is further separated.

By examining these sediments, this study provides new insights into the sediment sources to the Agulhas Current just after the Mid-Pleistocene Transition.

POSTER A19

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

Anthony González, Egli Gjuzi

Mentor: Yoel Rodríguez
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 A20

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

Elsa Holguin, Jade Blando

Mentors: Anna Ivanova, 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 A21

A Collection of Ground Spiders at the American Museum of Natural History

Susan Hu

Mentor: Vladimir Ovtcharenko
Hostos Community College

The American Museum of Natural History houses the largest collection of spiders in the world. An important part of the research we do there is to identify and catalogue spiders collected in the field from different countries and borrowed from other museums. Our job is to organize each specimen's labels and to take corresponding photos for identification. In order to identify whether each specimen is known or a new species, we photograph the whole specimen, its eyes, spinnerets, and genitals. This categorization will expand our current understanding of ground spiders and will be made available for any scientist to use.

POSTER A22

Roles of NSAIDs In Preventing AMR Infection

Rahimul Karim, Chrislynn Rodriguez,
Rosa Paredes

Mentor: Debasish Roy
Hostos Community College

One of the biggest challenges of biomedical science is the ever-evolving microbial resistance against our existing antimicrobial drugs. Knowledge over these microorganisms is essential to create a preventative measure that combat the future Covid-19 (viral) or Black Plague (bacterial) like pandemic. This experiment, we conducted, using a non-steroidal drug, Sulindac, tested its antibacterial properties against common drug-resistant bacteria screened from different locations of five boroughs of New York City. In these experiments, we determined the Minimum Inhibitory Concentration (MIC) of a non-steroidal anti-inflammatory drug (NSAIDs), Sulindac, against standard bacteria, such as *E. coli*. Additionally, we tested the MIC of four different common antibiotics that attacked different parts of the bacterial cell after collecting bacterial samples from NYC's five boroughs. These bacteria were found around hospitals, sidewalks, and other places that were heavily congested with people. This way we developed the Antibiotic Resistant Bacterial strains (AMR) and then tested their potency against NSAIDs, Sulindac. Various AMR positive bacterial strains were isolated and their characterization is in progress. AMR strains were tested against NSAIDs, Sulindac at pH=5.0 and at pH=7.0. The structural alteration of Sulindac at different pH are in progress after its IR analysis. Development of altered structural form is in progress. We will also use of Sulindac against AMR strains collected from Different areas of NYC to study their genetic characterization (e.g., AMR genes) of the AMR bacteria to develop a roadmap for AMR strains surrounding NYC and successively apply other NSAIDs on those isolated AMR

strains to get an overall picture the AMR scenario surrounding NYC.

POSTER A23

Zooming Effects on JPEG Compression: A Mathematical Analysis

Yovely W. Mena Garcia

Mentor: Tanvir Prince
Hostos Community College

This project investigates how repeated zooming affects image quality after JPEG compression. Using an-iPhone 14 Pro, we captured a regular image, then applied 2x zoom and took another photo. This step was repeated 20 times. After that, each image was saved in JPEG format. The study focuses on two key processes: zooming and compression. Each zoom step causes interpolation, which gradually reduces image detail. JPEG compression then removes more fine details and introduces artifacts such as blurring and color distortion. Repeating these steps many times leads to a visible loss in image quality, including increased pixelation and banding. The goal of this research is to observe how image quality changes over multiple zoom and compression cycles. We aim to understand the mathematical and visual patterns behind this progressive degradation.

POSTER A24

Leveraging Peer-to-Peer Interview Methodology to Understand the STEM Student Experience at a CUNY Community College Through an Intersectional Lens

Minji Nam

Mentor: 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 in STEM fields for four HCC STEM students from populations underrepresented in these disciplines. The Intersectional lens considers an aggregate of social factors, such as race and 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. The impact of the peer-to-peer interview methodology was also considered.

POSTER A25

Impact of Long COVID on Human Health

Loveline Nwankwo

Mentor: Soheli Chowdhury
Hostos Community College

Long COVID is a frequently incapacitating illness that affects at least 10% of patients with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections. This illness has a wide range of symptoms and affects multiple organ systems, with over 200 symptoms identified so far. Globally, an estimated 65 million people have long COVID, and the number is rising daily. Some research has made significant progress in understanding the pathophysiological changes and risk factors associated with long COVID, and similarities with other viral-onset illnesses like myalgic encephalomyelitis/chronic fatigue syndrome and postural orthostatic tachycardia syndrome have provided valuable insights into the condition.

This review aims to provide an overview of the current literature on long COVID, highlighting key findings, overlapping symptoms, and examine the role of an overactive immune system and the presence of autoantibodies in development and persistence of long COVID. It will also explore the effect of long COVID on different tissues and cells, as this plays a critical

role in the widespread and lasting symptoms experienced by affected individuals. I will be using publicly available research papers, peer-reviewed journals, and periodicals both online and offline for this work.

POSTER A26

Identification and Characterization of High Resistant Bacterial Strains Around Five Boroughs of NYC

Chrislynn Rodriguez

Mentor: Debasish Roy
Hostos Community College

Severe microbial resistance over available drugs become a challenging task for Biomedical Scientist in present time. Also, characterization of drug resistant microbial pathogenesis is critical to prevent future pandemic. Therefore, in this research study, we have identified different Antimicrobial Resistant (AMR) bacterial strains collected mainly from south Bronx and other boroughs of NYC. Initially, Antibiotic Resistance Microbes (ARM) are collecting from those areas and screen against high concentration of various natural antibiotics. The primary goal of this research is to better understand antibiotics resistant bacteria those cause disease, particularly in dense urban areas like NYC. Then identifying the mechanisms that allow these bacteria to evade antibiotics resistance can lead to improved treatment strategies and preventative measures. Initial research has involved collecting bacterial samples from various locations across the five boroughs of NYC focusing on the south Bronx. These bacteria have been tested against conventional antibiotics to determine their resistance. Primary screening was done by colony picking and replica plating method. Then, MIC determination by broth dilution method. Next step involves studying these resistant bacterial strains to determine their genetic characteristics using DNA sequencing and bioinformatics (under progress). Computer based tools will allow us to compare genetic data across samples offering insights into how resistant microbes evolve and spread in the surroundings. We sincerely acknowledged the assistance from CRSP for this work.

POSTER A27

Identification of Herbaceous Aromatic Plants as Phytotherapy for ADHD

Marilin Rodriguez, Jasmin Sanchez,
Miram Fidelis

Mentor: 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.

POSTER A28

Smart Campus Navigation: NFC and AI-powered Chatbot Integration

Jose Gabriel Rosario Vargas

Mentor: Biao Jiang
Hostos Community College

First-year students frequently face difficulties navigating campus buildings and accessing essential services. GPS signals are unreliable indoors and individual classrooms and services are not included in this system, leading to confusion, and delays. Students highlight the importance of solutions to this problem.
This research will develop and evaluate an indoor navigation system that combines Near Field Communication (NFC) tags with an AI-powered chatbot. The primary objectives are: (1) to design an NFC architecture to accurately identify user location inside campus buildings, (2) to integrate an artificial intelligence model capable of interpreting student questions about directions and campus services, and (3) to measure the system's usability, accuracy and usefulness among first-semester students.
The study will employ a mixed-methods approach. First, NFC tags will be placed at strategic indoor waypoints across the campus and will be linked to location identifiers. A mobile application and a website will be developed using open source software and cloud services. For the AI component, a language model will be fine-tuned on campus information extracted from the college's website and services directories. Usability tests will be conducted using a quantitative approach, measuring navigation accuracy and completion time, and qualitative feedback will be gathered through satisfaction questionnaires.
It is anticipated that the system will reduce the average time to get to targeted locations, usability evaluations will show positive user satisfaction scores. It is expected that this research will serve as a reference for extending AI-driven solutions for campus services.

POSTER A29

Challenging Biological Essentialism through Community Science: A CBPR Approach

Nadia Shahzad, Rasheed Larry, Yakira Padilla

Mentor: Damaris-Lois Lang
Hostos Community College

Community-centered projects in science education play a crucial role in addressing the persistent impacts of racial disparities, particularly by challenging the misconceptions rooted in biological essentialism. Understanding that race is a social construct with no biological basis, distinct from ethnicity, which reflects ancestral and genetic connections, is vital for promoting equitable student learning. One effective approach to engage students in these critical conversations is through Community-Based Participatory Research (CBPR). CBPR offers a culturally responsive and sustainable educational framework that fosters ongoing professional growth while directly confronting harmful pseudoscientific beliefs.

In this study, students are first given a comprehensive background on common misconceptions in evolutionary biology and also those related to race. They then participate in ethnographically-informed CBPR events hosted by P-CoC Inc., conducted across three strategically selected community-based activities. During these events, students engage in internship-style activities and observe community interactions to better understand the lingering effects of racialized beliefs on contemporary social dynamics involving race, color, and ethnicity. This process not only equips students across disciplines with the tools to

develop their own community awareness initiatives, but also encourages them to become lifelong learners and advocates for equity-centered education.

POSTER A30

The Sound of the City: Quantifying Noise and Vibrations in Urban Transit Hubs

Jannis Tyson

Mentor: Biao Jiang
Hostos Community College

Urban noise pollution in New York City is an inevitable part of everyday life, shaped by the cacophony of sirens, traffic, loud music, and trains. Yet, the cumulative effects of these sounds on health and urban living remain underexplored. How loud is the city, and how harmful is it to residents? More specifically, how much noise pollution is generated by above-ground trains, and what role do structural vibrations play in amplifying this noise? This research focuses on the MTA's Westchester Square station in the Bronx, a critical hub connecting train and bus commuters. By quantifying the noise and vibration levels at this station, we aim to highlight the contribution of structural train design to urban noise pollution and propose potential mitigations.

POSTER A31

Role of Fractals in Systems Biology: Insights into Neurodegenerative Diseases

Matt Uy, Gerald Hysenaj

Mentor: Yoel Rodríguez
Hostos Community College

Fractal geometry is a branch of mathematics that studies complex geometric shapes characterized by self-similar patterns that repeat at different scales. Unlike traditional Euclidean geometry, which is often inadequate for describing irregular or fragmented structures, fractal geometry provides a robust framework for modeling the intricate forms observed in nature. In the human body, fractals exist within several anatomical structures including blood vessels' branching patterns, brain's cortex folds, lungs' alveolar architecture, and neurons' interconnected network. These fractal patterns are believed to provide efficient spatial organization and physiological functions optimization. On a functional level, fractal dynamics are also evident in various biological processes such as heart rate variability, brain activity, and rhythmic movements like breathing and walking. The analysis of these fractal patterns has become increasingly valuable in medical diagnostics. Current applications include assessing cardiac health, evaluating tumor progression, and designing biomimetic scaffolds that mimic natural complexity. While not yet considered standard clinical practice, fractal-based analysis is rapidly emerging as a promising tool in diagnostics and biomedical science. Of particular interest is the potential of fractal disruptions as early indicators of system-level failures in complex neurodegenerative disorders like Alzheimer's and Parkinson's diseases**.** It is hypothesized that disruptions in the fractal organization of physiological signals may precede measurable clinical symptoms and thus serve as early biomarkers of disease onset. This research aims to explore how the disruptions in fractal complexity reflect system-level dysfunctions in neurodegenerative diseases**.** We first conducted a literature review to examine the role of fractal complexity in systems biology using Google Scholar and PubMed database. Next, we plan to use computational modeling to compare disease states with and without fractal regulation in systems biology frameworks. Our study may help to better understand how fractal dynamics relate to neurodegeneration, with the goal of contributing to earlier and more accurate diagnostic strategies.

HUNTER COLLEGE

POSTER A32

Hexagonal Boron Nitride Ionogels: A Potential Alternative to Lithium-ion Battery Electrolytes

Moises Acero

Mentor: Steven Greenbaum
Hunter College

Lithium-ion batteries are the most widely used technology to meet society's needs for energy storage because of their high energy density and ability to undergo many charge-discharge cycles. However, their electrolytes, which are responsible for transferring lithium ions, are based on highly flammable organic carbonates. A potential alternative are materials known as ionogels. Ionogels are made of salts with melting points below 100°C (ionic liquids) encapsulated within a gelling matrix. Their greatest advantages are being non-flammable, non-volatile, withstanding high voltage, and being stable at high temperatures. Their drawback is having poor lithium-ion transport. Ionogels based on exfoliated hexagonal boron nitride (hBN) nanoplatelets, however, have displayed high ionic conductivity, high mechanical strength, and higher thermal stability. Despite these promising features, a detailed understanding of their ion transport properties at the molecular level remains incomplete. The goal of this project is to complete that understanding using high-field and fast-field nuclear magnetic resonance. We analyzed the molecular dynamics of the ionic liquid known as 1-ethyl-3-methylimidazolium lithium bis(trifluoromethylsulfonyl)imide (EMIM-LiTFSI). By encapsulating it within hBN nanoplatelets, the ionogel hBN-EMIM-LiTFSI is formed. We found that this introduced a new relaxation mechanism: rotations mediated by translational diffusion. For $TFSI^-$, chemical shift anisotropy becomes the dominant relaxation mechanism above 300 MHz. Additionally, we found that $TFSI^-$ forms asymmetrical ion pairs and aggregates with Li^+, restricting the mobility of both ions. $EMIM^+$ and Li^+ compete for interactions with the nanoplatelets, slowing down the transport of both cations. Specifically, the long-distance-jump values of Li^+ decrease significantly from 3.45 Å to 1.64 Å. This does not rule out hBN-based ionogels as future electrolytes, but the technology needs improvement. With the molecular dynamics now quantified by this study, that improvement can commence.

POSTER A33

Transparency in NYC Carbon Emissions: The Role of CUNY in Climate Action and Sustainability

Ayanna Dickinson

Mentor: Elias Brockman
Hunter College

This research examines the City University of New York (CUNY), specifically Hunter College, in relation to transparency in carbon emissions reporting and climate action within New York City. Through an analysis of the institution's sustainability reports, greenhouse gas emissions records, policy implementation, and interviews with key sustainability experts, we examine CUNY's dual position as a significant contributor to urban emissions and an educational leader with the potential to drive climate literacy and transparency. This study examines how the City University of New York (CUNY) promotes transparency regarding its CO_2 emissions and upholds ethical sustainability practices. Burning fossil fuels releases high levels of carbon dioxide (CO_2), significantly contributing to global warming and climate change. Large buildings and institutions in cities like New York emit a lot of carbon. Faced with the challenge, NYC introduced Local Law 97, which requires buildings to make considerable cuts in greenhouse gases, reaching a 40% reduction by 2030 and an 80% cut by 2050. One of the largest public city universities in the US, CUNY, plays a vital role in achieving these aims. This research involves conducting interviews with

experts to assess CUNY's efforts to achieve sustainability, its approach to public emissions reporting, and the importance of transparency in climate accountability and good governance.

POSTER A34

Synthesis of Vittatalactone Analogues to Support Agricultural Pest Control Efforts

Aminul Haque

Mentor: Akira Kawamura
Hunter College

The synthesis of vittatalactone analogues presents a promising strategy for environmentally sustainable pest control targeting the striped cucumber beetle, *Acalymma vittatum*, a major agricultural pest known for damaging cucurbit crops and transmitting bacterial wilt. Vittatalactone, the species' aggregation pheromone, offers high specificity and potential utility in pheromone-based trapping systems, but its complex stereochemistry makes chemical synthesis challenging. In this study, analogues containing vittatalactone's stereochemically defined β-lactone core and varying alkyl chain lengths were synthesized to evaluate how structural modifications affect biological activity. The synthesis proceeds through a titanium(IV) chloride-catalyzed linkage between a chiral auxiliary and a linear aldehyde, such as decanal, hexanal, or octanal, yielding the desired stereoisomer. The auxiliary is then removed under basic conditions to free the β-hydroxy acid intermediate. Subsequent intramolecular Mitsunobu cyclization affords the β-lactone core of vittatalactone. The first two intermediate products were confirmed to have been synthesized through spectroscopic characterization. The final synthesized analogues will be subjected to behavioral bioassays in cucumber beetles to determine their efficacy in eliciting aggregation. This work aims to refine pheromone design for species-specific pest management while minimizing environmental impact relative to conventional pesticide use.

POSTER A35

Isolation of Lytic Bacteriophages Targeting Enterococcus Faecalis for Effective Cocktail Development

Chris McDermott, Shomaiya Alam, Mishal Rahman, Anita Mandal, Emelie Dominique

Mentor: Rabindra Mandal
Hunter College

Phage therapy, the use of bacteriophages to treat bacterial infections, is a promising alternative antimicrobial approach that can help combat the growing prevalence of antibiotic-resistant bacteria. Unlike broad-spectrum antibiotics, lytic bacteriophages — viruses that infect and kill bacteria — offer targeted lysis of specific bacterial strains, reducing the risk of disrupting the host gut microbiota. In this study, we isolated seven bacteriophages from sewage wastewater from Newton Creek Wastewater Treatment Plant against *Enterococcus faecalis*, a bacterium though commensal in the human gut microbiome, can also act as a gram-positive antibiotic-resistant pathogen frequently involved in hospital-acquired infections. Of the seven phages tested against *E. faecalis*, the E1NC phage consistently produced the largest visible plaques—clear, circular zones of lysed bacteria on bacterial lawn using double agar overlay spot assay—indicating strong lytic activity. To further characterize E1NC and to test its effectiveness in culture medium, we conducted a kinetic assay over several hours using Biotek plate reader. Our results demonstrated sustained lytic phage-mediated reduction in bacterial density across all tested dilutions (multiplicity of infection), with the most pronounced effects observed at the lowest dilutions, relative to the uninfected control. To assess the potential of a phage cocktail, we performed another kinetic assay with two additional phages, E2S and NEC1.The phage cocktail was less effective at lysing bacteria than E1NC alone, indicating potential

antagonistic interactions between phages. In future experiments, we hope to test additional phages against *E. faecalis* to discern how phages interact in cocktails.

POSTER A36

Construction of a Mesothelin-Targeted Radioimmunoconjugate for the Diagnosis of Atypical Teratoid Rhabdoid Tumor

Shane McGlone

Mentor: Brian Zeglis
Hunter College

Atypical teratoid rhabdoid tumor (ATRT) is a rare and aggressive pediatric malignancy that generally presents within central nervous system tissues of patients under the age of three years. Treatment options for the disease are limited and strategies such as surgery and radiation cause significant harm to the developing brain. To address this, precise drug-delivering molecules are needed. In this study, we investigated mesothelin (MSLN) as a biomarker for ATRT via immunofluorescent staining and Western blot analysis. We then designed a lysine-conjugated monoclonal antibody capable of targeting mesothelin, [^{89}Zr]-Zr-DFO-Amatuximab. To validate the efficacy of the drug's ability to deliver radioactivity to the tumor site, we performed a PET study on three cohorts of mice, each xenografted with a different cell line for the disease. The biodistribution and PET image data reveal significant uptake in the tumor site, but not in surrounding tissues. We contend that this radioimmunoconjugate could have a significant impact on the clinical management of patients with ATRT, though further experimentation with β-emitting radionuclides will be necessary to elucidate the full therapeutic potential of the targeting molecule.

POSTER A37

Peptides as Natural Adhesives and Sustainable Glass

Homayra Nabilah

Mentors: Rein Ulijn, Elma Naranjo
Hunter College

Natural peptides are known to decompose rather than melt – the transition of a solid material to a transparent liquid – and those that do melt have extremely high melting points. Yet, the relatively low melting point of one hydrophilic dipeptide, its glass-like structure, and its ability to behave as an adhesive glue were important discoveries that have led our lab to investigate its various properties. The physiological temperature at which the dipeptide of interest melts (38°C) and its ability to transition to adhesive glass widens its range of possible applications, such as in biomedicine, engineering, and cosmetics, distinguishing it from other natural dipeptides. Therefore, for this lead dipeptide and the other dipeptides studied, the lab observed its disordered solid structure, its glass forming properties, its interaction with water, and its adhesive strength on various surface types, such as glass, metal, plastic, and wood. Results revealed a direct correlation between the glass transition temperature and the amino acids' side chain pi-pi interactions. Specifically, the peptide water-interaction network changed as variables such as surface material or amino acid side chain differed. For instance, wood retained moisture, which disrupted the peptide's ability to interact with water molecules. The lab intends to perform further spectroscopy analysis to study the molecular interactions of the dipeptides in order to gain a better understanding of the impact of inter- and intramolecular bonds on the peptides' melting property.

POSTER A38

Evaluating the Therapeutic Potential of Repurposed FDA-Approved Drugs for Alzheimer's Disease Using Human Derived Microglial Cells

Most Parvin

Mentor: Maria Figueiredo-Pereira
Hunter College

Alzheimer's Disease (AD) is an age-dependent neurodegenerative disease that gradually impairs memory and affects cognitive function. There are limited treatment options for AD, so the need for effective treatment is urgent. Developing new drugs is costly, time consuming and takes longer to get FDA approved. Our current research focuses on drug repurposing as a therapeutic strategy for AD. We aim to identify novel treatments by testing the efficacy of four FDA approved existing drugs—Amibegron, Opicapone, Dobutamine and Piribedil—using human microglial clone 3 (HMC3) cells. These drugs mainly target adrenergic and dopaminergic pathways, which play a role in neuronal activity and neuroprotection. Our focus is on evaluating the effects of these drugs on cell viability to explore their potential therapeutic applications. In vitro experiments were conducted to assess the toxicity of the drugs. HMC3 cells were passaged, seeded into 24 well plates, then incubated for three days to allow adherence and growth. The cells were then treated with various concentrations of each drug for 24 hours. Cell viability was then assessed using the 3-(4,5-dimethyl-2-thiazolyl)-2,5-diphenyl-2H-tetrazolium bromide (MTT) assay. Opicapone treatment demonstrated decreased cell viability. Dobutamine did not show any effect/change in viability even at high concentrations, Amibegron and Piribedil showed inconsistent results and require additional investigation. Since some adrenergic and dopaminergic receptors are also found on microglial cells, drugs targeting these pathways may influence immune responses in neurodegenerative diseases like AD. By targeting pathways implicated in neurodegeneration, particularly neuroinflammation, this work seeks to advance the development of effective treatments for Alzheimer's disease.

POSTER A39

Recognition of the U2-U6 snRNA Complex by Spliceosomal Protein Cwc2

Janom Saha, William Perea, Sofya Murina, Vanessa Arcos Borja

Mentor: Nancy L. Greenabaum
Hunter College

To fulfill its role in encoding proteins, a precursor mRNA molecule first undergoes a splicing process in which non-coding intervening segments are excised and flanking coding regions ligated together. This splicing process is catalyzed by the spliceosome, a ribonucleoprotein complex that comprises five small nuclear (sn)RNAs and >100 proteins. The spliceosome's catalytic center comprises a complex formed between U2 and U6 snRNAs; in other words, the spliceosome is a ribozyme. In solution (in the absence of proteins), the U2-U6 snRNA complex exists in a mix of conformers characterized by four- or three-helix structures surrounding a central junction. In the context of the spliceosome, however, only the three-helix conformer is observed. This infers an important role for spliceosomal proteins in facilitating/stabilizing the catalytic conformation. The only protein that interacts directly with the RNA complex is Cwc2, which acts as a liaison to a larger protein complex. We hypothesize that Cwc2 shifts the conformer equilibrium by binding to a site in the more open central junction of the three-helix conformer. Thus, we would expect that Cwc2 would bind with greater affinity to the three-helix conformer in solution. To test this hypothesis, we transcribed a mutant sequence of the RNA complex designed to form the three-helix conformer only, as well as a sample representing the native sequence that forms both conformers. Recombinant Cwc2 was expressed and purified by HPLC. The binding

affinity of Cwc2 to both the mutant and native sequences is being tested using an electrophoretic mobility shift assay. If Cwc2 binds with greater affinity to the three-helix conformer, it will support our hypothesis of a previously unknown additional binding site within the junction of the three-helix. Such a finding will provide important information about the protein-assisted stabilization of the RNA-based catalytic core of the spliceosome.

JOHN JAY COLLEGE

POSTER A40

The Relationship Between Metabolic Genes and Chronic Pain

Klaudia Baran

Mentor: Angelique Corthals
John Jay College of Criminal Justice

We suggest that there is a complex interplay between PPARγ, APOE, and GCH1 in the development and maintenance of inflammatory chronic pain. This interplay involves crosstalk that creates a chronic feedback loop including macrophages, astrocytes, microglia, neurons, and mitochondria that contribute to the induction and maintenance of inflammatory chronic pain. This interplay will be tested by analyzing the gene expression of apolipoprotein E (APOE), GTP cyclohydrolase 1 (GCH1), peroxisome proliferator-activated receptor γ (PPARγ), nitric oxide synthase 1 (NOS1, also known as neuronal NOS (nNOS)), nitric oxide synthase 2 (NOS2, also known as inducible NOS (iNOS)), cyclooxygenase 2 (COX2), and sepiapterin reductase (SPR) in formalin-fixed paraffin-embedded brain tissue. The control group is healthy brain tissue and the experimental group is multiple sclerosis brain tissue.

POSTER A41

The Impact of Parental Education about Plea Bargains on Parent Recommendations Regarding a Child's Plea

Ashli Hamilton

Mentor: Emily Haney-Caron
John Jay College of Criminal Justice

Prior research illustrates that parents have limited legal knowledge, which may impact justice involved children as they seek parental input prior to courtroom decision making. No research so far has examined whether providing parental education prior to a child's plea bargain changes parent recommendations about the plea. This study examined whether educational materials have an impact on parental advice given to justice-involved youth during the plea-bargaining process. We recruited adult participants ($N = 202$) who are parents of adolescents aged 13-17, are from the United States, and are English speaking. They read a vignette in which their child is offered a plea deal and then answered questions about the recommendations they would give their child. We used a 2x2 design and participants were randomized to a scenario in which their child admitted guilt or one in which their child claimed innocence, and randomized to view or not view educational materials about plea bargains. The educational materials were displayed as an infographic with information about the plea-bargaining process, potential outcomes, and details about parental role. Parents then completed a survey through Qualtrics that asked about parental perceptions of the plea bargain and of the educational materials provided in the study, as well as recommendations given to their youth. Questions also explored parental level of knowledge of the plea-bargaining process. Findings revealed that although the educational materials did have an impact on parental understanding, it did not impact the recommendation given to their child. Additionally, only child guilt significantly predicted parental recommendation. These

findings have implications for attorneys and juvenile justice systems in providing educational legal resources during the youth plea bargaining process.

POSTER A42

Killing the Black Body: The Eugenics-Necropolitics Framework Of Reproductive Oppression Against Black Women

Lisa Haye

Mentor: Lygia Sabbag Fares
John Jay College of Criminal Justice

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 A43

Cytotoxic Response of Breast Cancer Cells to Novel Indium(III)-Terpyridine Complexes

Ashley Kaswer

Mentor: Shu-Yuan Cheng
John Jay College of Criminal Justice

Terpyridine-based (tpy) compounds, including 2,2′;6′,2″-terpyridine and its 4′-substituted derivatives with base metals, are promising candidates for cancer treatment due to their strong DNA intercalation capabilities. While gallium-based compounds have demonstrated tumor-inhibiting potential, indium remains underexplored despite its clinical use in imaging and emerging cytotoxicity data. Recent studies suggest indium complexes may be effective against MCF-7 breast cancer cells. This study evaluates the anticancer potential of indium-terpyridine compounds in an in vitro breast cancer model. Three indium-tpy compounds (Indium 1–3) were synthesized by combining equimolar amounts of 2,2′;6′,2″-terpyridine (and derivatives) with $InCl_3$, and their crystals characterized via X-ray crystallography. Cytotoxicity was assessed using the CCK-8 assay after 72-hour incubations with MCF-10A (non-tumorigenic), MCF-7 (hormone receptor-positive), and MDA-MB-468 (triple-negative) cell lines. IC_{50} values were calculated using AAT Bioquest analysis. All three compounds inhibited cancer cell proliferation, with Indium 1 and Indium 3 demonstrating the most promising profiles. Compared to cisplatin, both showed low IC_{50} values against MCF-7 and MDA-MB-468 cells while maintaining relatively low toxicity toward MCF-10A cells. Indium 1 notably inhibited MDA-MB-468 cells (IC_{50} = 0.336 ± 0.056 μM) and showed minimal toxicity to non-cancerous and MCF-7 cells. Indium 3 displayed strong cytotoxicity toward both cancer cell lines (IC_{50} = 0.331 ± 0.089 μM for MCF-7; 0.363 ± 0.098 μM for MDA-MB-468), with relatively low toxicity toward MCF-10A cells. Indium 2, though potent, was also highly toxic to non-cancerous cells, limiting its therapeutic potential. The

results highlight Indium 1 and Indium 3 as compounds of interest for breast cancer research, supporting the need for further mechanistic studies. Ongoing investigations using bioinformatics aim to elucidate their pharmacological profile and mechanisms of action.

POSTER A44

Synthesis of Oligonucleotides Containing DNA Adducts from a Novel Mitomycin C Derivative

Sarah Marks, Gabriel Martinez, Michael Adamov, Christopher Alley, Owen Zacarias

Mentor: Elise Champeil
John Jay College of Criminal Justice

Mitomycin C is a common anti-tumor drug currently used to treat stomach and pancreatic cancers. This drug works by forming interstrand crosslinks (ICLs) between guanosine within opposing DNA strands (dG-ICL-dG), therefore, preventing DNA replication and transcription. DELS-15 is a derivative of mitomycin C. Although the structure of MC and DELS-15 are similar, DELS-15 was found to be more cytotoxic toward tumor cells with a mutated TP53 gene. Since at least 50% of cancer cells lack a functioning TP53, understanding the molecular mechanism for the enhanced cytotoxicity of the novel MC derivative is crucial to develop more efficient therapeutics against tumor cells with a mutated TP53. Our hypothesis is that the different structures of MC and DELS-15 ICLs are responsible for the distinct cytotoxicity of the 2 drugs. In support of our hypothesis, we performed molecular modeling which showed that DNA distortion induced by DELS 15-ICL is much greater than in the case of MC-ICL. Our goal is to synthesize oligonucleotides bearing a single DELS-15 ICL at a specific site and, using these substrates, to decipher the molecular mechanisms responsible for the increased cytotoxicity of DELS-15 ICLs versus MC-ICLs. We developed a new biomimetic protocol to generate DELS-15 monoadducted oligonucleotides; the first step toward the synthesis of DELS-15 ICLs. The monoalkylated oligonucleotides were isolated by HPLC and the site of alkylation as well as the structure of the adducted oligonucleotides was confirmed using enzymatic digestion, UV, and LC-MS. We then generated DELS-15 ICL by annealing a monoadducted 25-mer with a complementary strand and further reducing the monoadduct. In conclusion, we successfully developed a new protocol to access oligonucleotides containing DNA monoadducts and ICLs formed in cells by a novel Mitomycin C Derivative. These oligonucleotides will be used to delineate molecular pathways triggered by DNA ICLs inducing large DNA distortion and responsible for the enhanced cytotoxicity of DELS-15 toward cancer cells lacking a functioning TP53 gene.

POSTER A45

The Effects of Over-Lubrication of a Gun Barrel on Discharged Cases and Bullets

Olsmaël Mérisier

Mentor: Peter Diaczuk
John Jay College of Criminal Justice

Forensic firearm examination can be used in forensic investigations to determine if a recovered bullet or cartridge casing was fired from a suspected firearm. This field of forensics is based on the principle that most firearms leave microscopic marks on the bullets and cartridge cases fired from them due to the interactions between the two and the barrel. While the use of ballistics evidence has been widely accepted in criminal courts, there are still limitations to the process, starting with how the condition of the firearm before or after the crime could change the marks left on the bullets or cartridge casings. For example, some firearm modification can alter their marking patterns, preventing the association between a firearm and a crime. This project explores how the modification of firearm barrel lubrication affects the striations left on a recovered bullet or cartridge casing. This is done by analyzing recovered bullets and cartridge casings fired in

dry and over-lubricated barrel conditions under the comparison microscope. The overall goal is to examine if and how the barrel conditions impact the marks left on a bullet or cartridge casing. It was concluded that over-lubricating the barrel leads to inconsistencies in the striation pattern of the bullets and cartridge casings, potentially leading to inconsistent conclusions. The results from this project could address one of the limitations in firearm examination and help make conclusions made by firearm examiners even more concrete for criminal investigations.

POSTER A46

The Impact of Mindfulness on Dysregulated Behaviors

Nayelle Pace

Mentor: Peggilee Wupperman
John Jay College of Criminal Justice

Research suggests that mindfulness (the ability to practice awareness and attentiveness in the current moment) may be a protective factor against dysregulated behaviors (impulsive or addictive behaviors). However, most previous studies of mindfulness and dysregulated behaviors have focused on one or two dysregulated behaviors (e.g., binge eating or gambling). The current pilot study used correlation analyses to examine the relationship of mindfulness to a comprehensive range of dysregulated behaviors in a diverse sample of young adults ($N = 270$). As predicted, higher levels of mindfulness (measured by the Five Factor Mindfulness Questionnaire) were associated with lower incidents of dysregulated behaviors (measured with a checklist of 22 common dysregulated behaviors) in the previous 2 month ($r = -.25$; $p = <.002$). This relationship continued across gender (women, $n = 218$, $r = -.216$ $p = <.001$; men, $n = 53$, $r = -.244$, $p = .039$). Despite the small sample size for some groups, preliminary investigations were conducted on the relationship of mindfulness to dysregulated behavior across race/ethnicity. Findings included a significant relationship in Hispanic participants ($n = 163$, $r = -.293$, $p < .001$) and Asian participants ($n = 38$, $r = -.281$, $p = .044$), with a trend toward significance in Black participants ($n = 52$, $r = -.202$, $p = .075$). No significant relationship was found in White participants ($n = 44$, $r = -.140$, $p = .182$). Future research with larger sample sizes is needed.

POSTER A47

Mancozeb-Induced Cell Cycle Arrest and Senescence in Neuronal PC12 Cells: Implications for Neurodegeneration

Patricia St. Fleur, Ryan-Alexa Liquori

Mentor: Shu-Yuan Cheng
John Jay College of Criminal Justice

Mancozeb (MZ), a manganese-containing fungicide, has garnered increasing concern for its potential neurotoxicity, particularly in relation to neurological disorders such as Parkinson's and Alzheimer's disease. The manganese component of MZ is capable of accumulating in the basal ganglia of the brain, potentially harming dopaminergic neurons and contributing to the development of neurodegenerative conditions. Previous research conducted by Cheng's laboratory has shown that MZ can induce cellular senescence, characterized by premature aging and cell cycle arrest. Building on these findings, the present study investigates the influence of MZ on cell cycle dynamics in PC12 cells, a neuronal cell line derived from rat adrenal pheochromocytoma. To assess MZ's effects, cells were treated with 1 µM, 5 µM, and 50 µM concentrations for 24 hours, followed by senescence assays, flow cytometry, western blotting, and Ingenuity Pathway Analysis. The data demonstrated an accumulation of PC12 cells in the G0/G1 phase, indicating that MZ induces cell cycle arrest. Notably, cells treated with 50 µM MZ exhibited increased expression of β-galactosidase senescence markers, p53 and p21 proteins, alongside altered levels of the CDK4 protein. Disruption of cell cycle machinery has been proposed to play a role in the

pathogenesis of neurodegenerative diseases. These results support the hypothesis that MZ disrupts key cell cycle regulators, promoting senescence in PC12 cells and potentially contributing to neurodegenerative diseases.

POSTER A48

An Analysis of Sexual Grooming Behaviors Among LGBTQ+ Survivors of Childhood Sexual Abuse

Imani Thomas

Mentor: Elizabeth Jeglic
John Jay College of Criminal Justice

Research has explored the impact of childhood sexual abuse (CSA) and its effects on survivors. Given that sexual grooming behaviors are present in 99% of CSA cases, understanding these behaviors is essential to understanding risk factors in cases of CSA. This study used the Sexual Grooming Model (SGM) (Winters et al., 2020), to assess the presence of behaviors from each of the five stages of sexual grooming; (1) victim selection, (2) gaining access and isolating the child, (3) trust development, (4) desensitization to sexual content and physical contact, and (5) post abuse maintenance. Individuals identifying as LGBTQ+ are at increased risk for CSA; however, there is no research which has explored sexual grooming behaviors used in the perpetration of CSA among LGBTQ+ survivors. Results in the study revealed that LGBTQ+ survivors reported more sexual grooming behaviors in the victim selection, trust development, desensitization to sexual content and physical contact and post abuse maintenance stages of the SGM compared to heterosexual survivors of CSA. No differences were found between groups in the gaining access and isolation stage. These findings highlight the unique ways in which grooming behaviors may manifest differently on the sexual identity of the person experiencing the abuse.

POSTER A49

Are Soil Bacteria the Culprit of Soil Mercury Emissions? Identification of Mercury-Resistant Bacteria in Soils.

Andrew Vargas

Mentors: Anthony Carpi, Nathan Lents
John Jay College of Criminal Justice

Mercury is a toxic metal found ubiquitously in the environment due to its ability to transition between oxidation states. Previous work in our lab has shown that microbial activity plays a role in the reduction of Hg^{2+} to highly volatile Hg^{0}, and the merA gene in bacteria is known to code for mercury ion reductase. Identifying the microbes in soils that catalyze the transition of mercury can inform remediation methods for sites of great exposure. The merA gene was previously identified in soil samples from Connecticut (CT), Massachusetts, Pennsylvania, and New York, with a higher concentration of the gene in CT soil. Current experiments aim to isolate the bacteria containing the merA gene to determine their influence on mercury emissions from soil. CT soil suspensions were added to LB agar plates supplemented with increasing concentrations of Hg. Autoclaved CT soil was also plated in increasing Hg concentrations as a negative control. Preliminary results show that as the concentration of Hg increases, there is less bacterial growth, with minimal growth between 10 and 250 ppm. Future work will narrow the range of Hg to isolate mercury-resistant bacteria better for species identification.

LEHMAN COLLEGE

POSTER A50

Accretion Disk Images from Light Curves using Mircolensing

Lyrick R. Batista, Georgios Vernardos

Mentor: Georgios Vernardos
Lehman College

Active galactic nuclei (AGN) are incredibly useful objects to study, as they give insight to some of the most compelling physics surrounding black holes. The Event Horizon Telescope has been invaluable for observing Super Massive Black Holes (SMBH). However, it is somewhat limited in its effective range and observation capacity. Gravitational lensing provides a powerful probe for more distant astronomical objects that would otherwise remain unresolved. In particular, microlensing induces a variation in brightness of a background source due to stars in a foreground galaxy acting as lenses. This offers a unique opportunity to study the several specific regions of AGNs. When an AGN crosses a caustic (a region of high magnification) in a magnification map, the resulting high-resolution light curve encodes spatial information about the accretion disk on microarcsecond (10e-6) scales. Our project aims to exploit this by using light curve data from such caustic-crossing events to reconstruct two-dimensional images of AGN accretion disks. By modeling the time-dependent magnification of an accretion disk as it crosses a caustic region, we seek to recover fine structure in the disk's profile. This approach will not only resolve the size and shape of AGN accretion disks with unprecedented detail but also be able to constrain fundamental models of accretion disk physics and black hole structure.

POSTER A51

Echoes of Influence: Music, Identity and Cultural Appropriation

Chanell Cuevas

Mentor: Christopher Bonastia
Lehman College

This paper examines the early stages of an ongoing qualitative research project titled 'Echoes of Influence: Music, Identity and Cultural Appropriation'. Conducted under the mentorship of Professor Bonastia at Lehman College. This project seeks to understand how external factors influence an individual's musical taste and, by extension, their identity. Through the transcription and analysis of interviews with individuals across generations, initial findings suggest that external influences, such as family, friends, and broader cultural shifts (e.g., the transition from physical media to streaming platforms), play a significant role in shaping musical preferences and the formation of identity.

POSTER A52

Exploration of Cell Cycle Reactivation in Post-Mitotic Retinal Neurons

Tri Dinh

Mentor: Stephen Redenti
Lehman College

Neural degenerative eye diseases, caused by oxidative stress and genetic factors, result in permanent loss of retinal neurons leading to blindness. The disease threatens the global population, causing blindness in about 67 million people worldwide. Therefore, it is important to have a good understanding of the underlying mechanisms of gene regulatory pathways to develop treatment for retinoblastoma cancer. Neuronal development is a complex process consisting of various stages like proliferation, migration, maturation, and axon/dendrite formation. Under experimental and pathological

conditions, post-mitotic neurons are capable of re-entering the cell cycle, performing DNA replication, but then undergo apoptosis. Studies have shown that neuronal cells utilize various mechanisms for G1/S and G2/M checkpoints, which are closely connected with apoptotic machinery, can be influenced by environmental factors and lead to various outcomes from cell death at G1/S checkpoint to complete proliferation of differentiated neurons (Frade & Ovejero-Benito, 2015). Therefore, the purpose of this research is to explore the relationship between cell cycle activation and apoptosis by investigating the modulation of cell cycle genes in post-mitotic neurons. To conduct this experiment, we culture Mouse Retinal Progenitor Cell with viability >80% to ensure that there is a sufficient amount of healthy differentiated mRPC when they enter G2/M checkpoint and before undergoing apoptosis. I and my team also perform a series of gene analysis involved in postmitotic neuron reentry into the cell cycle and modulate them using oxidative stress and transient vectors. We then use WST-1 Assay to evaluate the viability of post-mitotic neurons and perform qPCR analysis to analyze the modulated cell cycle expression to evaluate the apoptosis signaling. These series of experiments will allow us to explore the cell cycle reactivation in post-mitotic retinal neurons and support further treatment to prevent death of stress-induced neurons during pathological conditions.

POSTER A53

Complete Ordered Fields versus Real Closed Fields

Harry Pacheco

Mentor: Brian Allen
Lehman College

The purpose of this paper is to compare first and second order logic by exploring complete ordered fields and real closed fields. The main conceptual tool we will take advantage of is model theory which studies mathematical structures as axiomatic systems in the language of first-order logic. As an example of the strength of second order logic, we will develop the theory of complete ordered fields and show that every such example must be order isomorphic to each other, a concept capturing the idea that every example must be the same. Despite the strength of second order logic, it comes with some drawbacks from a model theory perspective. Hence, we want to compare complete ordered fields with real closed fields which are expressed in first order logic. We complete this comparison by proving definable completeness for real closed fields which is the strongest completeness one should expect in first order logic.

POSTER A54

Neighborhood Crime and Sleep Quality Across Four New York City Neighborhoods

Z-Quana Powell

Mentor: Mia Budescu
Lehman College

The current study examines the association between perceptions of neighborhood violence and property crimes and sleep quality among adults. Data were collected in four neighborhoods in New York City that vary in racial and economic segregation. Participants responded to a self-report survey assessing sleep quality and perceptions of property and violent crime in their immediate neighborhood. The study aims to identify risk and protective factors for sleep health.

POSTER A55

State-Level Analysis of Long-COVID Trends

Tyler Stewart

Mentor: Naomi Spence
Lehman College

Long-COVID is a chronic illness where acute-COVID symptoms persist from weeks to months past the initial duration of the disease. This project seeks to find the extent of Long-COVID's impact at a societal level, investigating how state-level demographic characteristics influence Long-COVID rates. Uniquely, this project uses state-level data from CDC's Household Pulse Survey which includes Long-COVID rates merged with state demographic data from the U.S. Census Bureau. This project examines correlations and regressions across the merged data sets and visualizes these relationships.

DAY ONE, JULY 8
POSTER SESSION B

BARUCH COLLEGE

POSTER B1
Investigating the Role of Elongin B in *Drosophila melanogaster* Embryonic Somatic Muscle Development

Madelyne Dayan

Mentor: Krista C. Dobi
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 B2
Nerve Gene Rearrangements May Shape Cranial Appendage Growth and Induce Brain Cancer Development in Mammals

Alvi Khan

Mentor: Zachary Calamari
Baruch College

Craniopharyngioma is a rare pediatric brain tumor that arises in the pituitary gland, often causing hormonal imbalances and vision or balance issues. Although several mechanisms have been proposed, the genetic and developmental origins of this disease remain poorly understood. Our project investigates the potential role of nerve gene duplications and chromosomal rearrangements in ruminants—horned mammals whose cranial appendages, like pronghorns and antlers, exhibit rapid growth and strong innervation. Because of these properties, horns are a compelling ex vivo model for studying tumor-like growth. Using genomic data from GenBank, we performed de novo (i.e., from scratch) assembly on six ruminant species and conducted reference-guided assembly on three others. We identified nerve gene “orthologs”, or shared genes, across 15 species using OrthoFinder and visualized chromosomal rearrangements via RStudio. Our analyses revealed that nerve gene expression varies across developmental stages and that there is a common set of ruminant chromosomes (chromosomes 5, 11, 19, 21, and 29) that undergo frequent structural changes, while the rest remain conserved. Notably, species such as Oryx dammah exhibit over 20 nerve gene duplications within these chromosomes, whereas Sus scrofa only exhibits half that amount. Additionally, a subset of six nerve genes (ALCAM, DLX2, HOXB2, HOXB3, PAX1, and BOC) found in both humans and ruminants

showed significant developmental regulation, particularly in juvenile and adolescent ruminants. These findings suggest that nerve gene rearrangements may influence appendage growth and nervous system patterning, which may play a significant role in brain tumor development because of their mutagenic properties (i.e., these rearrangements can cause cancerous mutations). Our future work will focus on constructing an Artiodactyla-wide "pangenome" that includes all ruminant species and leveraging human nerve gene databases to identify conserved regulatory programs that may underlie brain cancer development.

POSTER B3

Differences in Climate Concerns and Childbearing Decisions Among Emerging Adults

Jennifer Lai

Mentor: Mindy Engle-Friedman
Baruch College

Young people report worry about climate change, and this may play a role in the childbearing decisions of emerging adults (18-29 years) who do not yet have children. This study builds on prior research that investigated childbearing decision-making among emerging adults by examining the differences in climate concern between those who plan to have fewer children due to climate change and those who say climate change does not affect their decision-making at all. Between the Fall 2023 and 2024 semesters, 781 Baruch students completed the online sustainability assessment where they responded to questions about their childbearing plans and climate concern. Those who plan to have fewer children selected the primary reason for this decision. Results show that 12% of participants plan to have fewer children due to climate change with 68.1% citing unpredictable environmental conditions that will affect their child's life. Those who plan to have fewer children report significantly greater climate concern about general weather-related disasters as well as the resurgence and impact of weather-related disasters in the future compared to those who say climate change does not affect their childbearing plans. Current decision-making in emerging adults shapes future behavior. This study highlights how emerging adults who plan to have fewer children are motivated by concerns for their future child's well-being and quality of life. Furthermore, it demonstrates how those who plan to have fewer children report greater climate concern compared to those who say climate change does not affect their childbearing decision-making at all, indicating that greater threat perceptions about environmental challenges in general and in the future may lead to negative childbearing motivations. Overall, this research helps clarify the qualities of emerging adults who plan to have fewer children, and it underscores the need for initiatives or policy changes to support emerging adults with climate concern.

POSTER B4

Shifting Alliances: Are Black People Increasingly Identifying as Republican?

Clamont Mack

Mentor: 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 B5

Protein Stability Retention Under Harsh Conditions

Kaylen Su

Mentor: 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 B6

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

Rachel (Zheyi) Xie

Mentors: Amanda Flores, 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 (#/m^2 & g/m^2). 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 B7

SIRT7 and Lamin A/C Interactions: Impact on Chromatin Organization, Genome Stability, and Cell Fitness

Hadia Amin, Duncan Occhiogrosso, Morgan Guidry, Shaima Alhirdi

Mentor: Maria Lourdes Serrano de la Pena
Borough of Manhattan Community College

Sirtuin proteins (SIRTs) are a family of protein deacetylases that regulate gene expression and help maintain cellular homeostasis by responding to environmental and metabolic stress. Among them, Sirtuin 7 (SIRT7) plays an important role in preserving genome stability and chromatin organization. Mice lacking SIRT7 show molecular and physiological signs of accelerated aging and genomic instability (Figure 1). SIRT7 interacts with Lamin A/C, a structural component of the nuclear lamina, to repress LINE-1 (L1) retrotransposons (Figure 2 & 3). Chromatin anchoring to the nuclear lamina is crucial for proper genome organization, but this structure is often disrupted in aged and cancerous cells due to abnormal Lamin A/C levels. Preliminary proteomic assays indicate that SIRT7 deacetylates specific residues on Lamin A/C; without SIRT7, these residues become hyperacetylated. To study this further, we used in situ mutagenesis to generate eight Lamin A/C mutants by altering three lysine amino acid residues to mimic either acetylated or deacetylated states (Figure 4). These mutated Lamin A/C proteins will be transfected into mammalian cells to determine the impact of Lamin A/C-SIRT7 interactions on overall chromatin organization and cell viability. Understanding the molecular pathways that drive SIRT7–Lamin A/C interactions may help inform therapies for cancer, degenerative diseases, and premature aging syndromes.

POSTER B8

Building Intelligence from Scratch: Investigating AI Weight Initialization and Model Accuracy

Akshara Desai

Mentor: Christopher McCarthy
Borough of Manhattan Community College

Understanding how artificial intelligence learns from the ground up is crucial for developing more transparent, efficient systems. While AI is often treated as a black box, we wanted to unpack how its foundational elements—specifically weight initialization—affect its final performance. This question is important because the same AI model, trained on the same data, can produce very different outputs depending on how it starts. Our research asks: What is the relationship between the initial weights input into a neural network and the final weights and accuracy of the AI model?

To explore this, we built a simple classification model using PyTorch, training it to separate red and blue data points on a 2D plane. We ran multiple training sessions using gradient descent, changing only the initial weights each time. We then visualized and compared the final decision boundaries and output probabilities. PyTorch was central to our approach—it allowed us to customize and closely monitor how weights

evolved during training, helping us experiment with different initialization schemes.

We found that although the model often achieved similar accuracy, the paths it took and the probability maps it generated varied significantly. Some initial weights led to cleaner separations and faster convergence, while others introduced noisy or skewed boundaries. These differences suggest that the training process is highly sensitive to its starting conditions.
Our findings have broader implications for AI development. By better understanding how initial weights influence learning, we can build more predictable and interpretable AI systems, even at the earliest stages of development.

POSTER B9

Developing an LLM-Integrated Robot using Raspberry Pi and Arduino

Wasit Massih Khan

Mentor: Levent Kurt
Borough of Manhattan Community College

Human-machine interactions can be greatly improved by combining robotics with artificial intelligence models, creating new opportunities for assistive technologies, automation, and education. The goal of this project is to use readily available and reasonably priced hardware components to design and build a voice-activated robot. Human-machine interactions can be greatly improved by combining robotics with artificial intelligence models, creating new opportunities for assistive technologies, automation, and education. The goal of this project is to use readily available and reasonably priced hardware components to design and build a voice-activated robot. The main goal is to construct a system that uses a Raspberry Pi and a lightweight large language model (LLM) to process spoken user orders. This will enable the robot to move forward and backward and respond orally with relevant data. The focus is on developing a real-time, efficient system that doesn't require a lot of powerful computers.

Initially, Arduino was used to configure the robot's mechanical structure and basic motor control. It does not, however, play a part in the ultimate human contact process. The Raspberry Pi is responsible for all spoken answers, decision-making, and voice command processing. Serial interfacing controls component communication, guaranteeing response to user inputs and well-coordinated movement and replies.

We anticipate that the robot will be able to comprehend a range of basic commands, perform simple physical tasks, and produce suitable conversational responses. According to early testing, lightweight LLMs can function dependably with a small amount of hardware while enabling efficient user-robotic system communication. The goal of this project is to develop a robotic experience that is easy to use by emphasizing both human-centered design and hardware efficiency.

Furthermore, as an optional addition to the project, if time permits, we intend to incorporate ambient sensors to gather tangible data, such temperature or distance, and do basic data analysis. The foundation for creating future robotic systems that are more intelligent, adaptive, and interactive is established by this work, which also shows that combining AI models with microcontroller-based robotics is possible.

POSTER B10

Repurposing Brita® Filters as Potential Low-Cost Adsorbents of Cu(II) Ions from Aqueous Solutions

Amy Lui, Kenneth Suen

Mentor: Abel E. Navarro
Borough of Manhattan Community College

Copper is a heavy metal present in living organisms and is considered a micronutrient for animals and plants. This work seeks to provide data on the viability of repurposing used Brita®

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 percentage (%ADS). NH_4OH (BF_N) and acetone (BF_a) were identified out of 10 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. Adsorption kinetics results indicated high initial adsorption rates for BF_N and BF_a with overall lower Cu(II) ion concentration remaining in solution.

In aggregate, the data appears to support the hypothesis that use of BF as a domestic 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%.

POSTER B11

Application of Biomaterials as Adsorbents of Salicylic Acid

Katrina O'Brian, Amy Lui

Mentor: 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 B12

How Does Neighborhood Socioeconomic Status Influence Green Infrastructure Equity?: A GIS-Based Site Suitability Analysis for Increasing Green Infrastructure in Brooklyn

Student: Faija Onjila

Mentor: Henry Bulley
Borough of Manhattan Community College

Recent catastrophic flooding in New York City (NYC) has raised concerns about the increasing impact of climate change on flood resilience in the city. To mitigate the excessive damage to infrastructure, property loss, and even fatalities, the NYC DEP has constructed hundreds of Green Infrastructure (GI) projects, including rain gardens and pervious pavement, to collect stormwater from streets, sidewalks, and other hard surfaces before it results in flash flooding. However, these constructions are limited to public properties and 'right of way' easements. There are other concerns regarding the equitable distribution of these initiatives, especially equitable access to private properties in low-income neighborhoods. This study examines the potential of installing rain gardens on private property in Brooklyn neighborhoods by considering their environmental vulnerability and socio-economic factors. The analysis reveals that a higher density of GI installations (constructed, final design, in construction) is observed in northern and central Brooklyn, particularly in neighborhoods near Flatbush Avenue and Brownsville. Southern Brooklyn neighborhoods, such as Bath Beach and Sheepshead Bay, show significantly fewer GI projects. Interestingly, there appears to be a positive correlation between GI investments and

low/moderate- income areas. Flatbush Avenue and Brownsville not only have the greatest number of GI projects but also the highest concentration of low-income households. This challenges initial assumptions that low-income neighborhoods lack GI investment. Nevertheless, the results also highlight persistent gaps, particularly the lack of GI presence in southern Brooklyn. The findings from this research will generate insights into how best to promote more equitable and effective climate adaptation measures for NYC by prioritizing equity in the planning and placement of rain gardens. green infrastructure.

POSTER B13

Investigating the Effects of Digital Fashion on Mood in College Students

Stalin Rozario

Mentor: Joanna Giza
Borough of Manhattan Community College

As digital spaces become part of everyday life, digital fashion such as avatar skins and virtual clothing NFTs has become a new form of self-expression. While it's well-established that physical clothing can impact thoughts and emotions through the theory of enclothed cognition, it remains unclear whether similar principles apply to the virtual realm. This study investigates whether digital fashion styles—based on McJimsey's four fashion personality types (Dramatic, Classical, Natural, and Romantic)—(a) affect college students' emotional states, and (b) whether responses vary by demographic factors such as age, gender, or ethnicity. Participants will be shown AI-generated images representing each fashion style. Mood will be assessed before and after each exposure using the Escala de Valoración del Estado de Ánimo (EVEA), a validated scale measuring sadness-depression, anxiety, anger-hostility, and happiness on an 11-point scale. Statistical analyses—including paired t-tests and repeated measures ANOVA—will be used to examine mood shifts across fashion styles and to asses whether demographic variables influence these effects. Each participant's mood changes will be compared across conditions, and subgroup analyses will explore variations by age, gender, and ethnicity. This research aims to advance theoretical understanding of how virtual aesthetics shape psychological experiences and offer practical approaches to designing emotionally resonant digital environments. Anticipated findings could inform strategies to enhance user engagement, refine digital marketing approaches, and optimize the influence of wearable aesthetics in metaverse platforms.

POSTER B14

The Potential of Moringa oleifera Extract in Prolonging Sea Urchin Eggs Viability

Ariel Salvador, San Yun Wadi

Mentor: Lalitha Jayant
Borough of Manhattan Community College

Sea urchin embryos could provide valuable insight into the embryological development of humans and other deuterostomes. However, sea urchin eggs needed to form embryos are very hard to maintain as they disintegrate and die within 24 hours after harvest. Previous research has shown that aqueous extract of Moringa oleifera dried leaves effectively prolonged the viability of sea urchin eggs for up to seven days while preserving their fertilization potential. Our study aims to verify a past experiment on an alternative method of preservation: storing sea urchin eggs in a salinated solution of moringa, which has also been found to preserve their viability for up to 6 days. Furthermore, by examining the properties of moringa that promoted the viability of the eggs, this study hopes to explain how moringa is able to protect the eggs for an extended period of time. *Research Design/Methods Used in the Investigation:* To identify the properties of moringa that allowed it to preserve sea urchin eggs, the extracts were tested for their

antibacterial and antioxidant properties using slight modifications of standard methods. The results indicate that the aqueous extracts brewed at 90℃ for thirty minutes showed antibacterial activity when used at 50% concentration on Bacillus subtilis. Furthermore, the total antioxidant capacity of the moringa extracts was tested using the Sigma-Aldrich (MAK334) kit. The results indicated that the values of a Total Antioxidant Capacity (TAC) of 5 ± 0.5 mmol Trolox equivalent TR/g. To further ascertain the role of aqueous moringa leaf extracts on the viability of sea urchin eggs, sea urchin eggs will be preserved in different combinations of antibiotic and antioxidant samples to observe which most resembles the effects of the extracts.

The results of our study suggest moringa may confer protection to sea urchin eggs and extend their shelf life due to a combination of its antimicrobial and antioxidant properties. Aqueous moringa extracts might potentially kill the bacteria and protists that are often seen growing on sea urchin eggs and causing their death.

POSTER B15

Enhance Job Training for Individuals with Autism using Augmented Reality

Marcus Swa, Joseph Sahap

Mentor: Hao Tang
Borough of Manhattan Community College

In recent years, virtual technologies have seen growing use in interventions for individuals with Autism Spectrum Disorder (ASD), particularly in educational and vocational contexts. While much research has focused on using these technologies to support children with ASD or to help autistic adults prepare for job interviews, there has been limited research on the use of augmented reality (AR) for training autistic adults in performing hands-on job responsibilities in real-world settings. This study addresses that gap by exploring the effectiveness of augmented reality (AR) in training autistic adults for real-world job responsibilities.

To achieve this, we developed a mobile AR application specifically designed to support job training for individuals with ASD. The app features interactive games and challenges that help users enhance their motor skills, enabling them to perform everyday tasks more effectively. It guides users through complex job-related activities using clear, animated instructions that are easy to follow. These instructions are repeated as needed until the users can complete the tasks independently.

Our application also includes scenario-based training modules tailored to specific careers. For example, if a user is interested in becoming a barista, the app offers a role-specific training module that displays 3D objects and step-by-step guidance on how to operate a coffee machine and prepare various types of coffee. These realistic simulations aim to build confidence and competence in performing job-specific tasks.

POSTER B16

Synthesis and Functionalization of Silica Nanoparticles

Juliana Tjornhom, Maisha Mumtaz

Mentor: Luis Gonzalez-Urbina
Borough of Manhattan Community College

The project focuses on optimizing the functionalization of silica nanoparticles to improve their ability to remove phenol from wastewater. Phenolic compounds are among the most common pollutants, posing serious environmental risks. Current treatment methods, such as activated carbon, have limitations, including reduced efficiency over time and expensive regeneration processes. Functionalized silica nanoparticles are cost-effective, biocompatible, and easy to modify,

making them a viable option for sustainable wastewater treatment.

This study is based on the hypothesis that the density of functional groups on the nanoparticle surface significantly affects their ability to adsorb phenols. To test this, we will synthesize monodisperse silica nanoparticles using the Stöber-Fink method, ensuring control over size and distribution. Characterization of size, charge, and stability, will be performed using Dynamic Light Scattering (DLS).

Functionalization will be achieved by grafting amine groups onto the nanoparticle surface using APTES, as amines are known to react efficiently with phenolic compounds. The solutions are then sonicated and centrifuged to separate the supernatant and nanoparticles. Ninhydrin tests are conducted to both confirm the presence of functional groups and determine the minimum amount of nanoparticles required to fully bind with a certain amount of APTES. Our target result is that ninhydrin detects amines only in the nanoparticles, not the supernatant, indicating that all APTES have binded to the intended surface; therefore, achieving maximum density.

The effectiveness of these functionalized nanoparticles will be evaluated through batch adsorption experiments, where they will be exposed to 2-chlorophenol solutions. The remaining phenol concentration in solution will be measured using UV-Vis spectroscopy. Additionally, desorption studies will be conducted to assess the reusability of the nanoparticles.

POSTER B17

Effects of Stress on Neuronal Cells

Jerlyne Umana

Mentor: Jane Tezapsidis
Borough of Manhattan Community College

This project aimed to research the effects of nutrient starvation stress on neuronal SHSY-5Y cells using serum withdrawal. Cells were deprived of fetal bovine serum (FBS), which gives essential growth factors and nutrients. Observation of cells included using MTT assay to measure cell viability and cytotoxicity. Treatment group "A" showed the most decline in absorbency (0.031), indicating possible stress induced cytotoxicity.

POSTER B18

Adsorptive Removal of Divalent Nickel Ions from Aqueous Solution using Marine Algae

Ronniel Vasquez

Mentor: 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.

POSTER B19

Enhancing Virtual Mobility for Individuals Who Are Blind or Have Low Vision: A Stationary Exploration Method

Hong Zhao

Mentor: Hao Tang
Borough of Manhattan Community College

Designing accessible locomotion in virtual reality (VR) for individuals who are blind or have low vision (BLV) is challenging, especially on mobile platforms with limited interface options. In this research project, we present a novel locomotion method that enables users to explore virtual spaces while staying in place or within a small physical area. Our approach uses the mobile device's gyroscope for movement control, supported by spatial audio and haptic feedback to enhance spatial awareness. We conducted a user study to evaluate how effectively BLV individuals acquire spatial knowledge using this technique. Our findings offer valuable insights for designing more inclusive and immersive mobile VR experiences for the BLV community.

BRONX COMMUNITY COLLEGE

POSTER B20

Investigation of Weeds Biodiversity in Ethnic Enclaves in New York City

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Mentor: Raffaella Diotti
Bronx Community College

Weeds are often overlooked yet play a significant role in urban ecosystems by providing a safe haven for insects, pollinators and other organisms. In addition, their presence can offer insight into how human activity such as migration across different parts of the world influence local biodiversity. This study is a survey of weeds' distribution across different ethnic enclaves in New York City, aiming to assess a correlation between human migration and the presence of native and invasive plant species. We used fieldwork, citizen science apps and DNA barcoding to identify plant samples from various ethnic enclaves across New York City. Weed samples from micro-ethnic communities were collected, identified with iNaturalist AI software, followed by processing in the lab to prep the samples for DNA barcoding. By examining the relationship between human migration and plant distribution, we observed a correlation between the ethnic neighborhood and the history of the weeds' species found within it. A deeper understanding of weeds' distribution is essential for promoting sustainability of healthy urban ecosystems for future conservation and ecological management.

POSTER B21

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

Marlee Barnes-Henry

Mentor: Cheila Cullen
Bronx Community College

Jamaica, like many Small Island Developing States (SIDS) in the Caribbean, faces significant vulnerabilities to natural hazards such as hurricanes, floods, droughts, and landslides - risks intensified by climate change. These hazards often disrupt economic stability, infrastructure, and livelihoods, leading to significant annual losses. A critical barrier to effective disaster risk reduction (DRR) and climate adaptation strategies in Jamaica is the severe scarcity of reliable historical disaster data, limiting accurate predictive modeling and science-based decision-making.

This project addresses this data gap by systematically extracting and validating disaster information from news reports in the Global Database of Events, Language, and Tone (GDELT), using data science and programming techniques including natural language processing and text mining. Event occurrence is confirmed by incorporating Earth Observation (EO) technologies, particularly Landsat and Sentinel-2 satellite.

Preliminary findings from evaluating data spanning 2015 to 2025 revealed approximately 418 unique hazard events. Our results show a consistent presence of flood, landslide, wildfire, and hurricane-related reports, with a notable concentration in the parish of Trelawny. While the reasons behind this clustering remain unclear, this finding highlights the need for further spatial analysis and ground truth verification.

POSTER B22

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

Frankie Davila, Jingnan (Jin) Chen

Mentor: 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 B23

Identification of Key Factors Influencing Security Culture

Wilmar Ferreiras

Mentor: Mohammad Nizamuddin
Bronx Community College

It is not enough to follow the security rules in today's workplaces. Cyber threats are getting intelligent, and they often not only go after the people inside any organization but also the systems. This project looks into how the culture of a workplace affects its overall cybersecurity. Rather than focusing only on policies and compliances, it explores how everyday behavior, shared beliefs, and values shape responses to security risks.

To start, the research explains why security culture matters, especially now. Then it takes about six to eight weeks to review what other

researchers have said on this topic. The goal is to see what's already known and what still needs more attention especially when it comes to how a company's mindset affects how seriously employees take security. After that, the team will put together a survey based on what they've learned. It will be sent out to workers from different departments and roles to get a good mix of views. The survey will run for around a month. Then, using charts and numbers, the team will dig into the responses and try to find patterns. This part will take another seven or eight weeks.

In the end, the study will offer some simple, useful suggestions for businesses that want to improve their security by improving their culture.

POSTER B24

Advancing Animal Classification Systems Through AI Models and Computer Vision

Nagib Gonzalez, Michael Lawrence

Mentor: 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 B25

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 B26

Rocks as Fertilizer in Geological Agriculture

Corrine Pieper

Mentor: 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 B27

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

Donique Spencer, Lily Ameling, Luis-Angel Perez-Gomez, Sambou Toure, Sue-Moura Burke, Victor Carrion

Mentors: Neal Phillip, Brian Van-Hull, Paramita Sen
Bronx Community College

This study examined the complexities of urban air quality in New Delhi and Mumbai, with a particular emphasis on gaseous pollutants (CO and SO_2) and particulate matter (PM2.5) across diverse community contexts. Mobile sampling and mapping methodologies were employed to identify variations in pollutant concentrations, analyze inter-pollutant correlations, and explore potential associations with vehicular traffic, cooking smoke, and construction activities. The findings offer valuable insights into the dynamics of urban air pollution and provide a foundation for further understanding the temporal and spatial sources of these pollutants.

POSTER B28

Implication of Background Radiation Measurement for Environmental Safety

Sambou Toure

Mentor: Sunej Hans
Bronx Community College

Background radiation is a constant presence in our environment, with over 80% of its sources coming from natural processes and the remainder from human activities. It exists in various forms, including alpha, beta, and gamma radiation, and is found in water, the food chain, sand, soil, and construction materials (Figure 1). In urban areas like the Bronx, it's vital to understand how geological and human factors affect radiation levels. This study will assess background radiation at Bronx Community College and its surroundings, measuring levels inside and outside buildings while considering human behavior and construction materials. By comparing our findings with existing literature, we aim to raise public awareness of radiation and its potential health risks in the Bronx, ultimately promoting a safer community for everyone.

BROOKLYN COLLEGE

POSTER B29

Assessing Antibiotic Resistance Profiles in Freshwater Ecosystems: A Study of Duckweed Biofilms and Their Surrounding Aquatic Environments

Nasheed Choudhury

Mentor: Theodore Muth
Brooklyn College

Antibiotic resistance poses significant threats to global public health and ecological stability. While extensive research has addressed clinical antibiotic resistance, environmental reservoirs and freshwater ecosystems can also contribute critically to this resistance crisis. This study investigated antibiotic resistance profiles in microbial communities associated with duckweed biofilms and surrounding freshwater environments, including microplastic surfaces. Utilizing two distinct but related experimental designs, this research quantified resistance to antibiotics cefotaxime and tetracycline under varied growth conditions and media. In the first experimental design, microbial samples from duckweed biofilms and pond water collected from an urban freshwater pond exhibited consistently low antibiotic resistance. Notably, though, duckweed biofilms presented slightly higher resistance levels than pond water, suggesting their potential as reservoirs for antibiotic resistant bacteria. The second experimental design introduced a growth medium to simulate nutrient rich aquatic conditions, including microplastics alongside duckweed and pond water. The setup yielded exceptionally high resistance percentages. The unexpected formation of dense bacterial lawns prevented accurate quantification, indicating significantly enhanced microbial proliferation, possibly triggered by nutrient abundance and antibiotic pressures. These findings highlight the complex interplay between environmental substrates, nutrient availability, and antibiotic exposure in shaping resistance dynamics. The pronounced variability between the experimental conditions highlights the necessity for comprehensive methodological considerations in environmental resistance studies such as this one. This research certainly emphasizes duckweed and microplastics as influential yet contrasting reservoirs for antibiotic resistant microbial communities for further experimental analysis.

POSTER B30

Developing a Stochastic Cellular Automata Model to Estimate Saltmarsh Restoration Outcomes and Delivery of Ecosystem Services

Adelia Honeywood Harrison

Mentors: Phillip Staniczenko, J. Stephen Gosnell
Brooklyn College

In order to justify and guide large-scale urban ecosystem restoration approaches, it is important to be able to quantitatively estimate the outcomes and benefits of restoration practices in terms of effectiveness, timeline, and delivery and economic value of ecosystem services. We extended a stochastic cellular automata model that focused on how the presence of ribbed mussels (*Geukensia demissa)* impacts saltmarsh cordgrass (*Spartina alterniflora)* recovery following a drought, to consider how including ribbed mussels in saltmarsh restoration programs may impact marsh spread, growth, and nitrogen removal in the short to medium term (1 - 20 years). The initial model focused on urban waterways found in Jamaica Bay, New York. Transition probabilities were estimated using field data collected in Jamaica Bay and the Harlem River in New York City, long term monitoring data of Jamaica Bay from the National Park Service, and other regional data on marsh restoration. Nitrogen removal under various marsh conditions was estimated using published data from core incubation studies focused on Jamaica Bay and other collected data estimating nitrogen removal processes in saltmarsh

restoration contexts. The model was used to estimate how various restoration techniques, including restoring only vegetation, restoring vegetation and mussels, and no restoration, impacted marsh persistence and ecosystem service provisioning, including estimates of restoration value based on nitrogen removal. Outcomes were considered under a range of parameter values in order to consider how lack of parameter resolution impacts findings. The final model can be extended with other restoration parameters--such as oysters, inundation, temperature, salinity--for broader applicability.

POSTER B31

A Taste for Rebellion: What our Art Preferences Say about our Power

Anisa Jagnarayan

Mentor: Ana Gantman
Brooklyn College

Art is a powerful tool for expressing freedom. It often allows creators and viewers alike to challenge norms and explore autonomy. Psychological research has long emphasized that autonomy is a core component of human well-being, which is also closely linked to a sense of power and personal agency. We aimed to explore whether art indeed serves psychological needs for freedom and autonomy. Specifically, we hypothesize that if art serves as a collective space for rule-breaking and autonomy; then individuals who feel less powerful or autonomous in daily life may be especially drawn to art that defies the norm and allows for expression of autonomy. To test this, we designed a survey-based study in which participants will view paired decks of artworks, one more conventional and the other more rule-breaking (i.e., transgressive) in form, style, or content. Participants will then indicate which piece they preferred over eight trials. Afterward, they will respond to validated measures assessing their perceived power, personal agency, and sense of freedom in daily life. So far, we have designed the study and plan to collect data later in the summer. We hypothesize that individuals who report lower power and autonomy will choose the transgressive art option more often than those who do not. This would suggest that personal choice in art may reflect a deeper psychological need for self-expression and autonomy.

POSTER B32

Comparing Generalized Anxiety, Asthma-Specific Anxiety, Depression, and Fatigue Outcomes in College Students With and Without Asthma Symptoms

Abigail Tenenbaum

Mentor: Laura Reigada
Brooklyn College

Asthma is a chronic respiratory disease that affects 9.5% of young adults ages 20-24 in the U.S. Despite being a distinct mental health risk, asthma symptoms' impact on mental health is unknown among college students, a group who often experiences psychological distress from balancing academic, personal, and career responsibilities. The present study examines whether college students with asthma symptoms experience more group differences in mental health and physical symptoms compared to students with no asthma symptoms. A total of 949 CUNY students (*M*age19.41 +/- 1.87, 63.4% female, 81.2% non-White) completed measures online through SONA assessing asthma symptom severity and control, asthma-related anxiety, generalized anxiety symptoms, depressive symptoms, and fatigue. The sample consisted of 18% with a self-reported asthma diagnosis, 17% with asthma-like symptoms (not diagnosed), and 64.7% with no asthma symptoms. A one-way ANOVA with Post hoc Tukey tests showed that compared to those with no asthma symptoms, both asthma groups reported significantly higher generalized anxiety, depressive symptoms, and fatigue (all $p<.001$). Asthma symptoms' relations with increased psychological distress implicates asthma's interference with students' ability to manage

their academic, social, and personal responsibilities during this pivotal developmental stage. Future research should further examine asthma symptoms' impact on college students' academics, mental and physical health, and day-to-day activities.

THE CITY COLLEGE OF NEW YORK

POSTER B33

Remote Sensing of Water Quality in Jamaica Bay, New York

Sarah Maria Dos Santos

Mentor: Maria Tzortziou
The City College of New York

Amid intense urbanization, Jamaica Bay remains a dynamic estuarine system. Its saltmarshes function as nurseries for fish and shellfish, feeding and nesting grounds for wildlife, and habitats for key invertebrates such as mussels and crabs. They also serve as natural filters, improving water quality. While saltmarsh islands submerge and reappear with the tides, Jamaica Bay's intertidal saltmarshes have drastically declined in recent decades. To improve its ecological health and slow saltmarsh loss, a multiagency restoration initiative launched, focusing on shoreline stabilization and water quality improvements. These efforts aim to reduce nitrogen loading, control combined sewer overflows, mitigate flooding, increase dissolved oxygen levels, and implement long-term scientific monitoring. Wetland restoration is critical for mitigating coastal erosion and enhancing biodiversity; yet its impacts on the biogeochemistry of Jamaica Bay remain largely uncharted. This study investigates the impact of wetland restoration on water chemical and biological parameters in the Bay by leveraging in-situ measurements and satellite retrievals. Key water quality parameters are being monitored, including colored dissolved organic matter, dissolved organic carbon, chlorophyll-a, and turbidity. High spatial resolution imagery from Sentinel-2/MSI and Landsat/OLI is used to analyze temporal trends in these indicators across the satellite record. In-situ measurements are applied to both train and to validate remote sensing retrievals, ensuring robust findings. Establishing a satellite-based water quality assessment reveals biogeochemical dynamics at new spatiotemporal scales, offering insight into the effectiveness of restoration strategies and their broader implications for coastal management and environmental sustainability in urbanized estuaries. Placed within Jamaica Bay's historical context, this study highlights ongoing marsh decline, the role of restoration, and the impact of storm events.

POSTER B34

Tesseract: Smart Home Security and Privacy Without Physical Hubs

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The City College of New York

As smart home technology becomes more widespread, so do concerns about privacy and security in how devices communicate. Many systems rely on cloud services, which expose user data to external providers, or physical hubs, which can fail and compromise the entire network. The goal of this project is to build Tesseract, a virtual smart home hub that distributes control across the IoT devices themselves, removing the need for centralized infrastructure.

This study explores how smart home devices can securely collaborate using secure multiparty computation (MPC), allowing them to coordinate automation tasks while preserving user privacy. The virtual hub concept offers a resilient alternative to both cloud-based and physical-hub architectures.

We begin by identifying the core functionalities a smart home hub typically performs. Next, we survey current methods in distributed

computation to guide system design. Representations for common hub actions are developed and used to create a decentralized model that operates across devices. The proposed system is implemented through simulation, then evaluated on real IoT hardware to test its performance and security features. Results from this research will inform future smart home designs that aim to improve both privacy and reliability.

POSTER B35

Quantum Circuit Synthesis: Opportunities in Optimization and Security

Christian Rasmussen

Mentor: Samah Saeed
The City College of New York

Quantum Computing has the potential to revolutionize the way we solve complex problems in many fields, from medicinal research to condensed-matter physics. Many techniques have been developed to prepare (optimize) and secure executable quantum circuits on quantum computers. In our study, we explore ways to leverage one of these techniques, quantum circuit synthesis, to promote the efficiency and security of executable quantum circuits. We provide an in-depth analysis of current quantum synthesis techniques while proposing opportunities for more effective synthesis-based optimization, leveraging modern machine learning techniques.

Furthermore, we showcase how approximate synthesis techniques can be effectively used in information hiding and watermarking, securing quantum circuits. We aim to highlight the current faults within modern quantum synthesis techniques while proposing opportunities for improvements and novel applications.

DAY TWO, JULY 9
POSTER SESSION A

NEW YORK CITY COLLEGE OF TECHNOLOGY

POSTER A1

Understanding of the Impact of Climate Change on Building Energy Consumption

Rashiek Barber, Abdellah Gessra, Takoda Nestor, Christopher Sanchez

Mentor: 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. Our study reviewed ongoing studies to learn how buildings can be designed, operated, and assessed for energy performance. It was found that integrating predictive climate data, adaptive retrofitting, and flexible building systems are essential. Traditional approaches to energy efficiency must be reevaluated in light of changing weather patterns and increasing environmental uncertainty, so that the impact of climate change is effectively implemented. Further studies are required to develop framework for sustainable building design by applying forward thinking frameworks, localized responses, and enhanced simulation tools.

POSTER A2

Ion Dynamics of Ionic Liquids

Elizabeth Brandwein

Mentors: Giselle de Araujo Lima e Souza, Steven Greenbaum
New York City College of Technology

Fast Field Cycling Nuclear Magnetic Resonance (FFC NMR) is a technique used to measure the relaxation of nuclei when influenced by a varied external magnetic field. The relaxation, in this case, the spin-lattice relaxation rate (T_1) is defined as the time required for the sum of the magnetic moments of the nucleus in question to return to their ground states (B_0). This parameter can be utilized to observe the local dynamics of different materials, including, but not limited to, liquids, porous media, solids, contrast agents, or gels. Specifically, for energy storage materials, such as batteries, FFC NMR is important in determining the ion dynamics, which is related to electrolyte efficiency. Among the possible innovative electrolyte solvents, ionic liquids (ILs) are considered a safer alternative to organic carbonates due to their low flammability and vapor pressure. By definition, ILs are salts having a melting point below 100°C, with some being liquid at room temperature. The purpose of this experiment was to measure the R_1 values of four ionic liquids; EMIM-TFSI, EMIM-FSI, EMIM-BF_4, and EMIM-PF_6. (Fig. 1) under varying magnetic fields, from 30kHz to 32MHz, in order to evaluate the cation and anion local dynamics, measured on ^{1}H and ^{19}F frequency domains, respectively. From the results, it is possible to distinguish the different mechanisms contributing to the ion relaxation rate and expand this knowledge to energy storage materials applications.

POSTER A3

Advanced Assistive Technology Facilitates Hands-on Service Learning

Suchi Chowdhury

Mentor: Farrukh Zia
New York City College of Technology

The Light Proximity Switch is an assistive technology device designed to enable people with limited mobility to use digital devices or turn on adaptive switches with minimal movement. Because it meets a critical demand for accessible technology among individuals with disabilities, this device is important because it enables people with conditions including muscular dystrophy, spinal cord injuries, and cerebral palsy to interact with digital environments and improve their quality of life. The Light Proximity Switch incorporates light sensors to record intentional, small movements, designing on previous assistive technology. While similar projects have made use of adaptive or single-switch input devices, the Light Proximity Switch improves usefulness by allowing for greater customization and multi-device control.

The Light Proximity Switch is activated by waving a hand or limb over the sensor and can control devices such as phones, computers, adapted toys, and gaming consoles. Users can adjust motion sensitivity, and an attachable circular base assists those with limited strength in reaching the sensor area. The project leverages a service-learning approach where students apply knowledge from STEM courses. Hardware components include two light sensors and a controller, while software supports Bluetooth and USB connectivity. Each subsystem integrates to create a customizable, user-friendly device. During development, testing and troubleshooting ensure that sensor sensitivity and response rates meet user needs. The project also involves 3D design and 3D printing of the assistive device which requires background knowledge and application of Math, Physics and Engineering. Expected outcomes include a functional prototype that accurately interprets user input for digital or switch control. Final deliverables encompass a working prototype, thorough documentation, and a presentation demonstrating the Light Proximity Switch's design and functionality, ready to showcase as an innovative solution for assistive technology users.

POSTER A4

Exploring Student Attitudes Towards AI and Willingness to Use it in Learning

Rachel Dawidowicz

Mentor: Nadia Kennedy
New York City College of Technology

Students and teachers hold mixed views on the use of AI in education. While teachers often express concerns about cheating, many students rely on apps like Photomath, Mathway, and Symbolab to get quick answers—tools that frequently lack meaningful explanation. Research suggests that most students are unaware that platforms like ChatGPT or Gemini can serve as tutors and offer valuable support when prompted effectively. Students may hesitate to use these AI-powered tools due to limited awareness, insufficient understanding of their capabilities, or lack of experience in crafting effective prompts.

In STEM subjects, AI tools have also been found to make basic arithmetic errors, which students often overlook but are typically caught by teachers during grading. Pilot studies indicate that teaching students how to craft prompts and critically evaluate AI-generated responses can significantly improve learning outcomes. This poster presents findings from a pilot program involving school students who received brief training on using prompts with AI platforms. Following the training, students completed a survey about their attitudes toward AI and their willingness to use it for learning and homework preparation. As AI becomes increasingly

integrated into education, building AI literacy is essential to ensure that students engage with these tools effectively, responsibly, and critically.

POSTER A5

A Hunting Cabin: The Question of Regenerative Architecture Retrofit

Kevin Hernandez

Mentor: Kenneth Conzelmann
New York City College of Technology

Climate change, caused mainly by pollution, has increasingly grown throughout the years since the industrial revolution. Affecting much such as animals, plants, and ecosystems. In response to this, design practices were made that aimed at reducing the negative environmental impact of buildings and development, that is sustainable design. While sustainable design was an important step forward, it did not suffice in addressing the environmental challenges. This led to a more holistic approach: Regenerative Architecture, a design practice philosophy that seeks to actively restore and enhance the surrounding environment. This research project is a case study of an existing hunting cabin built in 1960 in a forest in the foothills of the Catskill mountains in NY state. The cabin will be evaluated in terms of the practicalities of retrofitting it with regenerative design principles or if it should remain as is. Meanwhile, a new two-story addition with a 240 square foot footprint will be designed with full regenerative tenets in mind. Beyond that, this cabin is to be integrated into a larger vision plan for the forest site as part of a camping community with student-built cabins and a shared common “solar powered wet shed” for meetings, cooking and washing. Lessons learned, by implementing regenerative practices, climate change effects can be lessened, fostering a more sustainable future for both communities and ecosystems.

POSTER A6

Enhancing Middle School Computational Thinking through Mathematical Manipulatives: Designing Unplugged and Plugged Activities

Alyssa Johnson

Mentors: Ariane Masuda, Nadia Kennedy
New York City College of Technology

Providing students with the fundamental abilities they need to succeed in a technologically advanced society is the goal of the New York State Computer Science and Digital Fluency (CSDF) Standards. Through a deliberate blending of digital ("plugged") and hands-on ("unplugged") mathematical exercises, this initiative helps middle school students acquire computational thinking, a method of problem-solving that entails breaking problems down into logical parts. Students investigate fundamental mathematical concepts, including geometry, patterns, measurement, and spatial reasoning, using programs such as Scratch and Sphero Mini. With the aid of these interactive technologies, students can program robots, create cartoons, and develop games, which enables them to creatively and captivatingly visualize and apply complex concepts. Unplugged activities supplement these by utilizing basic, screen-free items to develop logic, teamwork, and critical thinking via tactile exploration and organized problem-solving. Together, these techniques encourage active learning and increase mathematical comprehension while also developing important life qualities such as teamwork, perseverance, and independent thinking. By incorporating these activities into the classroom, teacher candidates get acquainted with the CSDF Standards and learn how to apply them in an accessible, innovative, and student-centered manner. The initiative not only makes math more relevant and enjoyable for children, but it also develops future educators who are ready to introduce computational thinking into the classroom.

POSTER A7

Validity of the Idiosyncratic Volatility Puzzle

Hasib Mahmood

Mentor: Ossama Elhadary
New York City College of Technology

The Idiosyncratic Volatility (IVOL) puzzle challenges a foundational belief in finance: that higher risk should be rewarded with higher returns. Yet, contrary to this principle, the IVOL puzzle suggests the opposite—stocks with more firm-specific (idiosyncratic) risk often earn lower returns. Driven by curiosity, I set out to investigate whether this counterintuitive pattern holds in today's markets. Using real-world financial data, I applied the Fama-French three-factor model and conducted my analysis in Stata and R, focusing on differences across firm size—specifically comparing large-cap versus small-cap stocks. To test this, I sorted portfolios by levels of idiosyncratic volatility and ran regressions to examine return patterns. What I found was both surprising and consistent: stocks with higher idiosyncratic volatility generally underperformed, especially among smaller firms. The results reaffirmed the existence of this puzzling relationship and hinted at deeper behavioral or structural forces at play in financial markets. Ultimately, this research experience didn't just confirm what others have observed—it also pushed me to question traditional models and think more critically about how we measure risk, how investors behave, and how markets really function.

POSTER A8

Study and Analysis of the Design of a Robot Manipulator

Kimberly McLaurin

Mentor: Farrukh Zia
New York City College of Technology

Robotic Manipulator (Robot Arm) systems are extensively used in industrial warehouse package management, factory automation and manufacturing and production industries. A robotic manipulator system consists of inter-related sub-systems such as mechanisms, sensors, actuators, electrical circuits, microcontrollers and embedded software programs. A student can gain in-depth knowledge of these topics by studying and analyzing the design of a small-scale educational prototype of a robotic manipulator. This is a hands-on project which will involve assembly, construction, testing and evaluation of a robot manipulator kit. The objectives, processes and procedures, and achievement of the goals of the project will be documented in the form of a poster presentation.

POSTER A9

Assessing Urban Ozone Dynamics During Pandemic Disruption and Post-Recovery Using Differential Absorption LiDAR

Julissa Mendez, Thomas Ely, Yonghua Wu,
Tianyi Zhao, Tahsinur Rahman,
Thomas Legbandt, Fred Moshary

Mentor: Viviana Vladutescu
New York City College of Technology

This research examines the adverse effects of atmospheric ozone on the environment and human health. An Ozone Differential Absorption LiDAR (DIAL) system was utilized to obtain vertical ozone profiles in an urban area above City College of The City University of New York (CCNY/CUNY). The DIAL system operates with on-band (289 nm) and off-band (299 nm) wavelengths to deduce the ozone mixing ratio. Additional data from the Ceilometer, CIMEL, radiosonde, and HYSPLIT backward trajectories support the findings, which indicate high ozone concentrations above the threshold level in the mixing layer of the planetary boundary layer. Ozone concentrations measured at various altitudes above CCNY/CUNY exceed the threshold for human health of 122.25 ppb (70 ppb over an 8-hour average). Ozone levels from

2023 were compared with those during the COVID-19 pandemic to assess the impact of reduced human activity. Measurements from 2021 showed smoother and lower ozone concentration patterns, while in 2023, fluctuations were more pronounced, particularly at higher altitudes. Ozone retrievals on June 6th and 7th, 2023, encountered a high presence of smoke due to active wildfires in Canada. On those days, the data required in-depth analysis to remove aerosol contamination from the retrievals. The analytical results indicate a need for concerted global efforts in pollution control in urban areas. These cases required careful aerosol correction due to lidar signal attenuation and interference with ozone retrievals. This study underscores the utility of DIAL systems for real-time, high-resolution vertical ozone monitoring in complex urban atmospheres. It also highlights the influence of transboundary pollution events and the impact of human activity on air quality. The results emphasize the urgent need for global and local policy measures aimed at mitigating urban ozone pollution and protecting public health in the face of increasing environmental stressors, including climate change and wildfire frequency.

POSTER A10

Enhancing High School Computational Thinking through Unplugged and Plugged Activities using Manipulatives

Yadira Vazquez

Mentors: Nadia Kennedy, Ariane Masuda
New York City College of Technology

The New York State Education Department (NYSED) encourages teachers to enhance students' learning experiences by integrating the New York State K-12 Computer Science and Digital Fluency Standards into their lesson planning. A key conceptual category within these standards is computational thinking (CT), which encompasses decomposition, pattern recognition, abstraction, and algorithms. CT is an essential competency for the 21st century and is currently being implemented into the curriculum. This project aimed to create, adapt, and remix both plugged and unplugged computational activities for high school classrooms, with the goal of deepening students' understanding of CT and mathematics. We focused on developing conceptual frameworks that support CT and facilitate meaningful exploration of mathematical concepts using manipulatives. The activities, both plugged and unplugged, were reviewed, modified, and designed to introduce high school students to important programming concepts such as sequencing, looping, conditionals, debugging, and decomposition across various disciplines. The solutions, guided questions, and lesson plans for these activities are presented in a format that can be effectively implemented as computational steps and algorithms using a robotic ball (Sphero) and software (GeoGebra). Ultimately, we believe that these activities will enable students to visualize patterns, test solutions, model algorithms, and enhance their collaborative skills.

QUEENS COLLEGE

POSTER A11

BMP-Signaling and Lipid-Mediated Stress Response in *C. elegans*

Tiffany Cruz

Mentor: Cathy Savage-Dunn
Queens College

Lipid metabolism is critical in physiological functions such as energy storage, hormone regulation, and immune defense. It has been shown that the DBL-1 protein mediates the BMP-signaling pathway, which regulates body size, lipid storage, and innate immunity. *Dbl-1* mutants disrupt this pathway, resulting in a low-fat phenotype, reduced body size, and increased susceptibility to pathogens. This study investigates how lipid regulation via BMP signaling affects survival under stress conditions

by conducting survival studies on wild-type (*N2*) and *dbl-1* mutant strains, as well as *qc71*. *qc71* is a genetic suppressor of the *dbl-1* strain identified from a suppressor screen targeting the *dbl-1* phenotype. Suppressor candidates were tested via Oil Red O staining, and *qc71* showed significantly higher fat storage than *dbl-1* mutants. We exposed these three strains to the pathogenic bacterium *Serratia marcescens* and *FUDR* to evaluate whether suppression of lipid metabolism affects survival. *FUDR* was added to inhibit DNA replication, thus progeny was not produced or factored in. According to the survival curve, *dbl-1* mutants demonstrated the shortest survival rate, followed by *qc71,* and finally *N2*, showing the longest lifespan. Statistical analysis revealed that *qc71* significantly outperformed *dbl-1* in terms of survival rate ($p < 0.0001$); however, it showed no significant difference between *qc71* and *N2*. These findings imply that *qc71* may partially inhibit *dbl-1* mutant defects, potentially restoring fat storage and innate immune response, similarly to that observed in wild-type. Overall, these findings reinforce the utility of *C. elegans* as a model organism for uncovering genetic mechanisms and offer new insights into how metabolic pathways interconnect with innate immunity. Lastly, these results may relate to the difficulty individuals with diabetes or other metabolic diseases face in fighting infections.

POSTER A12

Characterizing Crowdedness in TESS Images

Swan Yi Htet

Mentors: Keaton J. Bell, Isabel L. Colman
Queens College

NASA's Transiting Exoplanet Survey Satellite (TESS) captures light curves from its pixel images to detect exoplanets and study stellar variability. TESS images are composed of individual pixels that measure the brightness of stars over time, creating light curves used to identify transits and other variations. However, TESS's large plate scale of 21 arcseconds per pixel introduces a phenomenon known as crowding, where light from multiple stars blends together within a single pixel. This blending, or crowdedness, contaminates the light curves and affects their accuracy. For exoplanets, excess flux from crowding can reduce the apparent transit depth, leading to an underestimation of planet radii. This research aims to assess the precision of crowdedness corrections applied by the TESS pipeline, enabling the propagation of this uncertainty to measured system parameters.

To achieve this, we gather Target Pixel Files (TPF) and sky positions of nearby stars using data from observatories like GAIA. We then perform MCMC (Markov Chain Monte Carlo) analysis in parallel on the AMNH cluster to develop a model image of the star, evaluating the crowdedness value in the photometric aperture for each image in the TPF. By comparing the distribution of these values to those used by the TESS reduction pipeline, we determine the precision of the pipeline's corrections. Our modeling quantifies additional sources of systematic error, such as uncertainty in the background flux of the TPF and intrinsic variability of stars. Applying this technique to multiple TESS targets will further quantify the precision of the contamination corrections applied by the TESS pipeline, improving the accuracy of exoplanet and stellar variability studies.

POSTER A13

Astrocytic and Microglial Morphological Responses in Hippocampus and Prefrontal Cortex Following Peripheral Inflammatory Injury

Selassie Mawuko

Mentor: Maral Tajerian
Queens College

Inflammatory pain not only induces peripheral sensitization but also drives neurobiological changes in the brain. Our previous work using the Complete Freund’s Adjuvant (CFA) model

demonstrated that peripheral inflammation leads to mechanical hypersensitivity, anxiety-like behavior, and cerebral hypoperfusion, all observed three days post-injury. These findings will highlight the brain's vulnerability to peripheral immune challenges, yet the cellular mechanisms remain unclear.

The current study aims to investigate how brain glial cells, specifically astrocytes and microglia respond to peripheral inflammatory injury. We focus on the hippocampus and prefrontal cortex, two regions previously shown to exhibit perfusion deficits in this model. The prefrontal cortex is a key center for top-down modulation of pain and affective processing, while the hippocampus plays a role in pain memory, emotional regulation, and cognitive performance. Both regions are susceptible to neuroinflammatory changes and have been implicated in chronic pain-related behaviors in recent rodent studies. By assessing glial cell morphology and activation in these areas, we want to investigate the central immune changes that may bridge peripheral inflammation and central dysfunction.
Using immunohistochemistry, astrocytes will be labeled with rabbit polyclonal anti-GFAP (Abcam ab7260) and visualized using donkey anti-rabbit Alexa Fluor® 647 secondary antibody (Abcam ab150075). Microglia will be labeled using rabbit monoclonal anti-Iba1 (Abcam ab178846) and visualized with goat anti-rabbit Alexa Fluor® 488 (Abcam ab150077). We will examine region-specific glial alterations, including cellular hypertrophy, branching patterns, and process complexity.

Our analysis builds directly on behavioral and imaging data from the prior study and focuses on establishing a temporal and anatomical link between inflammatory pain and central glial remodeling. We hypothesize that early glial responses contribute to the persistence of inflammatory pain and its comorbidities. By clarifying the timeline and regional specificity of glial activation in inflammatory pain, this study aims to enhance understanding of central mechanisms in chronic pain.

POSTER A14

Impact of IQ, Age, Sex, and Mutation Status on Reaction Time and Accuracy on Attention Network Test

Melanie Mejia, Sonia Seehra, Shira Russell-Giller, Elijah Singh, Natalia Mejia, Deianeira Rodriguez, Phoebe Macdowell, Shayna Herszage-Feldan, Declan Sung

Mentor: Veronica J. Hinton
Queens College

The goal of this study is to examine performance on the Attention Network Test (ANT) and determine whether factors such as sex, IQ, age and the fragile X premutation (PM) (defined as 55-200 expanded CGG repeats in the X-linked *FMR1* gene) may selectively impact on reaction time (RT) and accuracy.

The ANT is a computer-administered measure of executive attention, orienting, and alerting. RT refers to how long it takes the participant to respond to the trial, and accuracy refers to the number of correct responses obtained. These measures emphasize different aspects of individual performance. In the sample of 141 child participants, ranging from ages 8-13 with the PM allele (n= 67, 44.8% female) and controls (n= 74,51.4%), the ANT was administered remotely as part of a larger study protocol that examines cognition in children identified prenatally with molecular markers and controls. Data were processed to yield measures to RT, total # correct and the ratio of the two variables. Regression and between group analyses examined ANT outcomes with participant's age, sex, estimated IQ and PM status. Independent t-test analyses and Pearson's correlation were run. Alpha was set at .01.

Age and RT were negatively correlated ($r = -.499$, $p < .001$). Age and accuracy were positively correlated ($r = .222$, $p < .01$). Age and RT/accuracy were negatively correlated ($r = -.498$, $p < .001$). IQ and accuracy were

positively correlated (r= .309, p<.001). IQ and RT/accuracy were negatively correlated (r= -.276, p=.001). There were no differences in the group related to either sex or PM status (p >.01).

Performance on the ANT test is sensitive to both age and IQ. Across a relatively narrow age range (8 to 13), RT and accuracy both improved as age increased. Similarly, overall performance improved with increases in IQ. Neither sex nor the PM had impact on performance.

POSTER A15

Discovery of Selective Inhibitors of CK1δ and CK1ε with a Tetra-substituted Pyrazole Scaffold

Grace Park

Mentor: Jun Yong Choi
Queens College

Casein kinase 1 (CK1) is a family of protein kinases that regulate signal transduction pathways, such as Wnt signaling, circadian rhythm regulation, CNS-related disorders, and tumorigenesis in most eukaryotic cell types. Thus, they are a lucrative target for therapeutic agents in combating these types of disorders. The purpose of this study is to synthesize highly selective inhibitors of CK1δ and CK1ε. Small molecule analogs having a tetra-substituted pyrazole scaffold have been synthesized via multi-step organic reactions, which were monitored by thin layer chromatography and analytical liquid chromatography (LC). The final products were purified by high performance LC and characterized by NMR and Mass Spectrometry. The ADP-Glo biochemical assays show that JC-1025, JC-1031, and JC-1033 inhibit CK1δ in a low nanomolar range, while they are not active against CK1ε at 1 μM. JC-1059, JC-1154, JC-1155, and JC-1156 inhibit both CK1δ and CK1ε at 1.0 μM. JC-1207 and JC-1209 were active against CK1δ, and JC-1237, JC-1239, and JC-1249, while active against both CK1δ and CK1ε, were shown to be more active against CK1δ at both 1.0 μM and 0.1 μM. Presently, new analogs are being synthesized and tested and will provide insight into the types of effective therapeutic agents in the treatment of cancers.

POSTER A16

Investigating Sleep and Awake Activity Among Infants at High and Low Risk for Autism Spectrum Disorder

Gabriela Sedano

Mentor: Kristina Denisova
Queens College

The goal of this longitudinal research is to identify the correlations between sleep and awake periods and gross motor movements in infants with and without the risk of autism spectrum disorder (ASD). Accelerometers, actigraphy devices, non-invasive electrodes, and SpO2 monitors are used to track brain activity and physical activity of infants during both sleep and wake time. The participants consisted of high-risk infants, particularly infants with a family history of ASD, and low-risk subjects without any history of ASD. Data collection and analysis are being conducted to determine the different motor activity patterns correlated with sleep and wakefulness in high-risk and low-risk groups.

POSTER A17

Collective Behavior of Daphnia

David Young

Mentors: Oleg Kogan, Sebastian Alvarado
Queens College

Collective behavior is a widespread phenomenon in the animal kingdom, influencing how animal groups respond to environmental changes. This study utilizes the model organism *Daphnia magna* to explore the emergence of collective motor behavioral patterns. Daphnia in a petri dish executes what appears to be random

motion. In this study we investigated properties of this random motion and sought to understand deviations from random motion of a Brownian particle (such as dust particles suspended in liquid). Using TRex animal-tracking software, we recorded and analyzed the movement of daphnia under various boundary conditions. The position data were processed with Python and further analyzed in MATLAB to quantify average displacement from an initial position. The average over many daphnia of this displacement as a function of time was analyzed. Boundaries significantly impacted the behavior of daphnia. Because of this, we were not yet able to definitively establish the difference between the random motion of daphnia with that of a Brownian particle. This suggests the necessity for a larger experimental apparatus to accurately determine how daphnia's motion deviates from Brownian dynamics. We also examined the effect of colored light on daphnia's motion. Although these results are not yet conclusive, ongoing research aims to investigate this variable in greater detail, considering its ecological relevance in natural freshwater environments. This study offers valuable insights into the factors influencing daphnia's collective behavior, contributing to a deeper understanding of their motion patterns and the mechanisms underlying their collective dynamics.

QUEENSBOROUGH COMMUNITY COLLEGE

POSTER A18

Probing the Nanostructure of Hydroxyl Functionalized Imidazolium Ionic Liquids

Ieesha Ansar

Mentors: Sharon Lall-Ramnarine,
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 environmentally friendlier 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 and suitability for specific applications. The goal of this work is to synthesize hydroxyl-functionalized ILs and measure their temperature -dependent viscosity, conductivity and thermal profile, which will enable researchers to use them for specific practical applications and add to the existing knowledge of ILs. We hypothesize that the hydroxyl-functionalized side chains will participate in hydrogen bonding and alter the physical properties of the ILs compared to the unfunctionalized alkyl analogues. We report here on the syntheses and characterization of ILs comprised of imidazolium cations bearing hydroxyl side chains of varied lengths coupled with bis(trifluoromethylsulfonyl)imide (NTf_2^-) and bis(fluorosulfonyl)imide (FSI) anions. Synthesis was carried out by conventional, solvent-free and microwave assisted reaction techniques. 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 of imidazolium NTf_2^- ILs with 4-8 atom side chains showed higher viscosities (108-240 cP) and lower conductivities (2.2 -0.69 mS/cm) for hydroxyl-functionalized ILs compared to their alkyl-analogues (with viscosities of 50-93 cP and conductivities of 3.3-1.4 mS/cm). This suggests that inter- and intramolecular hydrogen bonding interactions in hydroxyl-functionalized ILs impede ionic mobility and negatively impact transport properties like viscosity and conductivity. The outcomes of this work are expected to significantly contribute to the design

and understanding of ILs tailored for specific applications.

POSTER A19

Monitoring and Predicting Chlorine Residual with Bagged Trees Model Based on Water Quality Parameters from Internal Plumbing System by Season and Water Demand

David Cen Cen

Mentors: Seo Dugwon, Ousmane Sy Savane
Queensborough Community College

The chlorine residual present in the water used for human consumption prevents microorganisms, bacteria, and other pathogens from contaminating the water, as the chlorine residual provides an extra layer of protection. The Surface Water Treatment Rule (SWTR) from the United States Environmental Protection Agency (USEPA), requires that a detectable level of chlorine must be present in the water to disinfect it and prevent any possible recontamination that could potentially put the consumer's health at risk by diseases like dysentery or salmonella. The chlorine residual in the distribution water is significantly affected by the bulk water characteristics and the distribution system's condition. Factors such as high-water temperature, low water consumption-induced stagnation, and aging main distribution system have resulted in a significant loss of chlorine residual in the distribution water (Savane et al, 2019). This research evaluates the effects of the previously stated parameters on the internal plumbing water chlorine residual in a high-occupancy institution that operates seasonally as a school. By applying Bayes' theorem to assess the effects of water temperature on the chlorine and using MATLAB Regression App to train an analysis model, such as Linear Regression, Gaussian Process Regression, Regression Trees, etc., to predict levels of chlorine based on previously mentioned factors. Water samples are collected twice a week throughout the seasons from different sampling points with differing water consumption levels within the institution. Water samples are then analyzed for temperature using HQ40D with a temperature probe, whereas chlorine and phosphate levels are measured using a Colorimeter (HACH DR900), which provides accurate readings of both parameters in the samples. According to the SWTR, a detectable chlorine level is crucial for preventing diseases caused by microorganism growth, as chlorine acts as a disinfectant while phosphate acts as the distribution system's protective agent, ensuring water remains safe for human consumption.

POSTER A20

Oligoether-Functionalized Ionic Liquids for Lithium Batteries

Jinzhi Chen, Ieesha Ansar, Sumaiya Husain, Syeda Hussain, Elijah Bernard, Martina Hove, Michael J. Keating, Elizabeth Biddinger, James F. Wishart

Mentor: Sharon Lall-Ramnarine
Queensborough Community College

The demand for highly conductive electrolytes is critical for the performance of electrochemical energy storage devices, with particular emphasis on those that offer electrochemical, mechanical, and thermal stabilities. Ionic liquids (ILs) and IL-based electrolytes offer these attributes along with advantages such as negligible vapor pressure, wide electrochemical windows, and stable solid electrolyte interphases (SEIs), making them suitable for various energy-storage applications. With the vast number of possible ILs, the key challenge lies in synthesizing ILs with the ideal combination of properties for battery electrolytes. We report here on the synthesis of pyrrolidinium ionic liquids with oligoether moieties (repeating ether units) in the side chains paired with bis(trifluoromethylsulfonyl)imide (NTf_2) and bis(fluorosulfonyl)imide (FSI) anions. These ILs were mixed with Solvate Ionic Liquids (SILs) in various ratios, developed by combining a lithium salt ($LiNTf_2$) with glymes such as tetraglyme

(G4). The resulting SIL-IL electrolytes will be characterized for conductivity, viscosity, electrochemical windows, thermal profiles, and lithium deposition behavior. Results reveal that the conductivity of the electrolyte mixture composed of the IL with one ether moiety (EO1:LiTFSI:G4) in a 1:1:1 molar ratio is 2.54 mS/cm at 30 °C, compared to 1.53 mS/cm for the SIL: LiG4TFSI, an increase of 67%. Continuing and future work will examine the effect of lengthening the ether chains on the ILs. This project is a collaboration with Professor Elizabeth Biddinger's group at the City College of New York (CCNY), where the performance of these ILs as battery electrolytes will be tested.

POSTER A21

Threshold-Based Pattern Mining for Stock Market Candlestick Analysis

Brian Chin

Mentor: Yusuf Danisman
Queensborough Community College

Pattern mining is a fundamental technique for identifying valuable patterns and extracting meaningful insights from data. Among various pattern mining methods, candlestick analysis has been widely adopted in financial markets to forecast trends in time-series stock data. While prior studies have applied sequential pattern mining on candlestick for stock time series forecasting, such approaches often overlook subtle yet significant price variations. To address this issue, this study proposes an enhanced forecasting model that builds upon existing encoding techniques by incorporating a threshold-based encoding method. This method filters out minor price fluctuations, aiming to improve the reliability of pattern detection and the overall predictive performance. By applying systematic threshold tuning and early stopping mechanism, the model efficiently identifies an optimal threshold value for maximizing forecasting accuracy. The proposed method was conducted by using historical data from stocks within the S&P 500 index. Through backtesting and comparative analysis, it achieves an average accuracy of 61%, outperforming the baseline models with 48% accuracy. These findings demonstrate the effectiveness of threshold-based encoding in reducing noise and improving return-driven forecasting strategies.

POSTER A22

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

Brett Hirsch

Mentor: 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. Two of the most popular Models for categorizing personality are the Myers–Briggs Type Indicator (MBTI) and Big Five (OCEAN) model. This information can be used in a variety of different jobs and industries such as therapy, teaching/tutoring, policework, customer service/human resources, hiring managers, hospitality, and more. However, it is difficult to properly accurately detect someone's personality from the testing options that are publicly available. This project aims to predict the personality type of someone by training a machine learning to analyze speech patterns within text. Additionally, my goal is to compare the accuracy of predictions for the MBTI model to the accuracy of predictions for the OCEAN model. The MBTI model's accuracy ranges from 50-56% while the OCEAN model's accuracy ranges from 50-59%. For MBTI the best performing algorithm is Logistic Regression while for OCEAN the best performing algorithm is SGDC Classifier.

POSTER A23

Attenuation of Beta and Gamma Radiation by a Commercial Bolus Material: A Comparative Study with Locally Available Alternatives

Md Rashedul Islam

Mentor: Rex Taibu
Queensborough Community College

Radiation plays a pivotal role in modern medicine, particularly in imaging and radiotherapy, where bolus materials are essential for optimizing treatment outcomes. These materials help protect healthy tissues, enhance dose delivery to the skin, and ensure uniform radiation distribution.

This study examines the attenuation properties of gamma and beta radiation using the commercially available bolus material Super-Flex, in comparison with locally available alternatives such as Play-Doh and honey. Using open beam geometry for attenuation measurements, percentage transmission values for various bolus thicknesses were calculated for both gamma and beta radiation.

The findings reveal distinct attenuation behaviors for gamma and beta radiation across the different bolus samples. Notably, the results indicate a significant similarity in attenuation properties between certain forms of Play-Doh and Super-Flex. This suggests that Play-Doh may serve as a viable bolus material in situations or regions where commercial bolus products are not readily affordable.

POSTER A24

Nanopore Sequencing of Isolated and Purified *Bacteriodes* Phages

Ashley Jaime

Mentor: Monica Trujillo
Queensborough Community College

Bacteriophages, or phages, are viruses that specifically target bacteria. Phages have evolved to target specific bacterial strains relying on receptor-binding proteins. Treatment with strain-specific phages is a valuable alternative/complementary strategy to anti-infectious disease drugs. Phage therapy is garnering renewed interest in Western medicine, concerning the rise in the frequency of multi-drug-resistant bacterial infections in humans. *Bacteroidetes* and *Firmicutes* phyla are the two major types of bacteria within the human gut microbiome, with *Bacteroides* being the most abundant. Bacteroides are a good model for understanding the human microbiome dynamics and the capability of altering it. The complex and diverse relationship between Bacteroides and their host is associated with health benefits, as well as the ability to cause disease within the gastrointestinal tract. We have sequenced nine bacteriophages isolated and purified from hospital wastewater, a useful source for phages. Through collaboration with the DNA Learning Center at City Tech, Nanopore sequencing and bioinformatic analysis were performed to recognize the genome of the Bacteroides phages and their potential applications for anti-infectious disease research and treatment. Nanopore sequencing involves passing DNA strands through tiny protein pores (nanopores) in a membrane. As the molecule passes through the pore, the changes in the ionic current can be directly tied to a specific nucleotide. This disruption is measured and translated into distinct DNA bases (A, C, G, T). We used this software technology to sequence our Bacteriophages. With the ability to produce results in real time with low material, Nanopore

technology is a strategy that can distinguish between lytic or lysogenic Bacteriophages. We will present the assembled genome from two of nine isolated and purified bacteriophages, one which represents the successful sequencing outcome and, one that requires further work and analysis.

POSTER A25

Perceptions of Mental Health and Related Issues: How Stigma Fuels Fear and Silence around Mental Health

Afzal Khan-Narain

Mentor: Celia Sporer
Queensborough Community College

Comprehending mental health-related challenges within a college environment is essential for tackling the escalating crisis among the college-age demographic. Students face heightened stress as they balance daily responsibilities with academic demands, which can complicate their ability to manage everyday life effectively. While awareness of mental health issues is not a new phenomenon, the stigma associated with these issues often hinders individuals from pursuing the assistance they need. Investigating the challenges associated with mental health and comprehending the coping mechanisms employed by persons of college-age to navigate their daily difficulties is essential for enhancing awareness and resources on campuses, thereby guiding students towards adaptive coping strategies. Our study examines how stigma surrounding mental illness influences college students' help-seeking behaviors, perceptions of dangerousness, and coping strategies. When students' mental health is well-managed, they are better equipped to handle challenges in both their personal and academic lives.

POSTER A26

Synthesis of Several Potentially Isolable Atropisomeric Benzazepines

Win Yuya Khin

Mentor: Sasan Karimi
Queensborough Community College

We have previously reported that several substituted 3*H*-1-benzazepines have a slow rate of interconversion, making them atropisomers (conformational enantiomers) with potential property that could render their separation. Several compounds that were recently made have higher free energy of activation for enantiomerization compared with the parent benzazepine. This energy barrier for the interconversion is raised presumably because of the steric interaction between the substituent at position 5 and the hydrogen on the phenyl group at position 11. The free energy of activation values was calculated from the coalescence temperature from the variable temperature proton NMR spectra. We have since synthesized a few more benzazepine analogues that have the highest free energy of activation to date.

POSTER A27

Application of Synchrotron X-ray Absorption: Structural Study of Iron Species in Plants

David Lee

Mentor: Sunil Dehipawala
Queensborough Community College

The synchrotron X-ray absorption spectroscopy including Extended X-ray Absorption Fine Structure (EXAFS) , X-ray Absorption Near Edge Structure (XANES) and X-ray absorption near edge and pre edge feature is used to analyze iron species in different plants. The study yields relative amounts of iron in different plants, oxidation states of iron compounds in plants. Plants used in this study are spinach and parsley. Primary data was collected at Cornell High Energy Synchrotron Source. Data analyses

were done at community college. The above information was extracted from analysics of XANES and pre-edge region of the absorption spectra. Analysis of oscillations appear above the edge, also known as EXAFS, yields near neighbor bond distance of iron atoms. EXAFS data analysis process includes edge normalization, back ground subtraction, transformation to k space from energy, Fourier transformation, back transform of selected peaks, and curve fitting to identify type and number of near neighbor atoms. Pre edge data analysis includes extraction of the pre-edge from main absorption spectrum, normalization to main edge height, and Lorentzian fit to back ground subtracted data. X-ray absorption data from spinach and parsley, as well as several iron supplements and the soil of which plants were grown was analyzed. The preliminary data analysis pre edge feature yields two forms of iron in both plants. One form has oxygen as near neighbor atoms and the other without oxygen.

POSTER A28

Classification of White Blood Cells using State-of-the-Art Neural Network Models

Daniel Lin

Mentor: Esma Yildirim
Queensborough Community College

White blood cells (WBCs) are important components of the immune system, and their classification helps in identifying diseases like infections and cancer. Currently, doctors classify white blood cells manually, which takes time and can cause human error. We tested neural network models to automate this process and improve accuracy. In our research, we tested three state-of-the-art neural network architectures used in computer vision: VGG16, ResNET and Vision Transformers. Vision Transformers outperformed the other models in speed and accuracy. Next, we worked on making the model usable for any dataset and not just the dataset it was trained on. To achieve this goal, we experimented with segmentation methods like YOLO12, watershed, thresholding, and centroid detection to isolate WBCs from raw microscope images to crop them in the same size of the training dataset images so that the trained model can classify them. We are also looking into color normalization methods to bridge the gap between the training and raw datasets' color palettes. Overall, our approach will allow us to test any raw data set with an already trained model without retraining.

POSTER A29

Psychological Effects of Early Morning Prayer on Cognitive and Emotional Well-Being

Sana Naseri

Mentor: Jody Resko
Queensborough Community College

Spiritual activities throughout history have had a significant effect on human well-being, emotional management, and cognitive development. Many cultures, especially pre-modern ones, followed biphasic sleep patterns that allowed people to wake up during the night to pray, meditate, and reflect. Modern research highlights the benefits of early morning prayer, such as Tahajjud, which activates the parasympathetic nervous system, helping the body relax and lowering stress levels. A deep sense of involvement in prayer can bring on a meditative state, allowing a person to calm down and reduce stress. Having a spiritual connection through prayer can also help people feel deeply connected to their beliefs, which can be a powerful way to manage stress.

This study explores how early morning prayer affects emotional regulation, mindfulness, and cognitive function. It looks at how prayer done before starting daily activities can improve emotional stability, mental clarity, and overall well-being. The act of setting intentions (niyyah) during prayer also plays a role in building psychological awareness and focus. In the future, this study will gather self-reported data from Muslim students and people from other

faiths. They will be asked to reflect on their emotional stability, memory, focus, and stress levels before and after engaging in early morning prayer. The study hopes to show that early morning prayer has a strong positive impact on emotional and mental health.

POSTER A30

Polyaniline and its Aminobenzoic Acid Derivatives as Adsorbents for the Removal of Copper and Zinc Ions from Aqueous Solution

Jalen Nicolas

Mentor: David M. Sarno
Queensborough Community College

Polyaniline (PANI) is a widely studied conductive polymer with a variety of applications. This includes remediation of wastewater as the amine groups on the polymer backbone are reported to bind to certain metal cations. PANI derivatives with additional polar functionalities are expected to possess an increased adsorptive capacity. To that end, we have oxidatively polymerized 2-aminobenzoic acid (anthranilic acid) and 3-aminobenzoic acid using two aniline-based initiators. FTIR spectra include the quinoid and benzenoid bands typical of PANI derivatives as well as a band corresponding to the carbonyl group, suggesting successful polymerization of both monomers. SEM images of poly(2-aminobenzoic acid) (P2A) and poly(3-aminobenzoic acid) (P3A) reveal a variety of morphologies, especially nanofibers and thicker tendrils. In our earlier work, suspensions of PANI nanofibers were confined to dialysis tubing and immersed in solutions of $CuSO_4$ and $ZnSO_4$ to determine their effectiveness as an adsorbent for metal cations. EDS detected a lower mass percentage of Zn than Cu after similar exposure protocols. FTIR showed that the quinoid and benzenoid bands of PANI were red-shifted after exposure to $CuSO_4$, indicating an interaction between the polymer and cation. Washing with water returned the benzenoid band to its original position, while the red-shift persisted in the quinoid band, suggesting a stronger affinity between the copper ion and the quinoid group. There were no meaningful shifts after exposure to $ZnSO_4$, indicating a weaker affinity for this cation. In addition to characterizing the new P2A and P3A polymers, their viability as adsorbents for copper and zinc cations will be studied and compared to our prior results.

POSTER A31

Investigating the Anti-inflammatory Effect of Fractionated Tea Extracts in the RAW264.7 Morphological Analysis of Microglia in Sensory-Deprived Mice using Immunofluorescence and ImageJ

Wilber Alexander Paiz Valenzuela

Mentors: Joshua Brumberg, Sarbani Ghoshal
Queensborough Community College

Microglia, the resident macrophage of the central nervous system (CNS), are highly dynamic and undergo distinct morphological changes in response to external stimuli. During early CNS development, microglia play a key role in modifying perineural nets, the specialized extracellular matrix that holds neurons together and regulates plasticity. Depending on the physiological state of the CNS (during early development, typical neural function and pathological conditions) microglia perform distinct tasks which can be readily identified by changes in their morphology. This study offers an analysis of how microglial morphology is influenced by sensory deprivation. It also examines microglial changes during the development of the CNS. In this study we will test the hypothesis that the morphology of microglia in whisker-trimmed mice will resemble microglia in an early stage in development known as the critical period during which the extracellular environment is most permissive to changes in neuronal structure and function. Microglia from the somatosensory cortex of control and whisker trimmed animals are stained via immunofluorescence, imaged and then analyzed via ImageJ. The analysis includes looking at specific morphology features in a pre-

trained software that can determine microglial states. Our results will reflect differences in microglial states after sensory deprivation.

POSTER A32

Exploring Issues of Tolerance and Inclusion in the Context of Stigmatized Behavior amongst Autistic Individuals

GiGi Perez

Mentor: Patrick Byers
Queensborough Community College

Autistic individuals who engage in masking behavior deliberately conceal their innate personality traits and natural behaviors to fit into social settings. Autistic masking requires people to hold eye contact and copy other behaviors alongside managing their innate responses including stimming. Many autistic people begin masking behaviors early because they hope to prevent judgment from others by replicating social cues from their peers. The short-term benefits of this help result in overwhelming long-term consequences such as emotional exhaustion and depression along with identity loss. It is claimed that stigma forces autistic individuals to conceal their true selves to escape negative judgments from society. This research examines how media depiction and social viewpoints sustain autism stigma. It also illustrates the double bind under which many autistic people live: Autistic individuals face the difficult decision of either revealing their autism and enduring discrimination or remaining silent and being misunderstood. Finally, this project examines the possibility of building a more inclusive society by establishing environments that honor neurodiversity, listening to autistic voices and dismantling stereotypes to create a space where people can live authentically without judgment.

POSTER A33

Macrophage Stimulated with LPS and LTA

Jacqulyn Persaud

Mentors: Sasan Karimi, Sarbani Ghoshal, Andrew Van Nguyen
Queensborough Community College

Black tea and green tea are derived from the plant *Camellia sinensis*, retaining many bioactive compounds with potential health benefits particularly antioxidant and anti-inflammatory properties. Among the various bioactive compounds—such as amino acids, alkaloids (caffeine), and polysaccharides—polyphenols, especially epigallocatechin gallate (EGCG) in green tea and theaflavins and thearubigins in black tea, are recognized for their significant anti-inflammatory properties. Polyphenols can be classified as semi-polar or polar compounds based on their chemical structure. This study aims to investigate the anti-inflammatory effects of black and green tea polyphenols by separating crude tea extract into different compounds based on their polarity. We hypothesize that polar solvent extraction will yield the most anti-inflammatory effect due to the presence of the hydroxyl (-OH) group in polyphenols. We employed the solvent extraction method using three different solvents, hexane (non-polar solvent), ethyl acetate (polar solvent) and diethyl ether (semi-polar solvent) to fractionate the black and green tea crude extract. Different fractions were used to pretreat macrophage cell line RAW264.7 cells prior to stimulation with either lipopolysaccharide (LPS) or lipoteichoic acid (LTA). The anti-inflammatory effect of each fraction was examined by measuring real time PCR (qPCR) the expression of proinflammatory cytokines such as, interleukin-6 (IL6), tumor necrosis factor-□ (TNF□) and iNOS (inducible nitric oxide synthase). Both green and black tea fractions exhibited anti-inflammatory properties. Contrary to our hypothesis, the hexane-extracted compounds—regardless of tea type—demonstrated the most potent and reliable anti-inflammatory activity. In future studies, we will

determine whether polyphenols can be purified from the hexane extract.

POSTER A34

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

Sabina Ruzieva

Mentor: Yusuf Danisman
Queensborough Community College

Stock market prediction has always been a challenge due to the unpredictability of prices. However, with recent advancements in pattern mining and machine learning, new methods are showing better results. One common approach is to match candlestick patterns - visual charts that reflect daily price movements - to past patterns with high "pattern accuracy" scores. Yet, this scoring method has some flaws, as a pattern can get a high score even if it only occurred once, which makes the prediction less reliable. This research introduces new weighted accuracy scores that consider both how often a pattern appears and how meaningful it is based on historical data. These improved scores were tested on 504 stocks from the S&P 500 index. Results showed that the new approach led to better predictions for over 240 stocks compared to the original score. While the improvements are clear, there is still room to refine the strategy further.

POSTER A35

Examining Socioeconomic Factors and the Prevalence of Type 2 Diabetes: A Literature Review on Food Access, Fast Food Density, and Health Literacy

Mekahla Simpson

Mentor: Michelle Rossi
Queensborough Community College

Type II diabetes is a chronic condition that affects blood glucose regulation, and it disproportionately impacts individuals from lower socioeconomic backgrounds. According to the Centers for Disease Control and Prevention (CDC), over 38 million Americans have diabetes, with approximately 90–95% of those cases being Type 2. While often portrayed as solely the consequences of poor individual choices such as diet and inactivity, research suggests that systematic factors like food access, income, health literacy as well as the environment plays a more significant role in the prevalence of diabetes. This literature review explores the relationship between the incidence of type II diabetes and lower socioeconomic status individuals, with emphasis on critical factors such as the predatory acts of these fast-food places in lower socioeconomic areas with limited health literacy, food access and income. Lower income neighborhoods are often subjected to various disadvantages including an oversaturation of fast-food establishments, fresh produce, and fewer opportunities for diabetes preventative care. Individuals with limited health literacy are less likely to comprehend the causes and effects of diabetes, early signs, and the importance of managing diabetes well. This research contains findings from peer-reviewed journals, public health literature as well as data from credible organizations and government websites. This research highlights the urgent need for policy reforms and public health interventions. We risk continuing a cycle where diabetes isn't just a disease, but a proven symptom of inequality, if we refuse to address the systemic roots of this epidemic.

POSTER A36

Organic Solar Cell and Singlet Fission via Molecule Co-Crystal Engineering

Isaac Steltzer, Junho Kwon, Toulik Maitra, Luis M. Campos, Adam Moulé

Mentor: Sujun Wei
Queensborough Community College

Singlet fission is a photophysical process in which two triplet excitons are generated from

only one singlet exciton (i.e. photon) in organic solar cells. It is a promising way to surpass the Shockley-Queisser limit of traditional single-junction solar cells and thus boost the device's overall efficiency to convert sunlight into electricity. Despite the recent advances in the field, control of molecular distance and coupling is critical for engineering more optimal singlet fission materials. Herein we report our preliminary effort and plan on how to tune Singlet Fission process via co-crystallizing a imidazole-pentacene derivative with various hydrogen bond donor compounds.

POSTER A37

Analyzing the Impact of Electric Vehicle Adoption on Greenhouse Gas Emissions in New York City

Phone Min Thant

Mentor: Dugwon Seo
Queensborough Community College

Greenhouse gases (GHGs), such as carbon dioxide, are a leading cause of global climate change, and the transportation sector remains one of the largest contributors to these emissions in urban areas. In response, green technology solutions like electric vehicles (EVs) have been widely promoted for their potential to reduce emissions and improve air quality. The purpose of this study is to investigate whether the rise in EV usage across New York City has contributed to a measurable decrease in GHG emissions over time. By analyzing trends in both air quality data and vehicle registration records, this research seeks to determine whether EV adoption is truly making an environmental impact as often claimed. To carry out this study, EV registration data from the state of New York will be collected and analyzed alongside publicly available data on atmospheric GHG concentrations in NYC. The datasets will be processed using MATLAB to examine correlations between increased EV usage and changes in GHG levels. We expect to find that increased EV adoption correlates with a gradual decline in greenhouse gas concentrations, supporting claims that EVs can help mitigate transportation-related emissions. The outcome of this study may help policymakers and environmental planners better understand the real-world effectiveness of EVs and guide future strategies for sustainable urban transportation.

POSTER A38

Life's Uneven Playing Field: The Role of Social Determinants in Diabetes and Diabetic Ketoacidosis (DKA)

Nayla Walters

Mentor: Michelle Rossi
Queensborough Community College

The management of diabetes requires more than insulin; it depends on access to care, education, and social support. This project examines how socioeconomic status, healthcare accessibility, and support networks affect blood sugar regulation and increase the risk of diabetic ketoacidosis (DKA), a life-threatening complication. A literature review was conducted using peer-reviewed studies from databases such as PubMed and CINAHL, focusing on research published between 2015 and 2025. Findings revealed that patients with lower income, limited insurance, and weak family or community support were up to three times more likely to experience uncontrolled glucose and DKA. These results highlight the need for a broader approach to diabetes care, one that includes addressing social barriers. By identifying and reducing these barriers, healthcare providers and policymakers can improve outcomes and lower the risk of complications like DKA in vulnerable populations.

POSTER A39

Diamonds from Depth: Insights into the Mantle Composition of the Slave Craton

Megan Wuerz

Mentor: Rondi Davies
Queensborough Community College

The mantle is Earth's thickest and most voluminous layer, located between the crust and the core. This study investigates the deep mantle composition beneath the Slave Craton in the Northwest Territories, Canada, through the analysis of micro-diamonds recovered from kimberlite pipes in the Lac de Gras (LDG) area. Kimberlitic magma originates at depths of around 150 km, where extreme temperatures and pressures allow carbon to crystallize as diamond. As the magma ascends, it forms pipe-like intrusions that transport diamonds and mantle materials to the surface, offering a rare opportunity to study deep Earth processes. Diamonds formed between 30 and 670 km depth often contain mineral inclusions that remain chemically unaltered, preserving a geologic record of their origin. Fifty micro-diamonds from seven kimberlite pipes were analyzed for color, growth features, and resorption characteristics using a binocular microscope. Analysis at the American Museum of Natural History includes the use of Raman spectroscopy to identify mineral inclusions. These inclusions will clarify the mineralogy of the ultradeep mantle and provide insight into the conditions at which these diamonds formed. This research enhances our understanding of the composition and evolution of Earth's deep interior beneath the Slave Craton.

POSTER A40

Extending Candlestick Encoding for Improved Stock Price Prediction

Iman Zahid

Mentor: 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.

To evaluate its effectiveness, we trained machine learning models using both the standard and enhanced encodings. 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. In this phase of our research, we have successfully identified key candlestick types: Tall White (TW), Short White (SW), Tall Black (TB), and Short Black (SB), with

a default classification of 'M' for any candlestick that does not meet these criteria.

The significance of these findings lies in their ability to add granularity to candlestick analysis. By distinguishing between tall and short candles, we can better understand market behavior and improve the precision of trend predictions. This structured classification lays the groundwork for encoding patterns in a way that reflects both the direction and intensity of price changes.

Our next steps will involve developing Small (S), Medium (M), and Tall (T) classifications to replace the default 'M' designation. We plan to analyze historical price spreads to define thresholds for these categories, ensuring that the encoding system reflects the nuances of market behavior.

As the research progresses, we aim to transition entirely to an encoding system that exclusively utilizes S, M, and T classifications. This streamlined approach will enhance the effectiveness of our predictive models by reducing ambiguity and focusing on size-based distinctions.

While we are in the early stages of implementing these refinements, we believe this work will help improve our understanding of stock price dynamics and make predictions more accurate by capturing variations in price movements that traditional encodings miss. Adding Small (S), Medium (M), and Tall (T) classifications creates a more detailed way to analyze market behavior, making it easier to detect trends by reflecting the size of price changes.

This enhanced system should give a clearer picture of price movements, which can improve how predictive models identify patterns and make forecasts. With more accurate inputs, these models can better predict future trends. The refined approach also provides traders and analysts with better tools to understand price fluctuations, helping them make smarter decisions. By combining traditional candlestick analysis with modern data-driven methods, this research takes a meaningful step toward improving financial forecasting.

YORK COLLEGE

POSTER A41

Understanding Sis1 in Inclusion Formation

Greg Fayz

Mentor: Lesley Emtage
York College

Inclusions of disordered proteins are a hallmark of many neurodegenerative diseases, including Huntington's disease. This condition is caused by expansion of a polyglutamine tract in the huntingtin protein, resulting in mutant huntingtin (mHtt) that is unstable and accumulates in large intracellular inclusions in affected individuals and in eukaryotic cell models. Using *Saccharomyces cerevisiae* expressing mHtt-GFP, we observed that mHtt-GFP inclusions are dynamic, mobile, gel-like structures that concentrate mHtt along with the essential chaperone proteins Hsp104, Rnq1, and Sis1. When RNQ1 and HSP104 were deleted, inclusion bodies within cells decreased; however, deletion of Sis1 was lethal, underscoring its essential role in cell viability. To visualize Sis1, we fused the fluorescent protein mCherry to its C-terminus, but this tagging disrupted the formation of a single inclusion body, resulting in multiple smaller inclusions and highlighting Sis1's critical role in inclusion organization. Alternatively, we tagged mCherry at the N-terminus; however, we were again unable to recover viable strains or detect expression, suggesting that N-terminal tagging renders Sis1 non-functional and likely lethal. Although inducible expression experiments of Sis1-mCherry were not performed, plasmid construction was successfully initiated, laying a strong foundation for future studies. These findings emphasize both the essential nature of

Sis1 and its sensitivity to terminal modification in the context of inclusion formation.

POSTER A42

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

Niroj Koirala

Mentor: 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 A43

Gamma-ray Detection of Galaxy Clusters

Joseph Z. Ogden

Mentor: Timothy Paglione
York College

As the largest gravitationally bound structures in the universe, galaxy clusters are home to a variety of processes, the study of which provides insight on how the clusters and their member galaxies evolve. Throughout a cluster, there is a hot (10^7 - 10^8 K) and extended (~10^7 ly) region of plasma known as the intracluster medium (ICM). Most of the cluster's matter resides in the center of its ICM - these denser regions emit copiously in the x-rays, thus cooling to become so-called "cool core (CC) clusters." However, some clusters exhibit instead disrupted, hotter, and more entropic "non-cool cores" (NCCs). Multiple events most likely create the conditions for a NCC, most prominently: cluster-cluster mergers, galaxy-scale winds from supernova explosions, and outbursts from relativistic jets of matter from supermassive black holes. These phenomena create large-scale shocks which are known to accelerate charged particles to nearly the speed of light. Known as cosmic rays (CRs), these particles can interact with ambient gas, radiation, and magnetic fields, eventually leading to gamma-rays and radio emission. We present a multiwavelength analysis of 210 nearby clusters ($z < 0.1$) selected from the second Planck Sunyaev-Zeldovic catalog. Using data from observatories such as the Fermi Gamma-ray Space Telescope, Chandra X-ray Observatory, and the Low Frequency Array, we attempt to detect, explain, and connect the high energy emission in clusters to the extreme physical processes that cause them.

POSTER A44

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

Md Rashidul Imran Sunny

Mentor: Ruel Z. B. Desamero
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.

POSTER A45

Prompt Engineering: Unlocking Better Responses from LLMs

Ngawang Tendrel Samdrup

Mentor: 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.

DAY TWO, JULY 9
POSTER SESSION B

GUTTMAN COMMUNITY COLLEGE

POSTER B1
Fiction and Nonfiction Accounts of Past, Present, and the Future

Nadim Ali

Mentor: Ria Banerjee
Guttman Community College

Literary narratives grounded in scientific data enhance climate discussions by making complex ideas emotionally relatable. The study "Literary Interventions in Climate Change Discourse" examines the impacts of polar ice melt, focusing on South Asia and New York City, and integrates climate research with climate fiction (cli-fi) to show how authors like Amitav Ghosh and Kim Stanley Robinson convey scientific facts. Ghosh's works, such as "*The Nutmeg's Curse*" and "*The Hungry Tide*," explore colonialism's environmental effects and the collaboration of local knowledge with science. "*Gun Island*" links climate-driven migration from Bangladesh to Venice. Robinson's "*New York 2140*" portrays a submerged Manhattan, highlighting social adaptations to rising sea levels, and the durability or failure of capitalist systems in the face of climate collapse. By merging storytelling with science, literature curates public engagement and understanding of climate issues, ultimately promoting collective action and awareness in diverse communities.

POSTER B2
Brewing Temperature Effects on the Total Antioxidant Capacity in Arabica Dark Roast Coffee

Lisa Ansvananda

Mentor: Chulsung Kim
Guttman Community College

Coffee is a widely consumed beverage and a primary dietary source of antioxidants, particularly in Western populations, where it often contributes more to antioxidant intake than fruits and vegetables due to its high consumption frequency. However, the effect of brew temperature on this benefit in coffee remains under-explored. Therefore, this study investigated how brewing temperature impacts coffee's total antioxidant capacity (TAC). Arabica dark-roast beans were obtained and ground using a commercial grinder, followed by sieving to collect unform-sized coffee (0.35–1.00 mm). The coffee was brewed at a 20 g/L coffee-to-water ratio across temperatures ranging from 0°C to 100°C at a rotating mixer for 10 minutes. Each extract was filtered and diluted to analyze the total antioxidant capacity using the Trolox Equivalent Antioxidant Capacity (TEAC) assay at a wavelength of 735 nm on an Aquamate 8000 UV-Vis spectrophotometer. The results demonstrated that hotter brewing enhances antioxidant extraction from Arabica dark-roasted coffee. The Pearson correlation coefficient between temperature and the TEAC value is 0.608, with a P-value of 0.00748, indicating a statistically significant positive relationship between temperature and antioxidant availability.

POSTER B3

Decision Trees for Explainable AI

Christopher Cruz

Mentor: Dara Pir
Guttman Community College

This study investigates various classifiers to identify those that yield explainable results. Decision trees were identified and subsequently given focus because their outcomes can be easily explained using visual representations. The performance and characteristics of a decision tree classifier is examined on a well-known dataset.

POSTER B4

Literary Interventions in Climate Change Discourse: Using the *All of Us* Research Data Browser to Explore Allele Frequencies

Ejatu Jalloh

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Guttman Community College

Body odor and earwax can tell us a lot about genetic and human diversity. Within this project, we focused on the ABCC11 gene, specifically the rs17822931 variant, which decides whether someone has wet or dry earwax and how strong a person's body odor is. To explore how common this variant is in different populations, we used the All of Us Research Program data browser to search up the genomic variant. We found that the 'A' version of the gene which is linked to dry earwax and little or no body odor is most common in East Asian populations with a frequency of 0.7884. It's very rare in African populations with a frequency of only 0.0269. European, South Asian, and American populations had frequencies in between. The All of Us data browser made it easy to view this kind of genetic information. Instead of the old-fashioned library research, we could quickly find and compare allele frequencies for the rs17822931 variant. The browser shows the data separated clearly by genetic ancestry populations making it easy to spot patterns when searching through the different queries. This made the research process much faster and helped us understand how one small gene change connects to bigger questions about human genetic diversity.

POSTER B5

The Correlation between Total Amount of Antioxidant Capacity and the Available Polyphenols in Various Vegetables

Nathalia Marmol

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Guttman Community College

Antioxidants play a crucial role in protecting cells against oxidative stress and offer health benefits such as the reduction of numerous health diseases like heart disease, cancer, and even neurodegenerative disorders. Antioxidants are a reducing agent that protects cells from harm or damage by neutralizing free radicals. It is also notable that antioxidants, polyphenols, and vitamin C are all involved in reducing inflammation, which protects cells from damage. This study focused on the total antioxidant capacity and total polyphenol vegetables. Vegetables are known and consumed by many, so this research takes a step to study the relationship between the total antioxidant capacity and the total polyphenol content in eight common vegetables. The Trolox Equivalent Antioxidant Capacity (TEAC) and Folin-Ciocalteu methods were used to evaluate the levels of antioxidants and polyphenols in these various vegetables, respectively. Statistical tools were adopted to investigate the relationship between total antioxidant capacity and total polyphenol content in the vegetables. Experimental results showed that vegetables with high polyphenol content do not always show high antioxidant capacity. A statistically significant negative correlation with the Pearson correlation constant of -0.88 was observed with a p-value of 0.0033. These findings contribute to our understanding

of vegetable nutrition and support further exploration in food chemistry and health science education.

POSTER B6

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

Nicolli Mesquita, Emiliano Corte

Mentor: 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 B7

Preventing Healthcare Data Breaches: Investigating the Role of AI

Keoni Quiroz

Mentor: Laquan Black
Guttman Community College

As healthcare systems become increasingly digital, data breaches pose a more significant threat to patient privacy, institutional trust, and operational integrity. With over 500 million healthcare records compromised between 2010 and 2023, the healthcare industry remains the most targeted for cyberattacks. These breaches not only carry profound negative financial costs estimated at $9.77 million per breach in 2024 but also discourage patients from seeking crucial care, creating long-term public health consequences. Artificial Intelligence (AI) offers innovative solutions to strengthen cybersecurity. Through real-time monitoring, predictive analysis, and anomaly detection, AI enables healthcare organizations to identify threats early, automate responses, and manage vulnerabilities. Deep learning techniques, such as Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), help detect irregular patterns in large data sets, enhancing system security. Despite these advancements, challenges remain. Limited resources and insufficient communication among healthcare professionals hinder widespread AI adoption. Using a socio-technical innovation system (TIS) framework, this review identifies key structural and functional barriers to AI integration. With targeted policy interventions and increased support, AI can evolve from a supplementary tool to a front-end component of healthcare cybersecurity. Naturally, adopting AI-driven solutions is essential to protect patient data, ensure compliance, and maintain public trust in an increasingly connected digital environment.

KINGSBOROUGH COMMUNITY COLLEGE

POSTER B8

Micro-Raman Imaging of High-Pressure Phases in Gujba Meteorite: Insight into Shock Metamorphism

Faruq Anjorin

Mentor: 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.

POSTER B9

Assessing the Effectiveness of N95 and Surgical Masks in Filtering Surgical Smoke with and without Smoke Evacuators

Solomon Asotie

Mentor: Roxanne West
Kingsborough Community College

Surgical smoke is a cloud of harmful particles released into the air during surgeries that use tools like lasers or electrocautery. It is made up of chemicals, gases, and tiny bits of tissue, and can be dangerous to breathe in. Healthcare workers who are in the operating room every day are at risk of breathing this in, which can lead to health problems such as eye and throat irritation, coughing, and even long-term lung damage. Many people think that wearing a face mask is enough to protect them, but that's not always true.

This study looks at how well N95 masks and surgical masks protect against surgical smoke, and whether smoke evacuators—a device that sucks smoke out of the air—make a difference. We reviewed past studies, safety guidelines, and data from trusted health organizations like the CDC and NIOSH. We found that N95 masks work much better than regular surgical masks. On their own, N95s block about 87–95% of harmful particles, while surgical masks only block 60–70%. When smoke evacuators are used, both masks perform better—N95s can reach up to 100% protection, and surgical masks can go up to 70–80%.

Unfortunately, many hospitals still don't use smoke evacuation systems regularly. This is often because there are no clear rules or because staff don't know how important these systems are. Our research shows that combining the right masks with smoke evacuators can make a big difference in keeping healthcare workers safe. More awareness and better policies are needed to protect the people who work in operating rooms every day.

POSTER B10

Unearthing Ancient Life: Biodiversity of the Devonian Community in Vestal, NY

Wyche Auguste

Mentor: Kristin Polizzotto
Kingsborough Community College

Understanding ancient ecosystems helps us see how life has changed over time. My research examines the Devonian fossil assemblage in Vestal, NY (approximately 372-382 million years ago), a time of significant climate change with resultant mass extinction in marine ecosystems. By studying the fossils, I aim to determine the biodiversity in this specific time and place, which has never been studied previously.
I examined fossils previously collected from one locality in Vestal, and attempted to identify each species present. The research suggests this was a typical shallow marine subtropical ecosystem, consisting of crinoids, brachiopods, gastropods, bryozoans, and bivalves.

I used published monographs of Devonian fossil assemblages to identify the species from the Vestal locality. Although it was not possible to identify each specimen to genus and species level, most were identified to family. Characterizing the Vestal fossil community, which has never been published on before, will allow future comparison to other, nearby Devonian fossil assemblages, expanding and clarifying research into the timing and locations of the marine ecosystem response to climate change.

POSTER B11

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

Tareq Awawdeh

Mentor: Roberto Mariani
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 B12

Geo Code – A Tool for Mineral Estimation

Mireya P. Cortes

Mentor: Steven Jaret
Kingsborough Community College

Geo Code is an interactive app designed to help geology students and researchers practice estimating mineral percentages in rock samples. It displays randomized black and white patterns that visually represent different concentrations, giving users a fun and engaging way to build their visual estimation skills.

The backend is built in Python and uses NumPy, io, and Matplotlib to generate dynamic heatmaps on a 10x10 grid. Each image reflects a specific mineral percentage, ranging from 5% to 100%, and is randomized to ensure variety with each attempt. The backend is deployed to the cloud using Flask and Render, making it accessible, shareable, and easy to update. The frontend, developed in Flutter, supports both Android and iOS. As development continues, the frontend and backend are being connected to provide smooth, real-time interaction between the user and the image generator.

The project originally began with static images using Python's Pillow library, but the process proved too limiting. Switching to dynamic heatmap generation gave us the flexibility, speed, and realism we needed to move forward. The ultimate goal is to transform Geo Code into a game-like learning tool, similar to *WORDLE*, where users guess the mineral percentage based on the image. This hands-on approach makes mineral estimation more approachable, visual, and fun for learners of all levels.

POSTER B13

UX Immersion Research: Unlocking Deep Insights for Seamless User Experiences

Tanzeela Jahangir

Mentor: Nathan Cooper
Kingsborough Community College

The field of User Experience (UX) design is expanding rapidly; however, many students face difficulties transitioning from classroom learning to real-world practice. This research explores the implementation and impact of a UX Immersion Program that addresses this gap by providing structured, hands-on experiences within the college community. The purpose of the program is to enhance student understanding of UX tools, methods, and practices through interdisciplinary collaboration with faculty, departments, and peers. The hypothesis guiding this work is that campus departments can benefit from UX design contributions, while students gain practical experience that improves their portfolios and employability.

A mixed-methods approach is used to conduct this study. After receiving IRB approval, a set of interview questions was developed to identify potential areas where UX design could be applied. Faculty connections were initiated through events such as the faculty achievement ceremony and outreach via the PTK advisor and UX Design professor. A consent form was created, and interviews—conducted both in-person and via Zoom—were held with representatives from the Student Union and Intercultural Center, Institutional Advancement, and the Departments of Physical Sciences, Biological Sciences, and English department. Currently, the project is in the data analysis phase, where insights from interviews are being synthesized into user profiles. We are using the UX Design Diamond method, a method given

from British design council to develop a solution. Proposed outcomes include digital tools, game and instructional design solutions, and experiential research initiatives. The next stage involves pairing students from the Art and UX departments with these opportunities, ensuring they are compensated. This will complete a scalable model for skill-based, on-campus internships. A key component of the program is fostering interdisciplinary collaboration, expanding both the reach and educational value of the initiative.

POSTER B14

Characterization of Genomic Insertion Sites in Chlamydomonas Mutants

Joshua Johnson, Sigournia Tait

Mentor: 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 B15

Beyond Crowns: Species Identification of Crinoids through Columnal Fossils

Lorasia Swift

Mentor: Kristin Polizzotto
College: Kingsborough Community College

This research investigates whether different crinoid species can be distinguished based on their columnal or stem fossils, using specimen samples from Vestal, a small town in South Central New York. This marks the first time these fossils have been utilized for species diversity research, adding new geographic and geological context to crinoid studies. Crinoids, an ancient class of marine echinoderms, are typically identified by crown morphology; however, the abundance of columnal remains in the fossil record suggests these structures may contain species-specific characteristics useful for identification in the absence of crowns. Employing morphological methods, we analyze columnal fossils from Vestal to assess patterns and variations within and between species. Results indicate that specific columnal features, such as shape, ornamentation, and dimensions, may reliably differentiate species, though some overlap exists. These findings contribute to a more nuanced taxonomy and enable more accurate palaeoecological interpretations based on incomplete fossil records.

POSTER B16

From Displacement to Empowerment: The Role of Youth Initiatives in Brooklyn's Sudanese Community

Doha Omer

Mentor: Raymond Fong
Kingsborough Community College

The Sudanese population in Brooklyn is sizable, numbering over a thousand residents and far outpacing other New York City boroughs, where the population remains under two hundred (Census, 2020). Like many diasporic communities, Sudanese residents have established cultural spaces to preserve their heritage. These spaces, known as "Dar Jalia," or simply "Jalia," translate to "community." One such center in Brooklyn's Kensington neighborhood serves as a hub for local Sudanese residents. It hosts major cultural events, such as the Sudanese Independence Day celebration, and offers services including funeral arrangements. By fostering cultural practice and education, the Dar Jalia helps sustain Sudanese traditions and identity.
Since war erupted in Sudan in 2023 between the Rapid Support Forces (RSF) and the Sudanese Armed Forces (SAF), the center's importance has grown. With more Sudanese immigrants arriving in Brooklyn, displaced by the proxy war, membership has expanded rapidly.
My project focuses on the New York State Youth Jalia (NYSYJ), a subgroup within the Dar Jalia that has helped reshape the community's view of the center. In interviews with Shayma Ali, NYSYJ leader, and Elfatih Ibrahim, Dar Jalia president, both highlighted the unprecedented level of youth involvement. Driven by the war's impact, the NYSYJ has taken a lead role in organizing events; from Independence Day festivities to Sudanese Trivia Game Night and the Cultural Showcase. These events are culturally significant and designed to engage younger community members. One standout initiative, Week4Sudan, included a youth therapy circle led by a Sudanese therapist and a film screening showcasing Sudanese artistic talent.
Field visits and on-site reporting revealed a consistent theme: many who had previously distanced themselves from the Jalia have returned, now actively volunteering or attending events. Once dismissed as a space overrun by internal politics and generational divides, the Dar Jalia has been reinvigorated by NYSYJ. Their efforts have reshaped the center's perception, giving it renewed energy and purpose.

POSTER B17

Design of a Low-Cost Potentiostat for a Comparative Study with a Commercial Potentiostat, Measuring the Concentration of Melatonin

Lorenzo Progonati

Mentors: Michael Danza, Homar Barcena
Kingsborough Community College

This research presents the design of a low-cost, microcontroller-based potentiostat which will measure melatonin concentration and compare our results with Vernier Potentiostat. The project is designed to introduce undergraduate students to electrochemical techniques and hands-on circuit design using accessible electronic components.

The purpose of the project is to create a system that is not only affordable but also capable of delivering accurate electrochemical measurements, making it a viable alternative to commercial potentiostats like those offered by Vernier. To ensure usability, the system includes a LabVIEW-based graphical user interface for real-time data visualization, eliminating the need for advanced programming knowledge.
Although the final steps of the experiment are not finished yet, the process so far has significantly expanded my practical understanding of electrochemistry. I have designed the prototype potentiostat which will be used in the comparative experiment. In addition, while designing the 3D-printed

prototype case I faced difficulties in the Ultimaker 3 software that caused our 3D printing to last for a long time, because we needed to remeasure our prototype case and to transfer them correctly to the updated Ultimaker 3 so they could be printed properly.

For now , we are measuring the concentration of melatonin with our prototype and parallel experiment using a commercial potentiostat from Vernier. This comparison will allow us to analyze the accuracy and performance differences between our low-cost system and the commercial-grade device.

Once experiments are completed, the device's accuracy and reliability will be evaluated through comparative testing with a research-grade potentiostat. My Goal is to demonstrate the educational potential of low-cost electrochemical instruments, particularly in resource-limited academic environments.

POSTER B18

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

Maureen Sam-Okomgboeso

Mentor: 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 face unique challenges when adapting to digital platforms, which impact 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 B19

Engineering Solutions for Upcycling Waste E-Vapes

Mykyta Satanovskyy

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Kingsborough Community College

The increasing use of single-use vapes has contributed to the growing issue of electronic waste, particularly through discarded lithium-ion batteries. This research investigates the potential to repurpose these batteries into functional, low-cost portable battery packs. The

goal is to reduce e-waste while creating sustainable energy storage solutions. The hypothesis is that a significant portion of lithium-ion cells recovered from disposable vapes retain enough capacity and safety margin to be reused effectively. To test this, 250 disposable vapes were collected and disassembled to isolate lithium-ion cells. Batteries are currently being evaluated using a battery tester to measure remaining capacity and internal resistance, ensuring only viable cells are reused. Additional tools include multimeters and soldering tools are used. Additive manufacturing is being used to design, and 3D print custom casings for safety and usability. Preliminary observations indicate that many of the recovered batteries are physically intact and likely reusable, but full testing is still underway. Next steps include completing battery capacity and safety testing, assembling multiple battery packs, evaluating performance under different load conditions, and finalizing 3D-printed enclosures for safe operation. This study presents a scalable, cost-effective method for repurposing vape batteries and reducing their environmental impact.

POSTER B20

Fractured Foundations: Exploring the Impact of Adverse Childhood Experiences (ACEs)

Shaniqua J. Simmons

Mentor: Sue-Melissa Burgher
Kingsborough Community College

Did you know that we often subconsciously seek out our old emotional wounds? While you may not consciously Remember these traumas; your nervous system certainly does. This idea is closely linked to Adverse Childhood Experiences, commonly called ACEs. But what exactly are ACEs? They are traumatic events that occur during childhood, such as losing a loved one, growing up in a single-parent homes, or even those coming from poor urbanization. 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 B21

Exploring the Connection Between the Human Subconscious and Physical Objects: A Potential Shift in Surgical Robotics

Niharika Singh

Mentors: Anupam Pradhan, Tyronne Johnson
Kingsborough Community College

The human mind has long intrigued researchers due to its extraordinary potential. It is widely accepted that thoughts can influence physical health—positivity, for instance, is often associated with self-healing. This research explores the lesser-understood frequencies and vibrations of the subconscious mind, focusing on its potential interaction with physical objects.

Our goal is to harness this connection to simplify and improve current surgical robotic systems. We propose that a thoughtless or meditative state of mind may not only promote healing but also interface with external devices.

This study aims to demonstrate that individuals subconsciously resonate with specific physical objects based on unique frequencies. Understanding this connection could inform the development of more intuitive and efficient surgical robots.

Hypothesis**:** The human subconscious mind, in a thoughtless state, connects with particular physical objects that share matching vibrational frequencies.

Methods: Interviews – Conducted with surgical and medical professionals to identify technological limitations and challenges in current surgical robotics.

Blinded Study – Designed to gather data on the subconscious mind's interaction with physical objects without conscious interference.
We are currently in the process of obtaining IRB approval to begin data collection.

POSTER B22

Comparison of Protein Content of Fish Available in New York Markets

William Smith

Mentor: Farshad Tamari
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 B23

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

Anastasiia Tarasova

Mentor: Farshad Tamari
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 mentioned above, 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 hypothesized. Also as hypothesized, 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 B24

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

Sukhrob Ulugmuratov

Mentor: Roberto Mariani
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 B25

Morphology, Microscopy and Mapping the Spider Genus *Zelanda* (Araneae: Gnaphosidae)

Joianne Bittle

Mentor: Boris Zakharov
LaGuardia Community College

This CRSP study aims to enhance the imaging, analysis, and revision of ground spiders Araneae: Gnaphosidae using AI mapping tools integrated with Photoshop, microscopy techniques, and NIS Elements software. The genus *Zelanda* (Gnaphosidae), initially described in 1979 and subject to taxonomic revisions, exhibits diversity across New Zealand and Australia. Based on museum specimen examinations, past studies focused on *Zelanda*'s close relationships to related species and its unique morphological features, including reproductive organs. The findings showed a broad distribution and commonality within both regions. Each week, detailed microscopy of the genus *Zelanda* alongside other species' groups continues to be documented at the American Museum of Natural History (NYC). To understand biogeographical analysis, ArcGIS was used in conjunction with advanced AI tools to produce mapped visualizations of pinned locations, referencing assigned literature. In the future, these techniques could provide valuable insights into the distribution and taxonomy of ground spiders, particularly across regions such as New Guinea, Australia, and New Zealand.

POSTER B26

From Humans to Sea Stars: Adapting Nanobodies to *Patiria miniata* Proteins for Advancing Reproductive Longevity Studies

Hui Meng Chen Li

Mentors: Reem Mourtada, Thomas M. Onorato
LaGuardia Community College

Echinoderms (e.g. sea stars) are model organisms with emerging roles in translational reproductive biology research focused on ovarian reproductive longevity. The lack of commercially available nanobodies that recognize echinoderm proteins impedes such research. Nanobodies are a subclass of antibodies that are extremely small in size, derived from camelids- camel antibodies lacking light chains, and are a versatile tool in multiscale biological imaging. However, *de novo* production of custom nanobodies is cost prohibitive and time consuming. Our long-term goal is to utilize computational biology to identify existing nanobodies that recognize reproductive proteins from animals, like humans, and modify them to bind sea star homologs.

Here we report preliminary computational work with carbonic anhydrase, a protein expressed in *Patiria miniata* (*Pm*) ovaries. Carbonic anhydrase, an enzyme involved in the reversible hydration of carbon dioxide, is believed to play an important role in regulating the ovarian environment in *Pm*, potentially influencing fertility and reproductive longevity. SabDab-nano and PlabDab-nano databases and iCn3D software from NCBI were used to align carbonic anhydrase sequences, analyze potential interaction sites, and simulate random mutations in the nanobody sequences to explore how slight modifications could enhance alignment and improve binding specificity to *Pm* carbonic anhydrase. These findings serve as a preliminary step toward developing novel nanobody-based reagents that can be used to visualize, track, and study how proteins, like carbonic anhydrase, function in sea star ovaries.

Ultimately, this work lays the foundation for using nanobody technology to explore and translate protein dynamics in emerging model marine organisms and humans.

POSTER B27

From Equations to Reality: Analyzing Pendulum Dynamics with Tracker and Numerical Methods

Rinzin Chhomu Lama, Jiale Lin

Mentor: Milena Cuellar
LaGuardia Community College

This project explores the dynamics of pendulum systems through a combination of theoretical modeling, numerical simulations, and experimental analysis. Building on classical mechanics and introductory differential equations, we implemented numerical methods—Euler and Runge-Kutta 4th order—to solve the equations governing simple and double pendulum systems. A key component of our work involved using Tracker, a video-based physics software, to extract data from real pendulum motion. This allowed us to compare experimental observations with theoretical predictions and numerical simulations. By analyzing discrepancies between the model, the simulation, and real-world behavior, we investigated sources of error and the limitations of mathematical models. This integrated approach not only deepened our understanding of chaotic systems and sensitivity to initial conditions but also developed our skills in programming, experimental design, and model validation.

POSTER B28

25W Polycrystalline Photovoltaic Module: Experimental and Computational Analysis in Long Island City, New York

KinFung Chou

Mentor: Reginald Eze
LaGuardia Community College

A 25W polycrystaline solar module was to experiment on the efficacy of solar power generation in Long Island City, New York, under varying experimental facotors. MATLAB Simulink, a theoretical model, was used to validate the experimental result using the input parameters: temperature and photo-cúrrent, to obtain the output paraters: output current, output voltage, and power. We found good agreement in both experimental and computational results. This approach will help validate theoretical models and provide valuable insights that will help optimize solar power performance.

POSTER B29

Underwater Acoustic Localization with Bayesian Learning

Enmanuel Carvajal, Sreya Dias,
Justen Gallagher, Jiale Lin, Miranda Schrade,
Melvin Schwartzbart

Mentors: Shenglan Yuan, Yun Ye
LaGuardia Community College

Underwater acoustic signals, or sound waves, are distorted by factors such as noise, refractions, and water depth, making it challenging to locate their source. The purpose of this project was to determine the efficacy of an adaptive learning algorithm in creating a model for estimating the location of an object emitting sound underwater. Using a hydrophone, we recorded subaquatic acoustic signals in the form of music to quantify the channel's distortions. We derived channel response coefficients using a Bayesian (or adaptive

learning) model. With them, we calculated an absorption coefficient relating the distance between the sound and hydrophone to properties of the recording. Through the process of multilateration, we aimed to approximate, with minimal error, the location of the acoustic source. Our adaptive learning model converges on channel response coefficients with increasing accuracy, leaving a strong foundation for continued efforts in underwater acoustic localization.

POSTER B30

Salt Marsh Habitat:
Restoration with Floating Pallet Design

Onyinyechi Erondu

Mentor: Sarah Durand
LaGuardia Community College

Newtown Creek's lost salt marsh of cordgrass (*Spartina alterniflora*) once formed vibrant tidal meadows within Long Island City and Greenpoint, supporting rich ecosystems of filter-feeding mussels and oysters. Today, this urban estuary has lost its natural interface, walled in by bulkheads that eliminated critical water filtration and habitat services.

Our project developed methods to restore this living edge through two approaches: First, we explored several designs, ultimately constructing a prototype floating wetland using repurposed wood pallets as a structural base. This completely biodegradable system was designed to support marsh grasses and mussel settlement, with features like simple assembly and locally sourced materials making it community-friendly. Second, we modified existing wall-suspended grass basins by adding textured surfaces to test their potential for facilitating ribbed mussel (*Geukensia demissa*) colonization.

While preliminary monitoring shows *Spartina* successfully establishing in the floating wetland prototype, the adaptive design process has already yielded valuable lessons about material durability in urban marine environments. Our work establishes a foundation for rebuilding ecological interfaces in hardened waterways, with ongoing monitoring to assess mussel colonization. These nature-based prototypes demonstrate how accessible, low-tech solutions can help communities recreate functional living edges in urban estuaries.

POSTER B31

Keystroke Dynamics Authentication:
Classifier Accuracy Under Data Constraints

Ei Paing Paing Htwe

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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 four machine learning classifiers—Random Forest, 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 B32

Antibiotic Resistant Bacteria in Newtown Creek

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Mentors: Joby Jacob, Ingrid Veras
LaGuardia Community College

Combined Sewer Overflow (CSO) events are a major environmental and public health concern in urban areas like New York City, where aging infrastructure can't always handle heavy rainfall. These overflow events release untreated sewage into local waterways, including Newtown Creek, introducing contaminants such as antibiotic-resistant bacteria (ARB). This study investigates the presence of ARB in water samples collected from the Dutch Kills Tributary of Newtown Creek, a site directly impacted by CSO activity. Several ARB strains were identified in collected samples, raising concerns about the role of city sewage in accelerating the spread of antibiotic resistance.

POSTER B33

Exploring Prompt Injection: A Study of Prompt Manipulation Techniques and Defense Strategies

Rajwant Kaur

Mentor: Doyel Pal
LaGuardia Community College

ChatGPT, a type of Generative AI, creates human-like text based on the input it receives. Generative AI tools like ChatGPT, Claude, Copilot are becoming popular in fields such as education, programming, and communication because they can automatically generate responses, code, and even entire documents. Users interact with Large Language Models (LLMs) - the foundation of Generative AI - by providing prompts that guide the generation of desired outputs. Prompt engineering is the practice of designing and refining these prompts to guide an LLM, like GPT-4, LLama, Claude, etc. in producing the most accurate, relevant, or useful results.

In contrast, prompt injection is a type of prompt engineering attack where attackers manipulate prompts to bypass safety filters, extract sensitive data, and force undesired behavior by exploiting vulnerabilities in LLMs. This research explores a wide range of prompt injection techniques, including direct prompt injection, jailbreaks, obfuscation through encoding, social engineering prompts, and multi-turn manipulation. These techniques can lead to the generation of harmful content, the circumvention of safety mechanisms, and unauthorized model behavior.

To investigate and mitigate these threats, we studied various approaches such as prompt sanitization, reinforcement learning, monitoring and logging of prompts, and multi-layered safety filters. Our research aims to identify effective strategies and platforms for detecting and preventing prompt injection attacks, handling adversarial prompts, and ensuring the integrity of AI interactions.

POSTER B34

Do Microplastics Affect Cloud Formation?

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LaGuardia Community College

This study investigates the potential influence of oceanic microplastics on c loud properties over the Great Pacific Garbage Patch, a region in the central North Pacific Ocean where currents cause a high concentration of marine debris, primarily consisting of plastic that is subsequently broken down into microplastics. This remote oceanic location was chosen because it is a persistent, large-scale region where sea spray from waves aerosolizes marine plastics, allowing a study of their atmospheric influence with minimal effects from land. Using atmospheric ERA5 reanalysis data from 1980-2024 and an annual oceanic microplastic proxy, we analyzed interactions between them.

Quantitative analysis using Python-based regression models revealed a shift in cloud composition, showing that cloud ice content increased while total cloud cover decreased. A statistically significant finding ($p < 0.001$) identified a temperature-dependent interaction between the microplastic proxy and cloud ice water. Below the threshold of approximately 13°C (286.18 K), there is a positive association, indicating that higher microplastic proxy levels may be linked to an increase in cloud ice. Above the threshold, the relationship inverts to a negative association.

Current climate projections are primarily driven by CO2 models and predict a general decrease in global cloud coverage over time. This study suggests a potential counteracting effect, with the hydrophilic and ice-nucleating properties of atmospheric microplastics possibly promoting cloud formation or altering cloud composition in ways that are not yet accounted for. This study highlights a need to investigate the effects of aerosolized plastics to ensure the accuracy of future climate projections.

POSTER B35

Autonomous Drone Delivery in New York City: Feasibility and Implementation

Luis Laca, Ryan Dorestal, Miranda Schrade

Mentors: Malgorzata Marciniak,
Vladimir Przhebelskiy
LaGuardia Community College

This research explores the feasibility of implementing an autonomous drone delivery system in New York City. By evaluating urban infrastructure, technological innovation, and public perception, we seek to determine whether drone delivery can enhance safety, sustainability, and efficiency in the city's logistics network. Our study involves building a functional drone prototype, analyzing current delivery methods, assessing public opinion, testing operational viability, and presenting our findings as a startup pitch to policymakers. Our results aim to contribute to the discussion on modernizing delivery infrastructure with cutting-edge technology.

POSTER B36

Tensile Behavior of 3D-Printed Composite Specimens: A Parametric Study on Geometry, Materials, and Testing Methodology

Sujal Mahaseth

Mentor: Yves Ngabonziza
LaGuardia Community College

Using interdisciplinary approach that integrates CAD modeling, additive manufacturing, finite element analysis, and physical testing, the tensile behavior of a composite structural was studied. The composite specimen was designed in CATIA and SolidWorks, featuring advanced geometries such as interlocking and custom hook-based designs to enhance load distribution. Two filament materials, Polylactic Acid (PLA) and Polyvinyl Alcohol (PVA) were chosen for their contrasting structural and environmental characteristics. Fabrication was performed using both the Ultimaker Cura and Bambu Lab 3D printers to compare production consistency and dimensional compatibility. Tensile tests were then conducted using the Mark-10 universal testing system, paired with a custom fixture and geometry engineered for precision alignment and controlled force application up to 25,000 N. Finite element simulations were used to predict stress and strain distributions and identify potential failure zones, which were then cross-validated through experimental data. Results revealed that specimens with optimized geometries demonstrated superior mechanical properties, including higher tensile strength, more uniform strain profiles, and increased Young's modulus. The strong correlation between simulation and testing confirms the effectiveness of design-centric mechanical optimization. This project presents a scalable framework for evaluating and enhancing composite structures through parametric design and validation. Its findings

have practical applications in aerospace, biomedical, and sustainable engineering sectors, where strength-to-weight efficiency and customizability are critical.

POSTER B37

Bioinformatics Study of HIV Structural polyprotein-Gag-Pol

Thilleli Mehrazi

Mentor: Pratikkumar Rathod
LaGuardia Community College

Human Immunodeficiency Virus (HIV) is a highly infectious retrovirus that targets CD4 T cells, weakening the immune system and leading to Acquired Immune Deficiency Syndrome (AIDS) if left untreated. To date, HIV has affected millions of people worldwide, with no known cure. Understanding the molecular mechanisms of HIV replication and infection is crucial for developing effective treatments.
One key post-translational modification involved in HIV's life cycle is phosphorylation, which plays a vital role in activating viral proteins and regulating interactions with host cells. This research project focuses on the Gag-Pol structural protein, a critical component in viral assembly and replication. Through a bioinformatics approach, we aim to analyze phosphorylation sites within Gag-Pol to understand their role in viral replication and potential as drug targets. Identifying conserved phosphorylatable residues may provide insights into new therapeutic strategies to disrupt HIV's ability to replicate and spread.

POSTER B38

Decoding Jailbreaking Attacks using AI

Oluwafemi Oroyemi

Mentor: Doyel Pal
LaGuardia Community College

Artificial Intelligence (AI) enables smarter interactions with technology, using prompts to generate specific and useful responses. Tools like ChatGPT, Gemini, and Copilot can assist in tasks such as coding, content generation, data analysis, sentiment analysis, and cybersecurity support. Prompt engineering—the practice of crafting inputs to elicit desired outputs from AI models—can be used for both beneficial and malicious purposes. Understanding prompt engineering is essential for building secure and responsible AI applications. However, prompt engineering can also be exploited through prompt injections or jailbreak attacks, which manipulate AI inputs to produce harmful or unintended results. For example, attackers may prompt an AI model to generate malicious code or bypass built-in security filters.
Jailbreaking attacks, a subset of prompt injections, involve removing the safety restrictions and content filters, potentially exposing sensitive data or compromising systems. These attacks pose serious risks, including data breaches and unauthorized system changes. Detecting them requires monitoring for unusual input/output patterns and implementing safeguards such as network monitoring tools and restricting access to developer modes. In this research, we study different types of jailbreaking attacks and utilize platforms like Hugging Face and Purple Llama, which offer resources to train AI models capable of recognizing and mitigating these threats.

POSTER B39

Worlds Around Other Suns

Miguel Pacheco

Mentor: Joshua Tan
LaGuardia Communty College

Our research works to confirm the existence of exoplanets by conducting transit observations using remotely operated telescopes. Being a part of The American Museum of Natural History and as members of NASA's Exoplanet Watch, we have been connected to resources such as Amateur Astronomer Association of New York's Texas Gateway Telescope, Amateur Astronomer

Association of New York's Chile Gateway Telescope Gleb Polyakov's private observatory in Pie Town, New Mexico. These telescopes are our main source for collecting data which we later use to measure and observe changes in light that confirm a planet's existence as it orbits around its host star.

POSTER B40

College Success and Overcoming Adversity: The Impact of Parental Relations

Adriana Rampershad

Mentor: 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 current 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 attachment and parental relations and their connection to adverse childhood experiences (ACEs), resilience and college experiences. 117 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. Spearman Rank correlations were used and its results were Parental Relations and College Problems $r(115)= -.161$, $p=0.043$. Parental Relations and Childhood Attachment $r(115)= .693, p<.001$. Parental Relations and Asking for Help, $r(113)=.262$, $p=0.003$. Overall, parental relations are correlated with every measure of adversity that was used and with two measures of college experiences. Childhood attachment is positively correlated with all measure of college experience variables except education importance. This suggests that ACEs are intricately connected to parental relations and attachment, which in turn are correlated with college experiences. Thus, 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 effects.

POSTER B41

Attitudes on The Effectiveness of Suicide Prevention Methods

Nabina Sambahamphe

Mentor: Dusana Podlucka
LaGuardia Community College

Suicide remains a leading cause of death globally, emphasizing the need to evaluate diverse suicide prevention strategies. Despite the existing research on the effectiveness of various interventions, differences in attitudes toward their effectiveness remain underexplored. This study, which utilizes an online survey method, examines differences in attitudes toward the effectiveness of five suicide prevention methods: therapy, crisis hotlines, medication, lethal means restriction, and online mental health platforms across genders and history of suicidal thoughts. The sample is 112 subjects, members of the general public, although most respondents were college students. Gender differences were expected, with women perceiving therapy and emotional support strategies as more effective than men. Overall, it was expected that individuals who identify as others would have positive attitudes towards all the prevention methods. It was also hypothesized that individuals with a history of suicidal thoughts would rate therapy and crisis hotlines as more effective compared to those without such a history. While female respondents expressed more positive attitudes toward all five strategies than male respondents, all genders considered therapy and hotline crisis the most effective strategy. The most significant differences were in attitudes about online mental health platforms and self-harm restriction

methods, with more women considering them as effective. Respondents of other genders also showed favorable views on these methods. Additionally, the greater portion of respondents with a history of suicidal thoughts considered most of the strategies as effective. While there were minimal gender differences in attitudes about medications as an effective prevention method, those with a history of suicidal thoughts considered medication as an effective prevention method. The findings of differences in people's attitudes about suicide prevention methods highlight the importance of designing targeted methods of promoting and implementing such strategies for different groups.

POSTER B42

Vision in Action: Real-Time Object Following with YOLO and ROS

Sahilpreet Singh

Mentor: Praveen Kumar Khethavath
LaGuardia Community College

In this project, the Yahboom Transbot SE, a tracked robot platform powered by the Jetson Nano, was equipped with object-following and path-tracking features. Using the Robot Operating System (ROS) and the YOLO (You Only Look Once) object detection model, the study aimed to integrate robotic control with real-time computer vision. Flashing the system image onto the Jetson Nano and configuring the ROS environment, which acted as the framework for communication between the robot's sensors, camera, and movement controls, constituted the first step. Multiple object classes were identified and tracked in real time using the YOLO detection tool that came with the Transbot SE package. The robot was able to follow a moving target by continuously adjusting its orientation and velocity through the processing of the detection output. Additionally, path tracking was implemented through ROS-based navigation nodes, enabling the robot to follow a set route with basic obstacle awareness. Testing confirmed that the Transbot SE successfully detected and followed targets while maintaining path accuracy in controlled environments. This research highlights the potential of low-cost, ROS-enabled platforms in combining deep learning and robotics for autonomous navigation tasks.

POSTER B43

Strategies to Reduce Semiconductor Testing Time

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LaGuardia Community College

Semiconductor testing has become increasingly critical in today's rapidly evolving world, where advanced chip manufacturing drives innovations across industries. As chips develop to become more complex and densely packed, minimizing testing time without impacting their functionality has become a priority and challenging. This research investigates multiple strategies to reduce semiconductor testing time, focusing on test optimization techniques, machine learning-based pattern recognition, and adaptive test scheduling. Key approaches include parallel testing, machine learning-based pattern analysis, built-in tolerance design, early-stage testing integration, and adaptive test skipping based on defect prediction. This research is built upon an extensive literature review, supported by systematic analysis of test data provided by leading semiconductor manufacturers known for their robust testing frameworks and reporting standards. Results from these case studies indicate that testing time can be reduced by approximately 10% to 50%, without compromising fault coverage (maintained above 99%) or the functional integrity of the devices. Given that semiconductor test cost is incurred on a per-second basis, even modest reductions translate to significant savings in production costs and time-to-market. The findings suggest that intelligent testing strategies can significantly accelerate the test phase, improve production

efficiency, and lower operational costs. While the research is grounded in industry reported data and case studies, the findings would be further strengthened and validated through practical implementation or simulation using platforms such as Synopsys or Cadence in future work. Overall, the adoption of intelligent, data-driven testing strategies offers a promising pathway to substantially reduce semiconductor testing time and costs, while maintaining high standards of quality and reliability paving the way for faster, more efficient and advanced chip production in an increasingly competitive industry.

MEDGAR EVERS COLLEGE

POSTER B44

Identification of Anti-Cancer Activity Mauby (*Colubrina elliptica*) Extract using PC3 Prostate Cancer Cells

Janelle Addison

Mentors: Ijaz Ahmed, Alam Nur-E-Kamal
Medgar Evers College

Hypothesis: *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 PC3 cells*.

Method: We seeded PC3 cancer cells into 24-well culture dishes and incubated them overnight at 37°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.

Results: 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.

Conclusion: 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 B45

Can You Hear the Shape of a Drum?

Ezia Aka-Nama

Mentor: Terrence Blackman
Medgar Evers College

The question “Can one hear the shape of a drum?” asks whether the sound produced by a vibrating drum uniquely determines its shape. Introduced by mathematician Mark Kac in 1966, the problem lies at the intersection of geometry, physics, and spectral analysis. At first glance, it seems intuitive that each shape should produce a unique sound. However, in 1992, Gordon, Webb, and Wolpert demonstrated that distinct shapes can be isospectral—that is, they produce identical sound spectra. This surprising result reveals that sound alone cannot always determine shape. Studying this problem deepened my appreciation for how mathematics can challenge our intuitions and uncover unexpected truths. It also highlighted the power of abstract concepts—such as eigenvalues and spectral theory—in explaining real-world phenomena, including sound and vibration. Ultimately, this topic sparked my curiosity about how mathematics describes both the visible and the hidden structures of the world. What we hear does not always reflect what is truly there.

POSTER B46

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

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Mentors: 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 B47

Bioinformatic Characterization of Key Gene Mutations in Colon and Rectal Cancers

Garnett Anderson

Mentor: Harsha Rajapakse
Medgar Evers College

This study investigates the prognostic implications of key gene mutations APC, KRAS, NRAS, and BRAF in colorectal cancer (CRC) using a curated dataset of 1,731 samples drawn from nine large-scale genomic studies. APC mutations, found in approximately 70–80% of cases, were selected as a baseline control due to their prevalence and relatively neutral impact on survival. Mutations in KRAS and NRAS were associated with moderate reductions in median survival (25 and 48 months, respectively), whereas the BRAF V600E mutation present in 8–12% of samples correlated with the poorest prognosis, showing a median survival of only 8–9 months. These results confirm that mutation type is a critical determinant of survival in CRC patients. The integration of mutation frequency data with survival outcomes using bioinformatic analysis helps in predicting disease progression and tailoring personalized treatment strategies in colorectal cancer care.

POSTER B48

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

Idrissa Bah

Mentor: Rosa Zavala
Medgar Evers College

This project explores the intersection of wealth and health outcomes in NYC using publicly available datasets from the NYC Open Data portal. It focuses on indicators such as socioeconomic status, life expectancy, and chronic diseases (e.g., diabetes, hypertension, asthma) through interactive data visualizations. The goal is to reveal spatial and statistical patterns of health disparities across the city, making systemic inequalities visible and accessible to the public, policymakers, and educators.

POSTER B49

Anti-Cancer Activity of Ethanol Extract of Neem (*Azadirachta indica*) Leaves

Fernanda Brevil, Nalaika Jean Francois

Mentors: Ijaz Ahmed, Alam Nur-E-Kamal
Medgar Evers College

Neem (Azadirachta indica) is a tree native to the Indian subcontinent, traditionally known for its medicinal properties in Ayurvedic, Unani, and traditional medicine systems. Neem is called a "miracle tree" since all parts of this plant (leaves, bark, seeds, flowers, and fruit) have been used as immune boosting, antibacterial, antifungal, antiviral, anti-parasitic, insect repellent, anti-diabetic, dental health, liver protection and anticancer agent. In this project, we studied the effect of neem ethanol extracts on the growth of v-Ha-Ras-induced cancer cells *in vitro*.

Methods: v-Ras transformed cells were seeded into 24-well culture dishes and incubated overnight at 37°C in standard cell culture conditions. The following day neem extracts were added in selected wells while PBS was added as control. Cell growth was monitored by MTT assay after 24 hours of the addition of neem extracts

Results: It was observed that neem extracts changed morphology and induced Ras-transformed cell death. The results obtained from this study are presented in this report.

Conclusion: Our results indicated that neem extract induces preferential death of v-Ras transformed cancer cells. Our results also show that neem could be used as an anti-cancer drug. Further studies are required to purify the active compound present in neem extract and study its potency as an anti-cancer agent.

POSTER B50

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

Thierno Abdoul Diallo

Mentor: Jshin Young
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 B51

Can You Hear the Shape of a Drum? Exploring Spectral Geometry: Astronomical Discovery and Mathematical Beauty

Judithe Dorelus

Mentor: Terrence Blackman
Medgar Evers College

All objects vibrate; be they drum heads or atoms and these vibrations have characteristic frequencies. From knowledge of these vibration frequencies can be gleaned information about the vibrating object. For example, the empirical science of spectroscopy has studied the vibration frequencies of atoms and molecules to provide information about astronomical objects. A full understanding of the relation between a

vibrating system and its characteristic vibrations has remained elusive. We describe some of the ideas, in this context, related to the vibrating string, in response to the question posed by mathematician Mark Kac: Can one hear the shape of the drum? That is, can we infer the shape of a vibrating object, i.e., the string, by its characteristic vibration frequencies.

POSTER B52

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

Anthony Garcia, Alice Townsend,
Daniel A Jacobson

Mentor: 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 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 cave nectar bat. In one functional clade, we found a novel relationship showing how viral infection positively regulates the genes IFIT2, IFI6, and IRF1 in macrophages by regulating innate immune responses by identifying and degrading viral RNA. In another functional clade we observed a novel relationship showing the positive regulation of the genes TXNIP and IRF2, both transcriptional repressors, and HNRNPH1 which regulates aspects of mRNA metabolism including splicing, transport and stability. This has implications for medical research, namely developing antiviral therapies.

POSTER B53

Studies on Anti-Cancer Properties of Maubi Plant (*Colubrina elliptica*) Bark Extract using VRAS Transformed Cancer Cells

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The Maubi (Colubrina spp.) extract preparations show cytotoxic effects on VRAS cells in a concentration-dependent manner, suggesting the presence of bioactive compounds with potential therapeutic or toxicological applications. This study investigates the cytotoxic effects of Maubi extract (derived from Colubrina spp.) on VRAS cells using an MTT assay to assess cell viability.

POSTER B54

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

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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 B55

Investigation of Protein PhytoDefenders in Mint, Basil, Sage, and Mango Leaves

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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*), sage (*Salvia officinalis*), 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 B56

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

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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 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 B57

Identification of Anti-Cancer Activity in Soursop (*Annona muricata*) Methanol Extract on Leukemia Cells

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Hypothesis: *Annona muricata* is a tropical plant of the Annonaceae family comprising over 130 genera and 2300 species. Commonly also known as soursop, graviola, guanabana, or Brazilian paw paw, it is popularly grown in areas such as Southeast Asia, South America, the rainforests of Africa, and Caribbean islands such as Grenada. The plant produces edible fruit year-round and is widely used in traditional medicine. According to Moghadamtousi et al., several studies have documented the traditional use of soursop in the treatment of various ailments, including inflammation, parasitic infections, and cancer-related symptoms. Additionally, different parts of the *A.muricata* have distinct medicinal use: the seeds resist parasitic infections; the fruit is used to mitigate the effects of arthritis, nervous disorders and diarrhea; and the leaves aid in the treatment of cystitis, headaches, insomnia, and cancer. Based on these alternative uses, I hypothesize that methanol extract of soursop leaves inhibits the growth of Leukemia cells.

Method**:** Dried powder of soursop leaves was extracted by suspending them in methanol for three days at room temperature. Methanol extract was dried using a vacuum drier and re-dissolved in methanol. Leukemia cells were seeded into 48-well culture dishes and incubated overnight at 37^{o}C in standard mammalian cell culture condition. Soursop extract was added at various concentrations to selected wells. After overnight incubation, cell growth was determined by MTT assay.

Results: The methanol extract of soursop inhibited the growth of leukemia cells and caused observable changes in cell morphology. Further analysis demonstrated that cell death was associated with the induction of apoptosis. Results obtained from this study will be presented.

Conclusion: Preliminary findings suggest that *Annona muricata* leaf extract exhibits selective cytotoxicity against leukemia cells and holds potential as an anticancer agent. Therefore, further investigations are needed to isolate and characterize the bioactive constituents responsible for anti-cancer activity.

POSTER B58

Landau Levels and Electronic States for General Pseudospin-1 Lattice with a Bandgap: Application to a Lieb Lattice

Lovely Joseph

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We performed rigorous analytical calculations and developed a theoretical model for the Landau levels of a general type of pseudospin-1 lattice with a flat band and a finite bandgap in its electronic spectrum in the presence of a strong uniform magnetic field. Our model involves a parameter \beta which determines the location of the flat band relative to the conduction band: the model was reduced to a gapped dice lattice for \beta = 0, and to a Lieb lattice in which the flat band intersects the conduction band at the slowest point for \beta = 1. Exact analytical results for the Landau levels have been obtained and explained for all types of the considered lattices. Our obtained results have direct implications for studying the quantum Hall effect, as well as the magnetic and topological properties of these novel materials.