

Undergraduate Research Day

**Showcasing Faculty-Mentored
Undergraduate Research Across the
Disciplines**



QUEENSBOROUGH
COMMUNITY COLLEGE

CUNY

December 4, 2020

ACKNOWLEDGMENTS

We would like to express our sincere thanks and gratitude to those organizations and individuals that have supported our efforts:

The City University of New York Research Scholars Program
QCC Bridges to the Baccalaureate Program
Society for Advancement of Chicanos/Hispanics & Native Americans in Science
Summer Intensive Research Program (SIRP)
Space Weather Research and Education Program
QCC NSF S-STEM Scholars Program in Smart Energy
The Kupferberg Holocaust Center
Center for Excellence in Teaching and Learning
Research Committee
Office of Academic Affairs
NSF Research Experiences for Undergraduates (Physics)
Collegiate Science and Technology Entry Program (CSTEP)

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UR Day program book editors and event organizers: Mercedes Franco, Tirandai Hemraj-Benny, Sharon Lall-Ramnarine, Joan Petersen, Rommel Robertson & Rex Taibu.



Welcome to our 5th Annual Undergraduate Research Day- a day that we set aside each year to celebrate the achievements of our dedicated students and faculty mentors.

Engaging in undergraduate research is always a challenging endeavor, but never as much as this year. In March, we were faced with the reality of not being able to meet in person for the foreseeable future. Our minds became focused on our health and the health of our loved ones. We were forced to transition to online teaching and learning. Many of us were accustomed to research projects that involved laboratory benchwork, museum visits, and in-person meetings. How could we continue with research while facing so many other challenges and distractions?

Despite these seemingly insurmountable obstacles, our devoted faculty got to work adapting their UR projects to an on-line format. Through their efforts, students have continued to stay connected to research in several ways. These include conducting extensive literature reviews, collecting survey data, using on-line tutorials/simulations, and several other methods. Projects have utilized museum archives, case studies, field observations, and remote data analysis. This year's presentations are a testament to the success of adapting research to the remote format. In the process, we have made great strides in our technological skills. More importantly, we learned about perseverance, creativity and flexibility in our approaches to research.

The Council on Undergraduate Research defines UR as “An inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline.” As this definition implies, UR can occur in many forms and span many diverse subject areas. We are proud to say that Queensborough's faculty have been engaging students in UR across disciplines for many years, and the college continues to expand and support research in all disciplines.

Undergraduate Research Day is an opportunity for students to present their own research as well as to learn about others' projects. In addition, attendees can learn about the various programs and opportunities on campus that support undergraduate research. This year, we are also proudly showcasing all of QCC's High Impact Practices, as well as the development of Open Educational Resources by our faculty.

Congratulations to our dedicated faculty who have mentored students in their research pursuits and dedicated the extra time required to create remote research experiences. Your efforts have greatly enhanced their education and contributed to their future successes.

Congratulations to our students who have taken on the challenge of conducting research and stuck with it despite the extra challenges. You will never regret your decision to participate in research.

Although we cannot be together in person this year, we hope that you make the most of our virtual celebration to stay connected with our QCC Community.

Dr. Joan Petersen, High Impact Practices – Undergraduate Research Coordinator, CETL
Mercedes Franco, Tirandai Hemraj-Benny, Sharon Lall-Ramnarine, Joan Petersen, Rommel Robertson & Rex Taibu.

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Undergraduate Research Day Agenda

Friday, December 4, 2020

10:00 AM	Welcoming Remarks	Main Zoom Room
	Dr. Joan Petersen, HIPs Undergraduate Research Coordinator	
	Dr. Christine Mangino, President, Queensborough Community College	
	Dr. Sandra Palmer, Dean of Faculty, Office of Academic Affairs	
	Dr. Ron Nerio, Research Program Director, CUNY Office of Research	
10:25 AM	Virtual Group Photo	Main Room
10:30 AM– 12:00 PM	Student Presentations	Sessions 1A 1B, 1C
		Sessions 2A, 2B, 2C
		Sessions 3A, 3B, 3C
	HIPs Showcase	Session 4
12:10 PM- 1:00 PM	QCC Research Programs:	
	Presentations by program coordinators	Main Room
	Open Educational Resources info session:	Session 4
1:00 PM– 2:30 PM	Student Presentations	Sessions 1D 1E, 1F
		Sessions 2D, 2E, 2F
		Sessions 3D, 3E, 3F
1:15- 3:00 PM	HIPs Showcase	Session 4
2:30- 3:00 PM	UR Networking Social & Closing Remarks	Main Room

2020 Research Committee Members



ART & DESIGN
Kathleen Griefen



**BIOLOGICAL
SCIENCES &
GEOLOGY**
Sarbani Ghoshal



BUSINESS
Roumen Vragov



CHEMISTRY
Tirandai Hemraj-
Benny
(RC Co-Chair)



**ENGINEERING
TECHNOLOGY**
Dugwon Seo



ENGLISH
Melissa Dennihy



**FOREIGN LANG.
& LITERATURE**
Mélida Sánchez



**HEALTH PE &
DANCE**
Rezan Akpinar



HISTORY
James Nichols



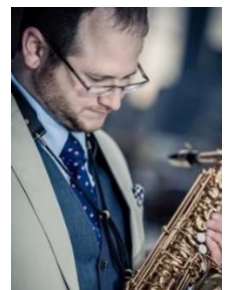
**KUPFERBERG
HOLOCAUST CTR.**
Marisa Hollywood



LIBRARY
Mi-Seon
(Christine) Kim



**MATH & COMPUTER
SCIENCES**
Andrew Bulawa



MUSIC
Scott Litroff



NURSING
Georgina Colalillo



PHYSICS
Jillian Bellovary



SOCIAL SCIENCES
Patrick Byers



**SPEECH
COMMUNICATION
& THEATRE**
Heather Huggins
(RC Secretary)



**SPONSORED
PROGRAMS** Jacinta
Patrice-George
(Grants Compliance
Specialist)

High-Impact Practices at QCC

***High-Impact Practices (HIPs)* are nationally recognized modes of instruction that promote student engagement and active learning. The positive impact of HIPs participation on student engagement and retention has been widely documented.**

HIPs Activities include:

- Significant investment of time and effort by students
- Substantive interactions with faculty and peers
- Frequent, timely, and constructive feedback
- Periodic, structured opportunities to reflect and integrate learning
- Opportunities to discover relevance of learning through real-world applications

Queensborough Community College currently offers six HIPs: Academic Service Learning, Global & Diversity Learning, The Common Read, Students Working in Interdisciplinary Groups, Writing Intensive, and Undergraduate Research.

Academic Service Learning (ASL) – Faculty Coordinator Steven Dahlke

Academic Service-Learning at QCC is:

- A pedagogical practice that aligns course learning objectives with community service.
- Mutually beneficial for students and community partners.
- An activity that reinforces curricular concepts and supports learning.
- An activity that advances the notion of life-long learning and civic engagement
- An activity that engages empathic awareness
- An emerging practice that is rich with publication and presentation possibilities
- Reflective in nature and promotes deep learning.

Global & Diversity Learning (GDL) – Faculty Coordinator Meg Tarafdar

Global & Diversity Learning provides a framework for exploring multiple perspectives on viewing the interdependent world. Queensborough's cultural resources provide opportunities for students to interact with the Kupferberg Holocaust Resource Center and Archives and the QCC Art Gallery. The College has sponsored a study abroad seminar in Salzburg, Austria each year in collaboration with The Global Citizenship Alliance.

The GDL framework integrates the exploration of course content through the following avenues: Intercultural Learning, Global Citizenship, Environmental Sustainability, and Human Rights. Students participate in experiences that promote an awareness of global issues, engagement with diverse perspectives, and transformative approaches towards learning.

GDL-HIP practitioners receive guidance and training at QCC's HIPs Institutes (held twice a year in January and August) and monthly meetings/workshops.

The Common Read – Faculty Coordinator John Yi

The Common Read sponsors cross-disciplinary events in support of a campus-wide, shared reading of a selected text. These events provide participating faculty and students additional opportunities to engage socially and academically across the campus, while supporting the learning in each individual class.

The AY 2020-21 Common Read Book Selection is *They Called us Enemy* - a graphic memoir of actor, social activist and LGBTQ+ icon George Takei's experience in WWII American concentration camps in California and Arkansas. This Common Read selection aligns with the KHC exhibit "The Concentration Camps: Inside the Nazi System of Incarceration and Genocide" and is an appropriate text across disciplines and student populations at our College.

Engaging with a graphic memoir offers us all new opportunity and flexibility as Common Read participants to experience different, non-traditional forms of literacies. Most significantly, *They Called Us*

Enemy is a timely work on so many different levels regarding all the -isms many of us are thinking about during this time and place in America.

Students Working in Interdisciplinary Groups (SWIG)- Faculty Coordinator- Alisa Cercone

The SWIG project is, in effect, a virtual learning community which falls under the AAC& U's *Collaborative Assignments or Projects*. Projects allow students from two or more courses to create a shared student-centered online space, in which they can share their work with others, offer authentic audience response, and constructive feedback. Interdisciplinary collaborations between English/Biology, English/Art, English/Health & Phys. Ed, Nursing/Biology, Nursing/Speech, and History/Physics, to name a few, have reached over 300 students in the past year with 22 faculty leading the projects.

Writing Intensive (WI) - Faculty Coordinators: Elise Denbo & Robert Donley

Writing Intensive practices are essential components of learning. All freshmen and transfer students who enroll in degree programs at QCC are required to complete two credit-bearing WI classes in order to receive the associate degree. An emphasis on writing underscores the centrality of writing to a university education and calls for the integration of writing across the disciplines. Good writing assignments, especially when effectively designed and scaffolded, motivate students to encounter, grapple with, and assess important course topics and ideas. As such, writing isn't simply a matter of expressing ideas in grammatically correct sentences but a form of critical thinking that can be adapted to different disciplines and genres. During WI training, faculty members design assignments to help students become more active learners, not simply learning to write but writing to learn! Low-stakes writing along with high-stakes papers through the revision process help students develop critical writing and rhetorical skills that reinforce course learning objectives.

Notably, faculty members who have participated in WI training tell us how writing not only enriched course content but also opened a new engagement with students. Several faculty members have presented papers at conferences and/or published articles regarding the value of incorporating WI practices into their classroom. As such, WI training continues to benefit students, faculty, and contributes to conversations across academic and professional communities.

Undergraduate Research (UR) – Faculty Coordinator Joan Petersen

Undergraduate Research takes many forms at QCC, including traditional student-mentor partnerships, designated research courses and research in the classroom. Any of these are considered a HIP if they include student reflection activities and are aligned to the college's general education outcomes. New UR-HIP practitioners receive guidance and training at QCC's HIPs Institutes, held twice a year in January and August. UR-HIP practitioners meet periodically to share information about projects, reflection assignments, assessment strategies and other resources. This year, we continued with our UR brown-bag lunches (virtually for fall 2020), at which UR faculty gave short informal talks about their projects.

OPEN EDUCATIONAL RESOURCES (OERs) at QCC
Leslie Ward, Emerging Technologies and Digital Scholarship Librarian



Textbooks play a huge role in how courses are taught and how students learn. Without access to textbooks, student learning can be impacted. We all know textbooks can be prohibitively expensive, but now with the sudden shift to online learning, what do we do when access to course material like textbooks is further hindered? Open Educational Resources (OERs) can help provide access to course materials as well as introduce new ways of engaging with pedagogy, teaching, and learning.

The term “Open Educational Resources”, first coined by UNESCO in 2002, was promoted as a way to encourage the, “free exchange of ideas and knowledge”. OERs are course materials centered on the 5R’s: Retain, Reuse, Revise, Remix, and Redistribute. OERs are designed to be free to access and use, can be changed or adapted to your course and are shareable to others. This doesn’t just refer to textbooks; it can include test banks, PowerPoints, lab manuals, syllabi, and rubrics.

Switching your course materials have an impact on multiple levels; on faculty course development, on the students who take the course, and on the college as a whole. By designing their own course materials, faculty have more autonomy in what material they use to teach, which can otherwise be restricted by publisher mediated content. Because OERs are primarily digital, they can be more easily accessed by students using multiple means, including mobile devices. They are also able to save on textbook costs, which NBC News has said increased 1,041% since 1977. Finally, with increased access to faculty curated material, student retention and graduation rates can improve.

At QCC, disciplines across campus have moved to using OERs. By participating in the NYS OER Scale Up grant initiative, QCC has become part of a growing community of OER creators at CUNY and beyond. This effort has resulted in CUNY students saving approximately \$9.5 million and allowed for the development of both 2- and 4-year zero textbook cost degrees. There has also been a shift towards integrating Open Pedagogy into course design, by engaging students in the active participation of course content and materials.

The lunch time forum will provide an introduction to OER creation and implementation, as well as time for discussion of the most common questions around open educational practices in higher education. For more information, contact Prof. Leslie Ward at lward@qcc.cuny.edu.

PUBLISH YOUR RESEARCH IN THE QCC *UNDERGRADUATE RESEARCH JOURNAL (URJ)*

Applied Sciences · Formal Sciences · Humanities · Natural Sciences · Social Sciences

About the Journal: The *QCC Undergraduate Research Journal (URJ)* is a peer-reviewed campus-wide journal which publishes original scientific work by undergraduate students in all disciplines. The *QCC URJ* aims to provide a platform to showcase student work and provide relevant experience in scientific writing. Students will learn first-hand about the peer-review process while making a significant contribution to scientific discovery and academic literature.

Types of Manuscripts:

- First-hand work which was directly performed and analyzed by the author(s)
- Mini review articles that summarize recently published work
- Technical papers that present new implementations of a program or technique

Submission Instructions:

- No longer than 6 pages (single-spaced)
- Authored by a QCC undergraduate student(s) with guidance from a QCC faculty member

Note to Authors:

Only submit work that is not intended for future publication in a more extensive journal.

Visit: www.qcc.cuny.edu/urj/ or Email: URJ@qcc.cuny.edu with questions or comments.

QCC Undergraduate Research Programs

Bridges to the Baccalaureate Program: Research Initiative to Maximize Science Skills (RIMS)



Program Director: Dr. Patricia Schneider,

Email: pschneider@qcc.cuny.edu

Location: QCC Biology Department, Room M-208

Telephone: 718-631-6335

In 2002, the Bridges to the Baccalaureate Program was established at Queensborough Community College with funding from the National Institutes of Health. The Bridges program is a partnership between QCC, Queens College and City College created to improve QCC's ability to train and graduate under-represented (UR) science students, and to facilitate their transfer to baccalaureate programs in biomedicine or behavioral science. A hallmark of the program is a strong focus on authentic research carried out under the mentorship of faculty in biology, chemistry, math, physics and behavioral science. These mentors serve as role models and provide students with encouragement, career advisement and visibility within the academic community. Scientific communication skills are explicitly taught, and each student gives an oral presentation and submits a written report at the final seminar. In the past five years, twenty students were listed as co-authors on peer reviewed research publications. Students have received 22 national and 30 regional research awards. A comprehensive system of academic and psychosocial support is provided to participants and interactions with the senior colleges facilitate transfer. Overall, 88% of participants have transferred and 81% have graduated from BA/BS programs in science or biomedicine. Sixty-five students pursued postgraduate degrees. To date, 6 PhD, 4 MD, 4 PharmD and 39 Master's degrees have been awarded to Bridges students.

Eligibility

- Full time student planning to transfer to a senior college and major in science or biomedicine
- US citizen or US permanent resident
- GPA of at least 2.7 (B-)
- Member of a group identified by NIH as underrepresented in biomedicine:
 - Black, Hispanic, Native American, US Pacific Islander
 - Students of any ethnicity with a disability or from a disadvantaged background
- Completion of 1 semester of science (2 preferred)

Support

Fifteen students per year participate in the program. All participants receive a salary so they can focus on their research project: \$150 to \$300/week. during the academic year and/or \$5250 for ten-week full time summer program. Students making good progress may continue for up to two years.

2019 - 2020 STUDENT HIGHLIGHTS

Publications

Fu, T.; **Smith, S.**; Camarasa-Gomez, M.; Yu, X.; Xue, J.; Nuckolls, C.; Evers, F.; Venkataraman, L.; and Wei, S. Enhanced Coupling Through π -Stacking in Imidazole-Based Molecular Junctions. *Chemical Science*, 2019, 10, 9998-10002.

Maria Luisa Cotrina, **Sindy Ferreira** and Patricia Schneider. High Prevalence of Self-Reported Autism Spectrum Disorder in the Propionic Acidemia Registry. *Journal of Inherited Metabolic Disease (JIMD)* 2020: 51:70–75.

T. Hemraj-Benny, **L. Pimentel** and G. Emeran. Formation of single-walled carbon nanotube-ruthenium nanoparticles in ethanol upon microwave radiation. [*Inorganic Chemistry Communications Volume 112*](#), February 2020, 107707

Collegiate Science and Technology Entry Program (CSTEP)



Program Director: Ms. Marie-Francesca Berrouet,

Email: MBerrouet@qcc.cuny.edu

Location: Science Building Room S-124

Telephone: 718-631-6036

The Collegiate Science and Technology Entry Program (CSTEP) is a New York State grant funded initiative designed to foster academic excellence for under-represented or economically disadvantaged full-time college students majoring in the STEM fields (Science Technology Engineering Math) or licensed professions (i.e. Health related careers, Accounting, Law, Psychology, Massage Therapy, Social Work, etc.).

CSTEP was established in 1987 and is funded by the New York State Education Department. The program is represented in CUNY, SUNY, and private institutions across the state of New York.

At Queensborough Community College, we are proud to have been funded continuously for over 30 years. We give our best to each of our students and we are happy to see them graduate and succeed year after year.

For more information, please visit <http://www.qcc.cuny.edu/CSTEP/>. Our amazing team will be more than happy to answer any questions.

Fall 2020 Student Engagement at the KHC

The Concentration Camps: Inside the Nazi System of Incarceration and Genocide *New Online Exhibition*

From 1933 to 1945, Nazi Germany concentrated, abused, and killed more kinds of people, on a wider scale, and using a more sophisticated system than any other time in human history. The Nazis, who sought white, German, racial purity across Europe, forcibly concentrated their enemies into approximately 44,000 ghettos and camps of varied sizes and purposes. This new, original KHC exhibit surveys how—and why—the Nazis tortured tens of millions of people during World War II. It features images, text, sounds, maps, statistics, artifacts, as well as personal testimonies from local Holocaust survivors in order holistically examine these excruciating landscapes of degradation and dehumanization.

This exhibit is curated by Cary Lane, Ph.D., the KHC 2020-21 Curator-in-Residence and Associate Professor of English at Queensborough Community College of the City University of New York. Dr. Lane worked with Jason Tingler, Ph.D., KHC Postdoctoral Research Fellow; Robyn Schwartz, Graphic Designer; Nicholas Caccese, Film Editor; Sean Simpson, Videographer, as well as QCC-KHC Student Curatorial Fellows Aliza Perlmutter, Jhordain Roberts, Manuel Souffrant, Nicholas Richards and KHC Student Interns Ashleigh Requijo, Calista Requijo, and Kristen Morgenstern.



“CONCENTRATION CAMPS” CURATORIAL FELLOWSHIPS

Fellows received practical experience curating an exhibition and learning about the Nazi Concentration Camp system. Project areas included: research, testimony transcription, and artifact documentation. Fellows committed approximately 30 hours of service and met weekly with the curatorial team.

PROJECT-BASED INTERNSHIPS

This opportunity was for students interested in gaining valuable experience working at a nonprofit committed to human rights. Project areas included: archival research, exhibition development, public programming, and social media/marketing. Students committed 30 hours of service and met weekly with their supervisor.

For More Information about the Kupferberg Holocaust Center:
khc.qcc.cuny.edu KHC@qcc.cuny.edu

Summer Intensive Research Program (SIRP)



SIRP 2020

DEPARTMENT OF SOCIAL SCIENCES
FACULTY MENTORS: DRS. JODY RESKO & CELIA SPORER
PROGRAM DIRECTOR: DR. ANISSA MOODY

Established in 2017, the Summer Intensive Research Program (SIRP) is designed to increase the number of students entering social science careers by offering them an intensive introduction to the scientific research process at a crucial time in their undergraduate studies. The SIRP program provides students in the social sciences with basic foundational training in research methods that will help them develop skills in research and experimentation. The program is also designed to increase students' overall interest in and appreciation for careers in the social sciences while also inspiring them to seek out other potential student research opportunities.

2020 SIRP HIGHLIGHTS

- SIRP was triumphant and against all odds provided three scholars with 3 weeks of research training. Congratulations to our 2020 SIRP scholars:
 - Emely Gutierrez
 - Celine Persad
 - Yvonne Rodriguez
- SIRP alum, Mikell Bursky, is now Ph.D. candidate in clinical psychology at Queens College.
- Four are currently in research labs at four-year institutions.
- One former SIRPERS is a CRSP scholar.
- One scholar completed an academic fellowship program over the summer.
- Two scholars won prizes at the 2020 CUNY Undergrad Research Symposium.

SIRP SYNERGISTIC ACTIVITIES

- Invited Presentation- The Impact of a Research Training Program on Developing a Pipeline for Minority Psychologists. American Psychological Assn Annual Conference, Washington, DC, Aug, 2020.

QCC Space Weather Research and Education Program



Program Principal Investigator (PI)/Director: Dr. M. Chantale Damas

Email: mdamas@qcc.cuny.edu

Location: Physics Department/Space Weather Lab, Room S-343/S-333

The Queensborough Community College (QCC) has partnered with the NASA Goddard Space Flight Center (GSFC) and the City College of New York (CCNY) to design and implement a high impact practice integrated research and education program in space science and technology. The program is aimed at enhancing the science, technology, engineering, and math (STEM) experience of community college students, and at increasing the participation of groups historically under-represented in STEM fields.

Eligibility

All students, as early as their first semester, can participate. Students must commit to being part of the program for one full academic year. Underrepresented groups in STEM are especially encouraged to join.

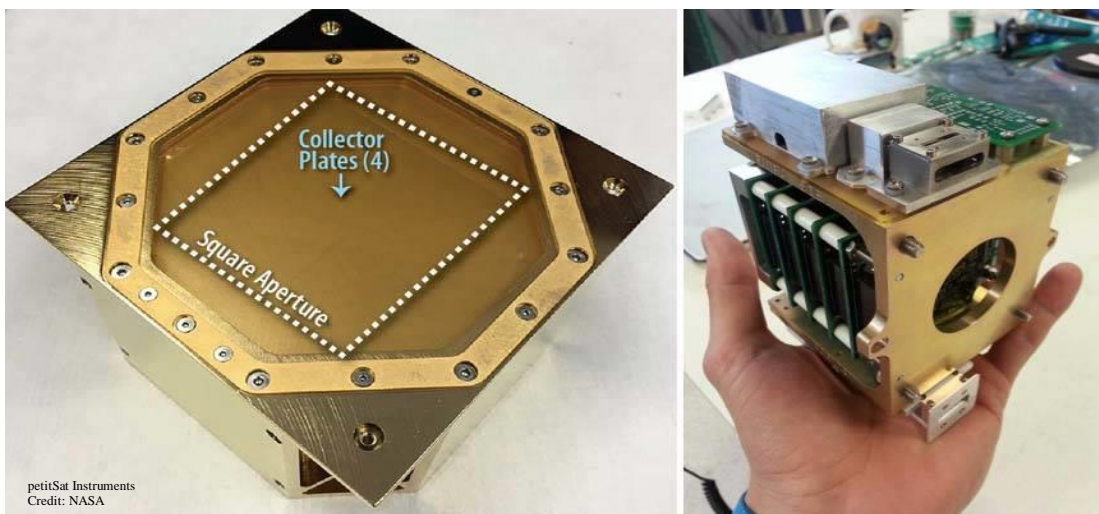
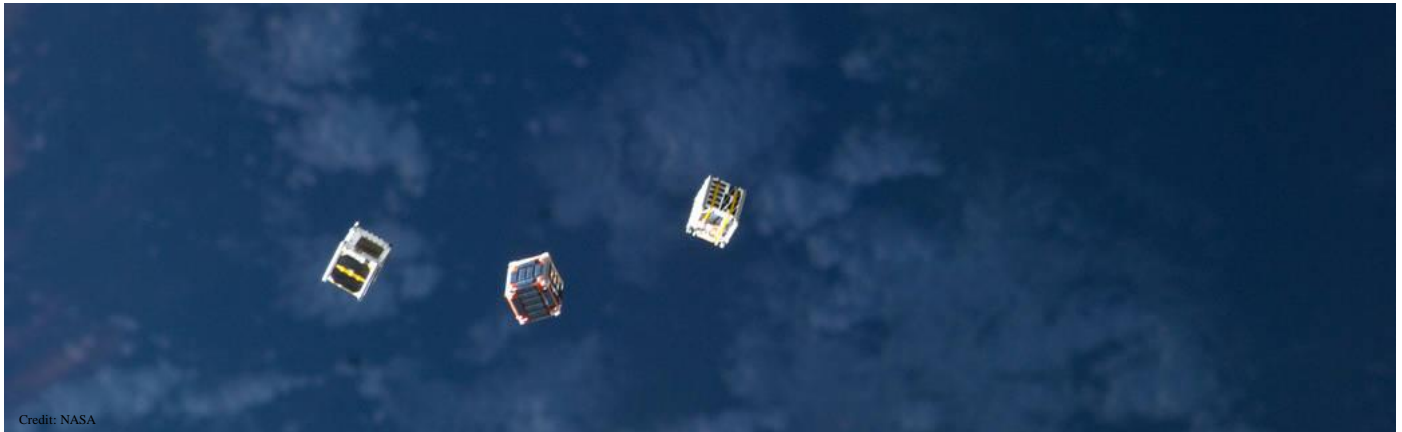
Support

During the summer, if eligible, students receive up to \$5,000 in stipend plus lodging/travel to NASA Goddard Space Flight Center located in Greenbelt, MD. The program also provides travel awards to students to attend national science and engineering conferences to present their work.

This program is supported by a grant from the NASA MUREP Innovations in Space Technology Curriculum– Group 2 (MISTC 2) under NASA Award Number 80NSSC19M0221.

WOULD YOU LIKE TO LEARN HOW TO DESIGN AND BUILD YOUR OWN CUBESAT?

JOIN OUR QCC-NASA-CCNY STEM TEAM!



What are Cubesats?

Cubesats are small satellites that conduct scientific investigations and technology demonstrations in space.

Why Participate in a Cubesat Mission Project?

- Gain hands-on experience working on a real, exciting end-to-end project.
- Build your 21st century skills such as problem solving, creativity & ability to work in teams.
- Get real-world exposure to spaceflight and space exploration with hands-on flight hardware development.

We invite interested STEM Majors to join our QCC-NASA-ASTRA Science & Engineering Team to Learn all about Cubesat & Space Weather!

The CUNY Research Scholars Program (CRSP) at QUEENSBOROUGH



Program Directors: Dean Sandra Palmer, Dr. Sharon Lall-Ramnarine, and Dr. Tirandai Hemraj-Benny
spalmer@qcc.cuny.edu; slallramnarine@qcc.cuny.edu; themrajbenny@qcc.cuny.edu

CRSP College Assistant: Ms. Ashley Mercado
ammercado@qcc.cuny.edu

Location: Office of Academic Affairs, Room A-503
Telephone: 718-281-5475

The CUNY Research Scholars Program provides funding to facilitate laboratory experiences for associate degree students over a one-year period. The goal of the program is to encourage undergraduate participation in authentic research and to increase persistence in STEM and Social Science disciplines. Students receive 320-400 hours of mentoring from faculty members and participate in structured activities on campus, including sessions on laboratory safety, writing journal articles, public speaking, and poster preparation. Each year, the program culminates in a summer symposium where students display and present their work to peers and mentors. *The CUNY Research Scholars Program at QCC currently supports 32 students and 30 faculty mentors.*

Eligibility

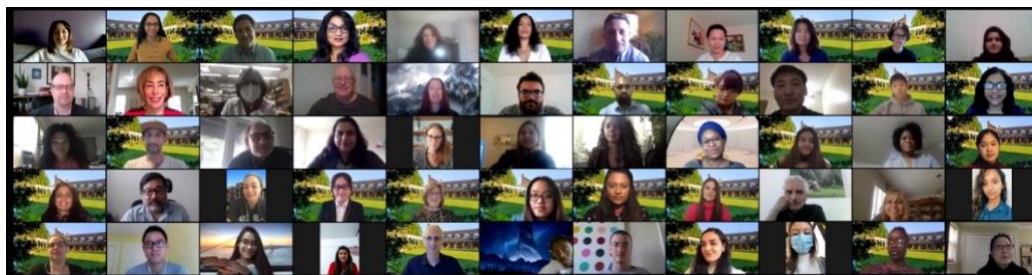
Associate degree students at any stage in their academic career can participate. Students must commit to being part of the program for one full academic year plus the summer. Graduating and transfer students who leave the college may take a partial scholarship for work done during the semesters or the summer, providing that they prepare a poster of the research conducted for presentation by the student or faculty mentor at the CUNY Research Scholars Program summer symposium in July of the funding year.

Support

The program also provides compensation for faculty mentors in the amount of \$1000-1200 per student mentee. This amount is for one year of the program. Faculty must commit to working with the student for each semester and the summer program.

For more information visit: <http://www.qcc.cuny.edu/ur/crsp.html>.

CUNY RESEARCH SCHOLARS PROGRAM 2020-2021 COHORT (Orientation)



CRSP Highlights from 2019-2020

Awards:

Seven QCC CRSP Scholars won presentation awards at the CRSP 2020 Virtual Summer Symposium:

- **Brettania Gordon (Mentor: Dr. Monica Trujillo, Biology):** Identification of Genes Regulated by SC03855.
- **Emely Gutierrez Mora (Mentor: Dr. Celia Sporer, Social Science):** Analysis of College Student's Knowledge Concerning Sexual Violence.
- **Hee Soo Cho (Mentor: Dr. Sunil Dehipawala, Physics):** Structural Study of Iron in Magnetic Thin Films Prepared by Sol-gel Method.
- **Chang Cui (Mentor: Dr. Jun Shin, Chemistry):** Synthesis of N-2-hydroxyethyltrichloroacetamide: Possible Precursor to Polyurethane.
- **Circe Gedeon (Mentors: Dr. Maria Mercedes Franco, Mathematics & Computer Science & Dr. Rommel Robertson, Social Sciences):** High impact Practices in the Mathematics Classroom.
- **Diego Cordova (Mentor: Dr. Anissa Moody):** Military Experience and Immigration Status: Impact on Educational Perceptions and Career Aspirations.
- **Harpreet Singh (Mentor: Dr. David Sarno):** Microwave Synthesis of Composites of Polyaniline Nanofibers and Ruthenium Nanoparticles.

Biling Chen (Mentor: Dr. Sasan Karimi, Chemistry)

- Recipient of The 2020 Jack Kent Cooke Foundation Undergraduate Transfer Scholarship (~\$40,000.00) & The 2019 CUNY Thomas Tam Scholarship, Asian American and Asian Research Institute.

Ashley Mercado (Mentor: Dr. Joan Petersen, Biology)

- Recipient of the 2020 Dr. Joanna Ambron Research Award.

Sophia How (Mentor: Dr. Paris Svoronos, Chemistry)

- Recipient of 2020 NSF-REU (virtual) Internship at The University of Nebraska-Lincoln.

Circe Gedeon (Mentors: Dr. Maria Mercedes Franco, Mathematics & Computer Science and Dr. Rommel Robertson, Social Sciences)

- Recipient of the 2020 Opportunities in Undergraduate Research - Umesh and Shailaja Nagarkatte (OUR SUN) Award.

Yanqiu Guo (Mentor: Dr. Wenjian Liu, Mathematics & Computer Science)

- Recipient of the 2019-2020 Center for Undergraduate Research in Mathematics (CURM) Mini-Grant Award; The 2020 virtual Summer Internship Program (CCI), Brookhaven National Laboratory; The 2020 Finch College Alumni Association Foundation Scholarship, June 2020; The NYSMATYC Award for Excellence in Mathematics, May 2020 & The SUN Award, QCC, May 2020

Presentations

- Ms. Yanqiu Guo (Mentor: Dr. Wenjian Liu) presented at: The MAA Metro NY 2020 Virtual Conference, May 2020; The Consortium for Computing Sciences in Colleges (virtual conference), April 2020; The NYC Regional Math Alliance Conference, City College of New York, September 2019

Five students had virtual Poster Presentations at the National American Chemical Society (ACS) Meeting, March 22-26, 2020

- Chang Cui (Mentor: Dr. Jun Shin, Chemistry),
- Sophia How (Mentor: Dr. Paris D. Svoronos, Chemistry)
- Zheyong Piao (Mentor: Dr. Tirandai Hemraj-Benny, Chemistry)
- Megan Pirtle (Mentor: Dr. David Sarno, Chemistry)
- Charles Wong (Mentor: Dr. Paris D. Svoronos, Chemistry)

The Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) QCC Chapter

Chapter Advisor: Dr. Maria Mercedes Franco, mfranco@qcc.cuny.edu

Co-advisor: Dr. Bianca Sosnovski, bsosnovski@qcc.cuny.edu

Mathematics & Computer Science

The SACNAS QCC chapter was established in Spring 2016 and, at the time, was the second chapter in the state of NY and the only one active. It was also the second chapter at a community college in the nation. The purpose of having a chapter at QCC is to provide STEM students with the benefits and opportunities available to SACNAS chapters and their members and to create a forum to come together for academic, social, and service activities.

On campus, the chapter has a strong presence dedicated to raising awareness about issues of importance to our diverse community and offering programming that encompasses academic work, advocacy, and service. Any student or faculty member interested in the mission of SACNAS is welcome to join the SACNAS QCC Chapter.

SACNAS is Multidisciplinary and Multicultural



At SACNAS we are changing the face of science together

Highlights

Presentations at the (virtual) 2020 SACNAS *Diversity in STEM* National Conference:

- Circe Gedeon, “High Impact Practices in the Mathematics Classroom”, Poster Presentation, STEM Education & Learning - Education Research Track
- Marie Francesca Berrouet, Maria Mercedes Franco, Circe Gedeon, Ashley Mercado, and Joan Petersen, “Why wait? The benefits of getting involved in research NOW!”, Panel Presentation, Professional Development Track

SACNAS has helped defray the cost of 48 individual trips (24 student/alumni, 24 faculty/professional) to the national conference made by members of the QCC community since 2012. The savings to travelers and the college are estimated in the **\$30,104 - \$41,313** range.

The Society for the Advancement of Chicanos/Hispanics and Native Americans in Science



Achieving **TRUE DIVERSITY** in STEM

SACNAS is an inclusive organization dedicated to achieving **True Diversity**. True diversity means the field (including leadership positions) reflects the demographics of the population. Thus, since its founding 47 years ago, SACNAS has been working to “make sure that those most underrepresented in STEM have the support they need to attain advanced degrees, careers, and positions of leadership.” Since 2018, new funding allocations have been made to fund travel awards for *all* students regardless of citizenship or residency status, an effort particularly helpful for DREAMers. All other SACNAS programs for students have been unrestricted since their inception. SACNAS also strives to secure unrestricted funding for postdocs and professionals.

- Largest multicultural and multidisciplinary STEM Diversity organization in the country
- Serves a growing community of over 27,000
- 8,200+ paid members
- 317 diverse emerging STEM leaders trained since 2009
- 115 student and professional chapters
- 27,000+ community of supporters

What is special about the annual SACNAS *Diversity in STEM* national conference?

- 5,100+ attendees
- 1,000+ are undergraduate students, most of whom receive travel awards to attend and present their scientific research at the conference
- SACNAS Community College Day
- Student Presenter Coaching Session
- Student Research Poster Awards
- LGBTQ+ Reception, Women in STEM Reception, Native American and Indigenous Community Reception, Chapter Reception, ...
- Scientific Symposia, Professional Development, Mentoring
- Networking, including
 - Exhibit Hall (brings recruiters from academia, government, industry)
 - Info Sessions presented by funding agencies such as NSF, NIH, and NSA
- Exceptional speakers like
 - [2018](#): Ellen Ochoa, PhD, Director of NASA Johnson’s Space Center and 1st Hispanic Woman ever to go to space (Full 2018 SACNAS YouTube playlist [here](#))
 - [2017](#): Mario Capecchi, PhD, Nobel Laureate, Distinguished Professor, University of Utah (Full 2017 SACNAS YouTube playlist [here](#))
 - [2016](#): Hannah Valentine, MD Chief Officer for Scientific Workforce Diversity at NIH, Senior Investigator NHLBI (Full 2016 SACNAS YouTube playlist [here](#))

Beyond the conference, SACNAS offers intensive support to its members via web-based services, leadership development, student scholarships, internships, and fellowships.

NSF Research Experience for Undergraduates (REU)
National Science Foundation supported Research Opportunities in Physics, Bio-physics and
Astronomy for Community College Students



Program Director: Dr. David Lieberman
E-mail: dlieberman@qcc.cuny.edu
Location: Physics Department
Telephone: 718-631-6324

Undergraduate participation in physics research at Queensborough Community College has been part of the college's academic program for over 20 years. Sponsors have included NIH RIMS, LSAMP, NASA NSF and PSC-CUNY. The college is offering Research Experiences for Undergraduates this summer supported by the National Science Foundation. Students will have the opportunity to participate in current research projects in physics, bio-physics or astronomy and perform independent research on a wide range of projects that aim to broaden their understanding of science and involve them in the acquisition, analysis and presentation of experimental data.

Research Program Objectives:

- To introduce students to a variety of current issues in science.
- To define and discuss useful methods.
- To provide instruction in experimental design and efficacy.
- To have meaningful faculty-student discussions on the experimental results.
- To assist with the production of a presentation of each student's work at a conference.
- To inform students of opportunities at four-year colleges and summer initiatives.

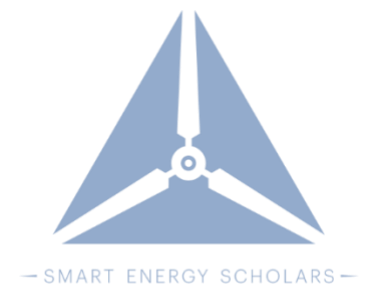
Program Details

The program is a 10 week long research program that runs from June 1, 2021 to August 5, 2021. This program provides an opportunity to do interesting research in a wide variety of topics with individual mentors. In addition, basic research skills are highlighted including responsible conduct in research, statistics, data handling and presentation skills. Each student will have an opportunity to present their summer research at a symposium at Queensborough and will be encouraged to present and publish their results in other forums.

Benefits

- A \$5000 stipend
- Travel support to and from campus
- An option to continue paid research with your mentor throughout the academic year
- A rich research experience and collaborative environment

QCC NSF S-STEM Scholars Program in Smart Energy



Program Director: Dr. David Sarno
E-mail: dsarno@qcc.cuny.edu
Location: Chemistry Department
Telephone: 718-631-6058
<http://www.qcc.cuny.edu/s-stem/index.html>

The National Science Foundation has awarded a five-year Scholarship in Science, Technology, Engineering, and Mathematics (S-STEM) grant to QCC and its partners at Binghamton University (BU) and Broome Community College (BCC). Its goal is to support academically talented QCC students who demonstrate financial need by providing scholarships and guaranteed transfer to Binghamton University. Upon transfer, students will complete bachelor's degrees in chemistry, physics, or mechanical engineering. They will also gain knowledge and experience in smart energy fields that will enable a future of alternative energy sources and energy efficient technologies. While at QCC, S-STEM students will participate in an online seminar course with their peers at BU and BCC. Although COVID currently prevents in-person meetings, students receive advisement from faculty mentors and support from their colleagues at the partner institutions with the goal of easing the transition to BU.

Program Features

- Up to \$5,000 per semester towards cost-of-attendance (up to 2 years at QCC & 2 years at BU)
- Guaranteed transfer to Binghamton University
- Opportunities for mentored research at QCC
- Smart Energy research opportunities at BU during the academic year and summer
- Mentorship by smart energy faculty at BU
- Weekly online seminar and cohort-building events with S-STEM Scholars from all campuses

Eligibility

- Full-time enrollment at QCC, BCC, or BU
- Interest in smart energy related fields, such as chemistry, physics or engineering
- US citizenship or permanent residency
- Maintain a minimum GPA of 3.0
- Demonstration of financial need based on completed and filed FAFSA

QCC NSF S-STEM SMART ENERGY SCHOLARS PROGRAM HIGHLIGHTS 2020



Fall 2020 QCC student cohort and program director (pictured left to right):
Miaolan Chen Weng, Devani Mahabir, (Christian Gomez, not pictured) and David Sarno

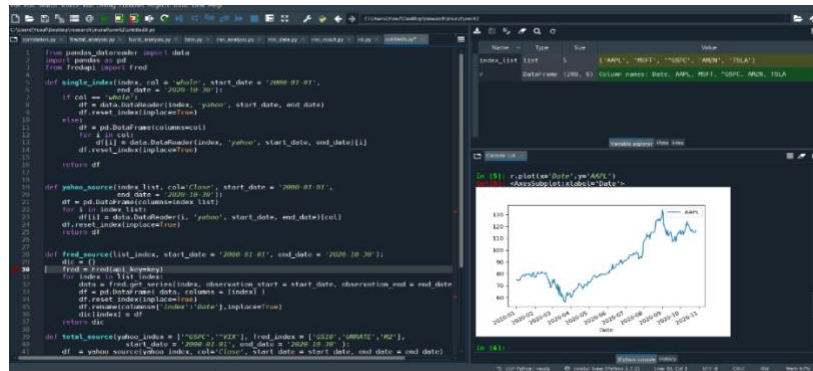
Highlights:

- Ten students have participated from spring 2018 through fall 2020.
- Five students have transferred to Binghamton University to pursue bachelor's degrees in Chemistry. Two students have transferred to pursue bachelor's degrees in Physics.
- Many of the Smart Energy Scholars participate in undergraduate research at QCC and are also supported by the CUNY Research Scholars Program.
- Harpreet Singh participated in a 2019 NSF-REU at City College and was a Presentation Winner at the 2020 Annual CRSP Symposium.
- Danial Mokhtari Sharghi participated in a 2019 NSF-REU at QCC.
- Edison Mera participated in a summer 2018 NSF-REU program at Binghamton University.
- Isabela Velasquez Gutierrez won a Best Poster award at the 2018 Annual CRSP Symposium.
- Xiaofang Yu participated in a summer 2018 NSF-REU program at University of Pennsylvania.

Presentations:

- H. Singh*, D.M. Sarno "Microwave synthesis of composites of polyaniline nanofibers and ruthenium nanoparticles" *67th NY-ACS Undergraduate Research Symposium*, Queens College, (May 2019)
- H. Zui*, P. Sideris "Surfactant-assisted hydrothermal synthesis of LiFePO_4 using sodium dodecylbenzenesulphonate" *67th NY-ACS Undergraduate Research Symposium*, Queens College, (May 2019)
- E. Mera*, P. Svoronos "Calculation of the Ionization Constant carboxylic acids in mixed solvents via freezing point depression measurements" *256th ACS National Meeting & Exposition*, Boston, MA (August 2018) and *66th NY-ACS Undergraduate Research Symposium*, York College (May 2018)
- I. Velasquez*, R. Sullivan, T. Hemraj-Benny, S. Dehipawala "Effect of single walled carbon nanotubes on breast cancer cell migration" *256th ACS National Meeting & Exposition*, Boston, MA (August 2018)

DATA SCIENCE TRAINING AND RESEARCH PROGRAM



Program Principal Investigator: Dr. Yusuf Danisman
 Email : ydanisman@qcc.cuny.edu
Mathematics and Computer Science

This fully online program is aimed at enhancing the coding and data science skills of community college students. For this purpose, 10-15 students will be recruited for the Spring Semester of 2021. This program is supported by a seed fund grant from the Northeast Big Data Innovation Hub.

Content:

The Data Science Training and Research Program requires participation in an Independent Studies class (MA-801) that will cover three modules:

- Module 1: Python as a Programming Language
- Module 2: Data Science & Machine Learning
- Module 3: Capstone Group Project

Eligibility

Open to all students. Members of groups traditionally underrepresented in STEM are especially encouraged to apply.

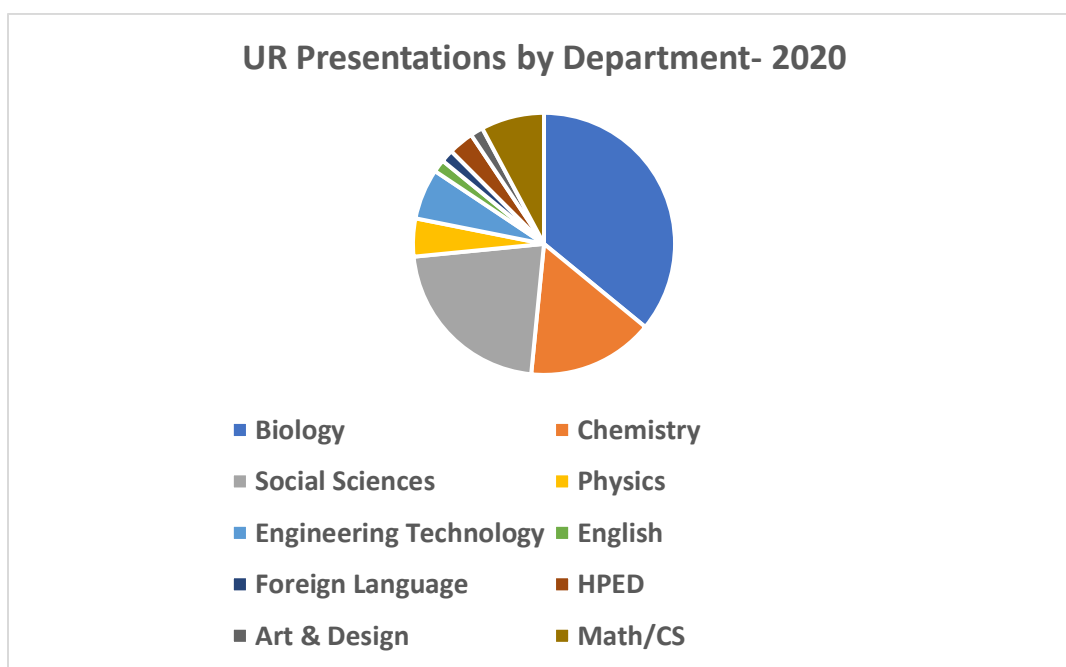
Responsibilities:

- Register in MA-801 Independent Studies with Dr. Danisman in Spring 2021.
- Attend talks by professionals in industry and academia.
- Complete lab assignments.
- Complete a capstone project as a group with 3-4 peers.

Support

Eligible students may receive up to \$750 in stipend.

2019-2020 Undergraduate Research Projects and Program Highlights



Research Program	Number of Students	Director
Summer Intensive Research Program (SIRP)	3	Dr. Anissa Moody
CUNY Research Scholars Program (CRSP)	32	Dr. Tirandai Hemraj-Benny Dr. Sharon Lall-Ramnarine
NIH Bridges to the Baccalaureate	15	Dr. Patricia Schneider
QCC Space Weather Research	4	Dr. M. Chantale Damas
Kupferberg Holocaust Center	11	Dr. Laura Cohen
NSF research Experience for Undergraduates (REU)	7	Dr. David Lieberman
QCC NSF S-STEM Scholars Program in Smart Energy	4	Dr. David Sarno

Presenters and Faculty Mentors

Presenter	Mentor	Department	Presentation #
Manuel Souffrant	Katherine Griefen	Art and Design	AD1
Sumaiya Nasrin	Dr. Andrew Nguyen	Biological Sciences and Geology	BG1
Sumaiya Nasrin	Dr. Nidhi Gadura	Biological Sciences and Geology	BG2
Leidy Goldstein	Nidhi Gadura	Biological Sciences and Geology	BG3
Sara Khan	Nidhi Gadura	Biological Sciences and Geology	BG4
Sara Khan	Andrew Nguyen	Biological Sciences and Geology	BG5
Jeanne Romin	Andrew Nguyen	Biological Sciences and Geology	BG6
James Hardat	Joan Petersen	Biological Sciences and Geology	BG7
Natasha McGowan	Sarbani Ghoshal	Biological Sciences and Geology	BG8
Tamara Areizaga	Monica Trujillo	Biological Sciences and Geology	BG9
Anthony Zheng	Trujillo Monica	Biological Sciences and Geology	BG10
Fatima Bojorge	Monica Trujillo	Biological Sciences and Geology	BG11
Izabella Clarke	Patricia Schneider	Biological Sciences and Geology	BG12
Michelle Franco	Urszula Golebiewska	Biological Sciences and Geology	BG13
Shan He	Urszula Golebiewska	Biological Sciences and Geology	BG14
Nicole Paulescu	Urszula Golebiewska	Biological Sciences and Geology	BG15
Janice Williams	Regina Sullivan Sarbani Ghoshal	Biological Sciences and Geology	BG16
Lisbel Pena	Sarbani Ghoshal	Biological Sciences and Geology	BG17
Anjuman Alpo	Joan Petersen	Biological Sciences and Geology	BG18
Cardi Lam	Joan Petersen	Biological Sciences and Geology	BG19
Nicole Paulescu	Nidhi Gadura	Biological Sciences and Geology	BG20
Tamara Areizaga	Peter Novick	Biological Sciences and Geology	BG21
Austin Hwang	Mangala Tawde	Biological Sciences and Geology	BG22
Aliya Ghazaal	Mangala Tawde	Biological Sciences and Geology	BG23

Shameir Nembhard	Sharon Lall-Ramnarine	Chemistry	CH1
Mehreen Mughal	Sharon Lall-Ramnarine	Chemistry	CH2
Zheyong Piao	Tirandai Hemraj-Benny Sharon Lall-Ramnarine	Chemistry	CH3
Yingying Zhang	Sasan Karimi	Chemistry	CH4
Arnab Sharma	Moni Chauhan	Chemistry	CH5
Yingxin Liang	Zhou Zhou	Chemistry	CH6
Devani Mahabir	David M. Sarno	Chemistry	CH7
Miaolan Chen Weng	David Sarno	Chemistry	CH8
Tyra Volney	Paul Sideris	Chemistry	CH9
Feruza Turobova	Sujun Wei	Chemistry	CH10
Ornima Tyeshi	Huixin Wu	Engineering Technology	ET1
Ashiqul Tuhin	Md.Shahadat Hossain	Engineering Technology	ET3
Nell Flores	Dugwon Seo	Engineering Technology	ET4
William Pollicino	Dimitrios Stroumbakis	Engineering Technology	ET5
Elizabeth Hanson	Ilse Schrynemakers	English	EN1
Teresa Farley	Carolina Chaves	Foreign Languages and Literature	FL1
Ran Tian	Parisa Assassi	Health, Physical Education, and Dance	HPED1
Neehaa Rishilakram	Carrie Stern	Health, Physical Education, and Dance	HPED2
Toaha Siddique	Dr. Esma Yildirim	Mathematics and Computer Science	MA1
Yahao Chen	Lyubomir Boyadzhiev	Mathematics and Computer Science	MA2
Siyang Li	Wenjian Liu	Mathematics and Computer Science	MA3
Magnola Pierre	Maria Mercedes Franco Rommel Robertson	Mathematics and Computer Science	MA4
Jiajun Gao	Yusuf Danisman	Mathematics and Computer Science	MA5
Kainat Mughal	Sunil Dehipawala	Physics	PH1
Christian Gomez	Kimberly Riegel	Physics	PH2
Paul Park	Corey Stalerman	Physics	PH3
Yvonne Rodriguez	Anissa Moody Jody Resko	Social Sciences	SS1

Kaylyn Kelly	Amy Traver	Social Sciences	SS2
Yvonne Rodriguez	Jody Resko	Social Sciences	SS3
Bianca Llivicota	Anissa Moody	Social Sciences	SS4
Steven Zamora	Anissa Moody	Social Sciences	SS5
Celine Persad	Anissa Moody	Social Sciences	SS6
Nathan Lloyd	Celia Sporer	Social Sciences	SS7
Madison Otway	Celia Sporer	Social Sciences	SS8
Lori Dean	Anissa Moody	Social Sciences	SS9
Florencia Gonzalez	Anissa Moody	Social Sciences	SS10
Alexis Klein	Kersha Smith	Social Sciences	SS11
Nicolette Ilizarov	Rommel Robertson	Social Sciences	SS12
Benjamin Menchell	Rommel Robertson Kersha Smith	Social Sciences	SS13
Jovanna Trapani	Anissa Moody	Social Sciences	SS14
Alyssa Cortez, Suellen Cho, Ernestine Rosa Estrella, Shania Smyer	Franca Ferrari- Bridgers	Speech & Theater	ST1

ART AND DESIGN

AD1

MY EXPERIENCE WITH KHC. Manuel Souffrant, and Katherine Griefen.

This presentation addresses student contributions to the online exhibit The Concentration Camps: Inside the Nazi System of Incarceration and Genocide which is currently being presented by the Kupferberg Holocaust Center at QCC. Working with curator, Cary Lane, a Faculty Member in the English Department, students from the college's Gallery and Museum Studies Program participated in the exhibition by creating a compendium of rigorous and intense testimonies from Holocaust survivors that speak to their trials and tribulations as well as their stories of love, family, and the will to live. Student interns researched photographs illustrating survivor's stories that represent what they went through during World War II in camps throughout Europe. Students also developed keywords for the video materials in the exhibition in order to make the original testimonies searchable.

BIOLOGICAL SCIENCES AND GEOLOGY

BG1

AFFORDABLE AND SPECIFIC DETECTION ASSAY OF ENTEROCOCCUS SPP. IN WATER AROUND NYC BY LOOP-MEDIATED ISOTHERMAL AMPLIFICATION (LAMP). Sumaiya Nasrin and Dr. Andrew Nguyen.

Enterococcus spp. are gram-positive bacteria that colonize human and animal intestines. They can survive in aerobic or anaerobic environments, as well as in extreme environmental conditions, making them ideal microorganisms for testing of fecally contaminated water. Rapid detection of Enterococcus spp. is needed to reduce the risk of exposure to water contamination. There are several ways to test for the presence of Enterococcus spp. such as the Enterolert enzymatic assay or monitoring microbial DNA using Polymerase Chain Reaction (PCR). Most tests are expensive or required special instrumentation like a thermocycler. We sought to explore the usage of an alternative method to PCR called Loop-mediated isothermal amplification (LAMP). Using LAMP, we plan to monitor for the presence of Enterococcus spp. in the water around New York City. The advantage of LAMP reaction is that it is inexpensive, requiring only a water bath between 60-68°C, 4-6 specialized primers and a processive Bst DNA polymerase. To make the assay rapid, we will employ the boiling method for DNA extraction rather than rely on traditional chromosomal method. Positive LAMP reaction has been traditionally detected by gel electrophoresis. To not only detect but also to quantify the amount of the amplification, we will use SyberGreen and molecular beacon to evaluate positive reaction. The challenge of the project however, is to determine whether we can detect Enterococcus spp. using available resources at home rather than rely on materials on campus, which is not accessible due to the Covid-19 pandemic.

BG2

ELISA: ENZYME-LINKED IMMUNOSORBENT ASSAY. Sumaiya Nasrin and Dr. Nidhi Gadura.

ELISA, or Enzyme-Linked Immunosorbent Assay is a diagnostic tool that detects and measures the antigens or, antibodies to determine whether a test subject is exposed to a disease or not. Additionally, if a test subject has a positive result for a disease, it is possible to determine the stage of the disease by using the ELISA method. In the ELISA technique, antigens and antibodies or, in other words, immunocomplex is a very important factor. Antigens are referred to as "foreign substances" that causes the human immune system to respond and to be activated. In contrast, antibodies are a type of protein that contains four chains of amino acids and antigen-binding sites. One special characteristic of the antibody is that each antibody recognizes a very specific antigen that allows fighting against a very specific infection or, disease. ELISA can be performed in four different ways such as direct, indirect, sandwich, or, competitive. Qualitative ELISA allows deciding whether a patient has a positive or negative result in terms of a disease diagnosis whereas quantitative ELISA allows us to quantify or, measure the optical density of the sample using a spectrophotometer. To analyze the data of this experiment, a standard plot was created by entering known antigen concentration on the Y-axis and corresponding absorbance value on the X-axis. ELISA should be performed in triplicate since triplicate allows us to determine an intra-assay variation within one test. Additionally, testing each patient sample in triplicate allows avoiding false-positive and false-negative results. Even though the standard plot based on ELISA was being used to test the HIV patient samples, it is possible to test the sample of COVID 19 patients by using the same methodology.

BG3

USING ARABINOSE TO CONTROL GFP GENE EXPRESSION IN E. COLI. Leidy Goldstein and Nidhi Gadura.

Plasmids are small, circular, extra chromosomal pieces of DNA found in bacteria which can be used as a vehicle to insert genes from one organism into another organism. The insertion of those genes can potentially change the organism's traits under specific conditions. In this experiment, competent E. coli cells are transformed with pGLO plasmid which contains an ampicillin resistance (bla) gene that serves as a selectable marker for transformants. It also has the AraC gene encoding an AraC regulation protein that controls the expression of Green fluorescent protein (GFP) gene produced by the bioluminescent jellyfish, Aequorea Victoria. Bacterial cells that have been transformed with the pGLO plasmid were selected by plating them on a LB/Amp plate. Additionally, transformant cells were exposed to arabinose sugar in a LB/Amp/ara plate in order to determine if there was gene expression for the GFP gene. The final results of this experiment suggest that only in presence of arabinose, the GFP gene will turn on and the bacteria will express their newly acquired jellyfish gene which causes them to glow brilliant green under ultraviolet light. In this work, the green fluorescent protein (GFP) is used as a cellular marker that allows gene expression to be observed in a living organism.

BG4

GMOS AND GENETIC ENGINEERING IN PLANTS. Sara Khan and Nidhi Gadura.

GMO stands for Genetically Modified Organisms. These organisms have been modified through genetic engineering artificially in a lab. The purpose of genetic modification is to introduce genes of interest in a cell so that it can develop into a complete organism with new characteristics of choice. The most common foods that are GMOs, whether organic or not, include corn, soybeans, rice, papaya, canola, and squash. Genes are inserted into plant cells by artificially introducing an extra-chromosomal DNA known as a plasmid from a bacterium. The plasmid is first manipulated to remove its original genes followed by incorporation of genes of interest into the plasmid. In this experiment, genomic DNA of different foods brought from home was extracted to identify whether they were GMOs or not. Genomic DNA was used as a template to do PCR. Three sets of primers were used to identify the PCR products, namely chloroplast gene as a positive control, CaMV 35S Promoter gene, and Nopline Synthase(NoS) both indicating genetic modification. The results showed that out of 10 foods that were brought, 8 were GMOs represented by bands on the gel corresponding to CaMV, NoS, or both. In the remaining two foods, either DNA was not extracted or the PCR had not worked appropriately due to which none of the bands were visible. This experiment concluded that GMOs are a vital part of human life as they have many benefits of increasing productivity, quality, and taste of food. Also, this experiment showed that organic foods also were genetically modified.

BG5

THE STUDY OF RELATIONSHIP BETWEEN STAT3 GENE AND ESTROGEN HORMONE IN OSTEOCLAST FUNCTION. Sara Khan and Andrew Nguyen.

A vital part of bone homeostasis includes a balance between continuous bone formation known as osteogenesis, and continuous bone destruction known as bone resorption. Bone tissue majorly comprises of osteoblasts, which are cells responsible for new bone formation and laying down of bone matrix and osteoclasts, which are cells responsible for bone resorption or 'eating up' of the bone. In cases when an imbalance occurs between these two processes, certain bone pathologies arise. One common bone pathology is osteoporosis in which bone resorption exceeds bone formation leading to weaker bones. For the past one month, I have been discussing with my mentor about the background, proposed hypothesis, procedures, and experiments of my research project. Recently my mentor, Dr. Nguyen, published a paper in PLOS ONE demonstrating that stat3 gene regulates osteoclast activity. Stat3 gene product encodes for a transcription factor of Signal Transducer and Activator of 3 protein. Interestingly, in this paper, it shows that female mice with knocked out stat3 gene in osteoclasts possessed weaker bones than the control female mice (with functional stat3 gene). However, this effect was not noticed in the male STAT3 knocked out mice. This suggests that estrogen hormone may interact with STAT3 in regulating osteoclast function. The relationship between estrogen, STAT3, and osteoporosis, however, is not known. The focus of our study is to determine this relationship by using the RAW 264.7 cells and conducting a series

of experiments to examine the interaction between STAT3 and estrogen receptor and the downstream targeted genes.

BG6

EXAMINING THE PRESENCE OF ENTEROCOCCI IN WATER USING LAMP AND FLUORESCENT DYE. Jeanne Romin and Andrew Nguyen.

Traditional PCR, short for Polymerase Chain Reaction, combined with the use of fluorescent dyes and probes has enabled easier identification of amplified DNA and bacteria. There has been a new technique for amplification called Loop Mediated Isothermal Amplification, also known as LAMP. LAMP has proven to be much faster and more specific than traditional PCR. This research focuses on identifying the presence of Enterococci in water using LAMP and fluorescent dye SYBR Green. Enterococci are bacteria that reside in the gastrointestinal tracts of humans and animals. This bacteria is harmless while in the intestinal tracts but when found in external sources such as various bodies of water, it can be very harmful. The presence of enterococci in water is an indicator of fecal matter. The presence of the bacteria has been tested by companies such as the USEPA (United States Environmental Protection Agency) by using membrane filters. In this research, methods such as the boiling method are used in the process of DNA extraction. A master mix containing BST enzyme is added with the 4 necessary primers used in LAMP. LAMP requires a water bath of 60 to 65°C for about 30 minutes. A sous vide is used as a water bath incubator. The addition of the fluorescent dye SYBR Green is added for amplification detection using a UV light. A positive result will show under UV light with a bright green fluorescent color. The higher the intensity of the fluorescent dye, the higher the amplification of the presence of Enterococci in the water sample.

BG7

MONITORING BIRDS IN NYC PARKS VIA FIELD OBSERVATIONS AND EBIRD DATABASE ANALYSES. James Hardat and Joan Petersen.

New York City is home to a diverse variety of resident and migratory bird species. Birds provide several benefits to our city parks: they are important part of both terrestrial and aquatic ecosystems, assist in seed dispersion, and provide recreational and aesthetic value for NYC citizens. Monitoring birds within New York City can provide valuable information that can inform conservation, management and restoration decisions of government agencies like NYC Parks. eBird is a global repository for citizen science data created by the Cornell Lab of Ornithology. Over 100 million observations of bird distribution, habitat and abundance are contributed each year. The reliability of these data has been verified, and several scientific studies have been published using information obtained via eBird. My project is focused on using an eBird database and ArcGIS software to identify parks in NYC City that are missing observations, and then obtaining field data for these parks. Field data will include bird species identifications, photographs, habitat descriptions, behavioral observations, and auditory recordings. I will also use computer-based

analyses to map and detect trends for rare, threatened and endangered bird species. This information will inform NYC Parks management decisions regarding habitat maintenance and protection as well as provide leverage for restoration efforts, especially for bird species with the greatest conservation needs.

BG8

INOSITOL HEXAKISPHOSPHATE KINASE 1: A NOVEL TARGET FOR TREATING OBESITY, TYPE- 2 DIABETES AND NON-ALCOHOLIC FATTY LIVER DISEASE.

Natasha McGowan and Sarbani Ghoshal.

Throughout evolution humans have had to hunt and forage for food as a means of survival. However, over the last 50 years, with access to more readily available food, especially fast food, coupled with an increase in sedentary lifestyle, cases of obesity have been on the rise. Obesity is a condition that acts as a catalyst for development of other diseases such as type-2 diabetes (T2D) and non- alcoholic fatty liver disease (NAFLD), both of which prove to be fatal if left untreated. Thus, extensive research has been going on to find therapeutics for obesity and its associated comorbidities. Many such research studies focus on either energy intake or energy expenditure as a means to combat obesity. Inositol hexakisphosphate kinase 1 (IP6K1) is an enzyme which has recently been shown to have a major role in metabolic diseases. This presentation will discuss pharmacological inhibition of IP6K1 in mouse models of diet induced obesity (DIO). DIO mice were found to gain less body weight, ameliorate conditions of type-2 diabetes and fatty liver, when treated with an inhibitor of IP6K1. Thus, IP6K1 can be considered a novel target for obesity, T2D and NAFLD.

BG9

MOLECULAR TARGETS OF SARS-COV-2 STRAIN VARIANTS IN HUMAN HOST.

Tamara Areizaga and Monica Trujillo.

SARS-CoV-2 is an enveloped positive single-stranded RNA virus and member of the Coronaviruses family responsible for the COVID-19 pandemic that continues to challenge our world today. Due to the highly adaptive and chronic etiology of SARS-CoV-2, it is able to infect different human tissue and transfer between different host species while adjusting to ecological conditions to sustain itself. As many other RNA viruses, SARS-CoV-2 has been able to mutate and different variants and lineages have been identified since the original Wuhan strain. In order to understand the hijacking mechanism of the virus during infection, identification of molecular targets in human hosts is critical. Scientists have recently studied SARS-CoV-2 molecular targets in humans providing valuable information for the development of vaccines and drugs to treat COVID-19. The virus's ability to mutate poses a unique challenge to the scientific and healthcare community as variants of the virus can negatively affect the protection offered by vaccines. Wastewater surveillance can serve as a valuable risk management tool to observe and assess the change in frequency of variants globally and locally. The CUNY team developed a

protocol which NYC Department of Environmental Protection is currently using to monitor the presence of SARS-CoV-2 across NY state.

BG10

MOVEMENT OF WATER ACROSS BIOLOGICAL MEMBRANES. Anthony Zheng, Monica Trujillo, Yanni Farinango, Brintney Lopez, Antonina Mazara, Natasha Michelot, Amanda Olivieri, Joy Orr, Austin Perrin, and Charlie Rivera.

Remote learning has presented a challenge to college students unable to attend lab classes. Through remote learning and research, we learn osmosis occurs in our everyday lives. There are many basic essentials such as breathing, the feeling of thirst, the filtration of our waste from cells to blood cells all required osmosis. Although we aren't able to visually see osmosis happening, we are aware of how important it is. This has lead us to develop a cheap and effective visual experiment of osmosis. Osmosis is the movement of solvent and small solutes across a semi-permeable membrane in response to the solute concentration. The movement of water molecules across biological membranes plays a very important role in the human body. Methods: In an experiment done at home we demonstrated the visible effect of osmosis using an egg, vinegar, and corn syrup/salt. Using a kitchen scale and/or a measuring tape we observed and recorded the changes in the egg appearance and size. Results: the incubation of the egg in vinegar removed the shell of the egg and allowed us to observe the changes that occurred as we incubated the egg in water or corn syrup. Conclusions: We were able to visually understand how water moved either from the egg to the outside environment or exactly the opposite. Being able to do hands-on experiments, discussing protocols, and recording results not only allowed us to use the scientific method but also to be able to connect the experiment with human diseases.

BG11

"THE ONCE INVISIBLE BECOMES VISIBLE". Fatima Bojorge, Monica Trujillo, Krystyna Tiufanova, Sarah De La Rosa, Krystal Cummings, Tyra A Mcglashan, Caren Alexandra Asitimbay, John Paul Arde Blando, Shannon Fleischman, Kayla Montana Brown, and Lesly Romero.

Introduction: Remote learning has presented several different challenges to college students in 2020- particularly those enrolled in lab science courses. Without the benefit of the laboratory environment and equipment, it has been difficult to make some of the class topics come alive, and help students understand how they encounter biological concepts in their everyday life. Method and Results: Our work is centered on making observations and recording data from the relative safety and convenience of our own homes, using regular household items in place of specialized and expensive lab tools. In this specific unit, we have isolated and extracted DNA from fruit and made them visible to the naked eye. Using ingredients found in an everyday kitchen cupboard, such as strawberries, dish soap, and rubbing alcohol we broke up cells and precipitated the DNA. This allowed us to see the DNA isolated from the strawberry cells. Additionally, we have built

model DNA strands from paper/cardstock, so as to better understand their shape and 3 D structure. Conclusion Being able to do hands-on experiments, discussing protocols and recording results not only allowed to use the scientific method but also to be able to connect the experiment with human genetics.

BG12

INVESTIGATING HUMAN ORIGINS BY EXPLORING ALU GENE INSERTION.

¹Izabella Clarke, ¹Patricia Schneider and ²Xiaoqun Catherine Zhang, ¹Biological Sciences and Geology Department, ²CSHL DNA Learning Center, Cold Spring Harbor Laboratory, 334 Main St, Cold Spring Harbor, NY 11724.

The study of human genetics includes the investigation of human origins and genealogy. The majority of human DNA is identical in each person, but about 0.1% is different from one another. The Alu polymorphism (+ and -) on human chromosome 16 is used to study human evolution and migration. In this experiment, DNA was extracted from the cheek cells of 16 participants. The Alu DNA was amplified and detected using two different methods: LAMP with colorimetric assay and PCR with Gel Electrophoresis. The collected results from 14 out of the 16 participants determined that 6 participants were homozygous negative (- -), 5 students were heterozygous (+ -), and 3 students were homozygous positive (+ +). This indicated that the participants that were categorized based on their specific genotype shared a common ancestor. Both methods produced identical results and supported the conclusion that humans are related to one another through a common ancestor. Collecting more samples on a broader scale and comparing results from modern to archaic humans could further support human lineage.

BG13

ANALYSIS OF THE GENOME OF SETTECANDELA. Michelle Franco and Urszula Golebiewska.

Settecandela is a bacteriophage found in a sample taken from a compost pit in 2016 in Hope, Michigan. It was isolated using Mycobacterium smegmatis. Settecandela belongs to the AA cluster. AA cluster has only one other member: Phrappuccino. Settecandela belongs to the Myoviridae family. Myoviridae phages usually have larger genomes and a characteristic contractile tail sheath that is essential to its high viral infection efficiency. Settecandela is a lytic phage. We identified 226 protein coding genes in the Settecandella's genome. We used DNA Master, Phamerator, Blast, HHpred, GeneMark and other programs to analyze these genes. We found that 15 of these genes were orphans, with no matches in existing databases. Only 35 of the protein coding genes had identified functions. We identified genes important in the cell lysis such as lysin A, peptidoglycan endopeptidase, and LysM. Since the AA cluster is very small, we looked for the relationships to other clusters. Settecandela shares similarities with the cluster A phages, particularly A1 sub-cluster. More interesting relationships were found with the sub-cluster C1 and

F1. The genes matching these other clusters were also found in the same location in the genome. This supports the observation of the mosaicism in the bacteriophage genomes.

BG14

TRNA GENES IN BELMONTSKP. Shan He and Urszula Golebiewska.

Phage BelmontSKP, a double-strand DNA lytic virus that infects *Microbacterium foliorum*. It was found in the soils near Lake Wylie, North Carolina, by Sarah Lewin, a student of Queens University of Charlotte. Phage BelmontSKP has a genome length of 41665 base pairs. Our research objective was to analyze and annotate the genome of BelmontSKP. Using Glimmer and GeneMark we predicted 72 genes in which 3 (Genes: 68,69,70) were identified as tRNA genes, and the rest as protein-encoding genes. In addition, we used: Mycobacteriophage Database, GeneMarkS, Starterator, Protein BLAST, HHPred, Phamerator, DNAmaster, Aragorn, and tRNA ScanSE to annotate and analyze these predicted genes. Here we present the identification and analysis of the tRNA genes. They were identified by both Aragorn and tRNAScanSe. Gene 68 codes for tRNA of anti-codon GTT corresponding to Asparagine; Gene 69 codes for tRNA of anti-codon CTG corresponding to Glutamine, and Gene 70 codes for tRNA of anti-codon CTT corresponding to Lysine. It is rare for viruses to have tRNA genes in their genomes. The distribution of tRNA genes is very likely cluster-based, with some clusters have a 100% presence of tRNA genes in its members' genomes, while some clusters have 0%. Phage BelmontSKP is a members of cluster EB, that includes 33 other phages. The average presence of tRNA in this cluster is 1 gene per species. However, whether BelmontSKP has the most tRNA genes in cluster EB is yet to be determined because some members in this cluster are still waiting to be annotated.

BG15

EFFECTS OF DENDROTOXIN ON ACTION POTENTIALS IN NEURONS. Nicole Paulescu and Urszula Golebiewska.

The mamba snake is a member of the family Elapidae which are known for their fangs allowing them to deliver venom and immobilize their prey. The black mamba is considered the deadliest snake in the world. Dendrotoxin is one of the main components in the venom and is believed to be majorly responsible for the high mortality rate. Dendrotoxin blocks certain voltage-gated potassium channels and thus enhancing the release of acetylcholine at neuromuscular junctions, which results in the body convulsing. Other toxins in the venom are thought to facilitate the spread of the dendrotoxin, therefore making treatment of a snakebite very time sensitive. Antivenom is the most prevalent treatment used, but as knowledge surrounding dendrotoxin is still limited and the antivenom's quality is yet equivalent, snakebites remain a WHO-listed neglected tropical disease. Treating patients with antivenom is life depending but can lead to acute or delayed side effects such as long-lasting serum sickness or immediate life-threatening anaphylaxis reactions. Therefore, a call for improvement of antivenom is necessary and can only be achieved by expanding our knowledge of dendrotoxin and its effects on the nervous system. To contribute to

this cause, we are planning to model how the inhibition of the voltage-gated potassium channels affects the neuronal signal transmission. We are going to use the computer language Python and simulate the changes in the action potential using a modified Hodgkin- Huxley model. We will examine how the amount of dendrotoxin affects the signaling, and how the environmental conditions contribute to the outcome.

BG16

INVESTIGATION OF CANCER CELL GENE EXPRESSION AFTER TREATMENT WITH SINGLE-WALLED CARBON NANOTUBES. Janice Williams, Regina Sullivan, and Sarbani Ghoshal.

Triple-negative breast cancer (TNBC) is an aggressive disease with limited treatment options. Biomedical applications of single-walled carbon nanotubes (SWCNT) have the potential to expand treatment options. Previous studies showed that SWCNT can enter cells through endocytosis or gap junctions. Our lab has shown that TNBC cells (MDA-MB 231 and MDA-MB 468) have reduced rates of migration after treatment with dispersed SWCNTs. This study will test the hypothesis that SWCNT alters expression of genes implicated in metastatic breast cancer. Genes analyzed by real-time PCR will include sphingomyelin phosphodiesterase 1, prostaglandin E receptor 3, and G protein-coupled receptor 3, sex-determining region Y-box 2. Thioredoxin-related transmembrane protein 2 (TMX2) possesses not only a thioredoxin consensus pattern but also an endoplasmic reticulum membrane retention signal, an N-terminal signal peptide, and a Myb DNA-binding domain repeat signature. Matrix metalloproteinases (MMPs), particularly MMP-2 and MMP-9, have been reported as putative tumor markers because of their involvement in cancer invasion and metastasis. After SWCNT treatment, RNA will be isolated following the traditional TRIZOL method. Using custom-made primers (IDT) and master mix from Applied Biosystems, RNA will be reverse transcribed to cDNA and processed for real-time PCR. HPRT1 will be used as the housekeeping gene control. MCF 10A, human mammary epithelial cell line phenotypically normal used as the negative control. The 549 cells (human non-small cell lung cancer cell line) are used to determine if the results are breast cancer-specific. Anticipated data from our gene expression studies will help reveal novel therapeutic treatment options for breast cancer.

BG17

GENETIC TOXICOLOGY WITH THE HELP OF A PLANT BASED SYSTEM. Lisbel Pena and Sarbani Ghoshal.

Plants are useful screening and monitoring systems. Plants like *Allium cepa*, *Tradescantia*, *Zea mays*, *Vicia faba* have been extensively used for their sensitivity to toxicants and their ability to detect chromosomal aberrations. Among all such plant systems, *Allium cepa* is regarded as one of the best systems to study disturbances in mitotic spindle, due to easy visualization of large size and low number of chromosomes. For studying genetic toxicology of specific agents, germinating *Allium* bulbs are grown in such solutions and stained root tip squashes are observed under

microscope to calculate mitotic index (MI), chromosomal aberrations (CA) and micronucleus (MN) formation. All these end points are indicative of damage to cell division or chromosomes induced by the agent being tested. In this presentation, we will describe the use of *Allium cepa* system to investigate chromosomal aberrations induced by few common toxicants. Such chromosomal aberrations, if not repaired, can lead to premature aging, senescence, and cancer. Our data will show *Allium cepa* root chromosomes can be used as a first-tier screening tool for genetic and environmental toxicants.

BG18

THE FUNGI CHRONICLES: AN ECOLOGY CLASS RESEARCH PROJECT. Anjuman Alpo, Joan Petersen, Noel Beckles, Mateo Gonzalez, Drew Guevara, Dwight Hadley, James Hardat, Bangaly Keita, Simona Mitac, Stanton Sanichar, Stephen Spiridakis, Andre Stewart, Ryan Tamashar, and Claire Toussaint.

Fungi are eukaryotic, heterotrophic organisms that include yeasts, molds, and mushrooms. They are an important food source for many organisms, and are also used in food and medicine production. In nature, fungi are essential as decomposers and nutrient recyclers - many fungi can break down lignin and woody plant material that other decomposers cannot. Several fungal species live in symbiotic relationships with photosynthetic algae or bacteria (lichens): others are associated with plant roots (mycorrhizae). Some fungi are poisonous or pathogenic to humans and other animals, and fungi cause the majority of plant diseases. Our class observed macrofungi in nature and used the iNaturalist application to document our observations. This app allows users to upload photos of their observations- other viewers can then assist in the identification of the organisms observed. Our macrofungi observations were made in several locations including New York City parks, Pennsylvania and Long Island. Altogether we made about 129 observations of fungi. Of these, 67 were identified as unique taxa in iNaturalist, and 16 fungi were identified to species. Our observations included mushrooms, bracket fungi, lichens and puffballs that varied in size, structure, color, and other attributes. Our survey revealed many types of macrofungi found in our local environment. Fungi have many important functions that make them invaluable in nature. Citizen science applications like iNaturalist can assist in identification of fungi to help scientists understand how climate change and pollution may impact the diversity and species distribution of these important organisms.

BG19

CHANGES IN LEAF PIGMENTATION DURING AUTUMN SENESCENCE OF DECIDUOUS TREES. Cardi Lam, Joan Petersen, Anjuman Alpo, Eduardo Flores, Aliya Ghazaal, Ariyana Russell, Estefani Sanchez, and Alexander Tilas.

Phenology is the study of the timing of life cycle events. Scientists look for patterns in phenological data to understand ecosystem function, as well as to detect and predict the impacts of climate change. Phenology can be studied in deciduous trees that undergo seasonal periods of leaf senescence and leaf loss in fall, and bud formation, leaf-out and flowering in spring. We studied leaf color changes and senescence by making weekly observations of several deciduous trees in our area. We also collected leaves and used paper chromatography to see if we could detect changes in leaf pigments during the process of senescence. For this procedure we ground up leaves, extracted their pigments in 70% isopropanol, and separated these pigments by size using paper towel strips. Our field observations showed that both the leaf colors produced and the progression of leaf senescence varied by tree type. Some of the trees we observed still had leaves on them in mid-November, indicating a late leaf fall that could possibly be correlated with warmer autumn temperatures. In addition, paper chromatography detected differences in the amounts of pigments present in active and senescent leaves, as well as in the different types of leaves tested. Our results demonstrate that the level of production of leaf pigments vary with tree species and at different stages of phenology. Our data will be compared to the National Phenology Network database to detect similarities/differences in phenology for the deciduous tree species we observed.

BG20

FISH PROTEIN PROFILING USING WESTERN BLOTTING. Nicole Paulescu and Nidhi Gadura.

Western blotting is a common analytical method used in molecular biology to detect specific proteins by using specific antibodies. Using this technique, information regarding the size and relative abundance of the protein in a tissue can be found. In this experiment, we became acquainted with extracting and separating proteins according to size by running an SDS PAGE gel. We learned how to use Coomassie stain to visualize the entire protein profile of the cell, and how to use specific antibodies to find a specific protein by doing a Western blot. Small fish samples of students' choice were used to extract protein using Laemmli buffer. Coomassie Blue was then used to stain one protein gel. Using the same protein samples, a second gel was used to perform the western blotting, and proteins transferred onto a nylon membrane where it was then incubated with anti-myosin primary and rabbit anti-myosin secondary antibody conjugated with HRP to only visualize chosen proteins.

BG21

COMPARATIVE MOLECULAR ANALYSIS OF VERTEBRATE SCN1. Tamara Areizaga and Peter Novick.

SCN1A and SCN1B genes produce a voltage-gated sodium channel which plays a role in neural signaling. Mutations in these genes lead to an array of disorders dealing with generalized seizures in humans. Human SCN1A is located on Chromosome 2 and codes for the alpha-1 subunit, creating a channel with 24 transmembrane domains. The human SCN1B located on Chromosome 19 codes for the beta-1 subunit, is associated with channel inactivation and contains a signal peptide. These subunits regulate electrical signaling within the brain and muscles. We hypothesize that a comparative protein analysis would help to understand evolution of these genes and associated proteins. Using bioinformatics, SCN1 genes and proteins from model vertebrates were compared. High levels of conservation at the protein level required analysis of the genetic environment and gene structure. Although mammalian species had fewer introns than amphibians, they were littered with more transposons (LINEs and SINEs). Results revealed that many proteins may contribute to this complex system. Two neighboring genes FXYD1 and GRAMD1A may be transcribed with SCN1. Working with these genes in a model organism may contribute to medical treatments.

BG22

EXPLORING ANTIBIOTIC RESISTANCE IN SOIL BACTERIA: A LITERATURE REVIEW. Austin Hwang and Mangala Tawde.

With the discovery of Penicillin, antibiotics have saved humanity for centuries. However, the long history of misuse and overuse of antibiotics have led to antibiotic resistance which is a major threat in medicinal therapeutics. The antibiotic resistant pathogens have evolved over time through various mechanisms such as mutations of inherent genes or evolution of genetic elements. This evolution is important as the bacteria can continue to become resistant to more and more antibiotics, leading to the continuing search for the development of and research of new antibiotics. Here we take upon a comprehensive literature review to study what is known in current literature about antibiotic/drug resistance developing in soil bacteria, specifically Streptomyces- a group soil bacteria that produce most of the clinically relevant antibiotics. This review will help us better develop our research project further studying the ongoing epidemic of antibiotic resistance.

BG23

WHAT DO WE KNOW SO FAR ABOUT COVID 19: A CURRENT LITERATURE REVIEW. Aliya Ghazaal and Mangala Tawde.

We are currently in the middle of a deadly pandemic of Coronavirus disease of 2019 (COVID-19). As we know this Severe Acute Respiratory Distress Syndrome (SARS) is caused by the novel coronavirus strain of SARS CoV-2. This acute respiratory syndrome has symptoms like fever,

cough, chills, lung inflammation, sore throat and loss of smell and taste. Real time PCR and genome sequencing are being used to identify the virus. The disease being highly pathogenic, transmission occurs via inhalation of respiratory droplets and contact with virus- contaminated surfaces, and the incubation period ranges from 2 to 11 days. Several vaccines such as inactivated vaccines, nucleic acid-based vaccines, and vector vaccines, are under development worldwide targeted towards Coronavirus spike glycoprotein and other antigens. Some potentially useful drugs identified in coronavirus treatment are Remdesivir, Lopinavir and Interferon alpha 2B treatment. Additionally, drugs such as hydroxychloroquine may help in treatment of lung inflammation. RNA synthesis inhibitors, neuraminidase inhibitors may provide good candidates for vaccines. We have undertaken a broad review of current literature to know more about this disease and its pathogen.

CHEMISTRY

CH1

PREPARATION AND CHARACTERIZATION OF ION GELS FOR USE AS GAS SEPARATION MEMBRANES. ¹**Shameir Nembhard**, ¹Sharon Lall-Ramnarine, ¹Nicole Zmich, ²Jasodra Ramdihal, ²Dr. James Wishart, and ³Dr. Edward Castner. ¹Chemistry Department, Queensborough Community College, ²Brookhaven National Laboratory, ³Rutgers, The State University of New Jersey.

The urgent need for suitable replacements of hazardous chloroflourocarbons (CFCs) as refrigerant gases owing to their ozone depleting nature, has resulted in the use of mixtures of hydrofluorocarbons (HFCs). However, the separation of the HFC blends which is necessary before recycling or disposal at the end of their life cycle, is problematic. Ionic liquids (ILs) with their low vapor pressure are suitable for use under vacuum conditions used for the separation of gases but their viscosity is too low. Ion gels prepared from ionic liquid-polymer mixtures have shown promise as solid supports that allow for the separation of gases while retaining the IL properties. However, the properties of ion gels are still poorly understood and both the structure of the IL and the IL/polymer ratio needs to be optimized to achieve a good separation of gaseous mixtures. We report here on the Synthesis and physical characterization of alkylphosphonium and alkylammonium bis(trifluorosulfonyl)imide ionic liquids mixed with a polymer to produce ion gels. The ILs were designed to have a dominant non-polar region and optimized for use as gas separation membranes. H-1 and C-13 NMR was used to confirm the structure of the ILs. Physical characterization of ion gel films include Differential Scanning Calorimetry (DSC). This work was supported in part by the NIH Bridges to the Baccalaureate program at Queensborough Community College and the U.S. Department of Energy, Office of Basic Energy Sciences, Division of Chemical Sciences, Geosciences, and Biosciences under contract DE-SC0012704.

CH2

SYNTHESIS AND CHARACTERIZATION OF IONIC LIQUIDS BEARING THIOETHER SIDE CHAINS.

¹Mehreen Mughal, ¹Sharon Lall-Ramnarine, and ²Edward Castner. ¹Chemistry Department, Queensborough Community College, ²Rutgers, State University of New Jersey.

Ionic Liquids are being extensively investigated as potential electrolytes in electrochemical devices, including rechargeable lithium cells, solar cells, and supercapacitors. Unfortunately, most ILs have significantly higher viscosities than those of electrolytes based on conventional solvents, resulting in slower charge transport. Recently, reports of ILs bearing short thioether side chains have shown that replacing the O atoms in ether side chains with S atoms lowers IL viscosity even more in imidazolium ILs but not in pyrrolidinium and phosphonium ILs. This project involves a literature review of current thioether ionic liquids and methods used to prepare them. Research reveals that there is a lack of information in the literature on the synthesis and characterization of thioether ILs of varying structural types, particularly those with polythioether side chains directly attached to the N of the imidazolium and pyrrolidinium cation rings. Future work will focus on synthesizing a series of methylimidazolium and methylpyrrolidinium ILs bearing thioether and polythioether side chains of varying lengths coupled with bis(trifluoromethylsulfonyl)amide and bis(fluorosulfonyl)amide anions. We will also characterize the ILs for conductivity, density, viscosity, and thermal profile. This work is a part of a larger collaborative project where we seek to examine the atomistic origin of viscosity by comparing ILs with ether and thioether side chains. Results are expected to make important contributions to the design of ILs optimized for large scale use in energy storage devices like batteries.

CH3

UNDERSTANDING SINGLE-WALLED CARBON NANOTUBE-IONIC LIQUID INTERACTIONS FOR VARIOUS APPLICATIONS.

Zheyong Piao, Tirandai Hemraj-Benny, and Sharon Lall-Ramnarine.

Carbon nanotubes (CNTs) are widely investigated for various applications involving strong elastic and highly electrically conductive materials. A single-walled carbon nanotube (SWCNT) is a seamless cylinder consisting of only one layer of graphene. SWCNTs have several outstanding properties over other types of carbon nanotubes, which include their purity and crystallinity. However, SWCNTs typically consist of a mixture of metallic and semiconducting nanotubes and are highly insoluble in many solvents. An ionic liquid is a salt in a liquid state below 100 °C. Among ionic liquids, imidazolium ionic liquids are found to be excellent solvents to disperse SWCNTs. It is critical to fully understand the specific interactions that exist between SWCNTs and imidazolium ILs when they are mixed for usage in practical applications. Here, a summary of reported interactions that have been identified between SWCNTs and different ILs are presented. This understanding will be utilized in the future to conclude specific interactions that exist between SWCNTs and imidazolium ILs containing cations with different side-chain functionality, coupled with the bis(trifluoromethylsulfonyl)amide (NTf₂⁻) or bis(fluorosulfonyl)amide (FSA⁻) anion.

Specifically, spectroscopic (Mid-IR, UV-Visible, and Raman) data of the SWCNT-IL mixtures containing different nanotube concentrations will be analyzed.

CH4

SYNTHESIS OF ANTIMYCOBACTERIAL PYRROLES. Yingying Zhang and Sasan Karimi.

Pyrrole, a heterocyclic compound, is found in many natural products that contain biological activity. We became interested in synthesizing several medicinally active pyrroles that have antimicrobial, antifungal, anti-inflammatory, and antitubercular activities. To that end, we envisioned an alternative synthesis of pyrroles which has not yet been reported. Our methodology involved treatment of nitrodienes in the presence of a Molybdenum (Mo) catalyst. We have illustrated that a number of substituted pyrroles can be synthesized using this approach and are currently applying this method to include the syntheses of the antimicrobial pentabromopseudilin, the anti-inflammatory bimetopyrol, and several anti-tubercular agents. Some of the antitubercular agents we have synthesized are new and will be tested for their biological assay.

CH5

ONE-STEP FABRICATION OF POLYRHODANINE - PD(II) NANOCOMPOSITES VIA REDOX REACTION. ¹Arnab Sharma, ¹Moni Chauhan, ¹Saleh Jaser, ²Gurjeet Longia, and ²Bhanu Chauhan. ¹Chemistry Department, Queensborough Community College, ²Chemistry, William Patterson University.

Polymers embedded with metal nanoparticles and polymeric metal complexes have been extensively studied for their application as catalysts, electroluminescent devices, optical and electrochemical sensors. Rhodanine (Rh) provides a great chelating agent due to sulfur, nitrogen and oxygen coordinating sites and PolyRhodanine (pRh) shows corrosion inhibition properties, is antibacterial, anti-diabetic, anti-viral, antimicrobial, antihistaminic and HVC inhibitor. In our lab, we have successfully synthesized polyRhodanine (pRh) nano/micro spheres by an oxidation-reduction reaction with Cu(II) salts. These core shell structures are the first green synthesis of a facile, single-step process where metal salts are the oxidizing agent. 80% degradation of MO (Methyl Orange dye) occurs in 3 hrs via adsorption when treated with Cu⁰-polyrhodanine nanocomposite. With Ag(I) ions Rh, is known to generate pRh nanotubes and nanofibres/Ag⁰ which exhibits high antimicrobial efficacy against Gram-negative and Gram-positive bacteria and yeast. To investigate the morphology of Nano Palladium encapsulated pRh nanocomposites and to study their catalytic efficacy, we synthesized Pd⁺² mediated pRh in the presence of KMnO₄ in microwave conditions at 80°C. To our surprise nano/micro spheres of pRh with core shell morphology were generated and the product was identified via Infra-red spectroscopy and Scanning and Transmission Electron microscopy. Thus, we have concluded that divalent ions generate spherical morphology and monovalent ions generate nanofibers of pRh via a redox reaction.

CH6

FROM NATURAL TO SYNTHETIC: PHOTOPHYSICALLY IMPROVED CYANINE DYES AND THEIR BRIGHT FUTURE. Yingxin Liang and Zhou Zhou.

Cyanine fluorophores have drawn more and more attention due to their applications in many scientific fields: such as engineering, pharmacology, biology, and medicine. This presentation primarily focuses on the background and the application of the cyanine families. From the naturally occurring anthocyanin pigments in flowers, berries and vegetables to the first synthetic cyanine dye made a century ago, people have known these compounds for a long time. Cyanine dyes also play interesting roles in everyday life. They have been used as cosmetic pigment and acid-base indicator, even dyes for DVD-R and CD-R discs. In recent years, novel and improved synthetic cyanine dyes have been used as a light source in a new biological imaging technology called single molecular FRET. This cutting-edge technology has enabled unprecedented insights into mechanisms of bio-functions and, probably most importantly, their "malfunction" due to diseases. To keep up with the fast advancement in instrumentation and computer science, chemists are now facing new challenges and opportunities to make better and brighter synthetic fluorophores. The future presentation will focus on the synthesis of cyanine fluorophores. From the early generation of symmetrical nonpolar dyes to the novel asymmetrical cyanine species that render high brightness, long life-span, improved photophysical properties, higher hydrophilicity, and specific labeling.

CH7

OPTIMIZING THE FORMATION OF POLYANILINE NANOFIBER-RUTHENIUM NANOPARTICLE COMPOSITES FOR THE CATALYTIC DEGRADATION OF CONGO RED. Devani Mahabir and David M. Sarno.

In this research, a method to optimize the formation of polyaniline nanofiber-ruthenium nanoparticle composites (PANI-NFs/Ru-NPs) is presented. PANI nanofibers provide a matrix to immobilize and disperse metal NPs. These composites are conductive and may be implemented in applications such as catalysis. Our goal is to use them as a catalyst for the degradation of congo red, an azo dye that is toxic to many aquatic organisms and highly resistant to biodegradation. Ru-NPs were synthesized from Ru-salts by microwave irradiation in water at $> 100\text{ }^{\circ}\text{C}$ in the presence of NaBH_4 and pre-formed PANI-NFs. Scanning electron microscopy (SEM) and Energy-Dispersive X-ray Spectroscopy (EDS) were used to determine the morphology and elemental composition of these materials, respectively. SEM appeared to show Ru-NPs, as well as unreacted Ru-salts. EDS indicated the presence of Ru, but cannot distinguish between Ru (III)-ion and Ru-metal. Recent results suggest that NP formation is favored by shorter microwave time and higher temperature, as well as pre-adsorption of Ru-salts onto dispersed PANI-NFs. However, these preliminary results require further study. Ultimately, the catalytic properties of the optimized materials with congo red will be tested by UV-Vis absorbance.

CH8

POROUS MICROSPHERES OF POLYANILINE AND ITS DERIVATIVES FOR PAYLOAD ENCAPSULATION. Miaolan Chen Weng and David Sarno.

Porous microspheres of polyaniline and several of its derivatives were prepared through a water-in-oil-in-water (W/O/W) double emulsion method. This simple method requires only rapid addition of excess 4 M ammonium hydroxide to acidic dispersion containing the preformed polymer and an amphiphilic monomer such as o-toluidine (OT). Our method is novel in that OT monomer serves as a single small molecular surfactant, whereas most W/O/W systems require multiple surfactants and stabilizers. FTIR and NMR spectroscopy confirm the presence of OT in the polymer spheres and its absence in non-spherical particles. By varying the amount of dispersed polymer and dissolved monomer, we have optimized the formation of porous spheres from polyaniline, poly(o-toluidine), poly(m-toluidine), poly(2,5-dimethylaniline) and poly(3,5-dimethylaniline). Cargo loading and delivery are among the important applications of these porous materials. Upcoming work will determine if loading can be achieved by encapsulation and/or permeation by a series of fluorophores. Their interaction with the polymers will be studied by fluorescence microscopy and will consider the effects of fluorophore molecular weight, concentration, and exposure time.

CH9

ENHANCING THE PERFORMANCE OF LASER-INDUCED GRAPHENE CAPACITORS. Tyra Volney and Paul Sideris.

Graphene is an allotrope of carbon composed of a single layer of atoms bonded in a hexagonal "honeycomb-like" lattice. It is currently being investigated for a wide range of applications, particularly in the fields of energy storage and electronics. A simple and scalable method of preparing graphene is to irradiate commercially available Kapton®, a polyimide film, using a laser commonly found in laser cutting systems in machine shops. The graphene prepared in this way is termed, "laser-induced graphene." The computer-controlled, high-accuracy laser beam positioning in these cutting devices allows the user to reproducibly "laser scribe" graphene in a variety of patterns on a polyimide film. The laser scribing technique described above has been effectively used to fabricate graphene electrodes for in-plane capacitors. The energy stored on a capacitor (U) is a function of the capacitance (C) and the working voltage (V), such that: $U = CV^2/2$. In this work, strategies to increase the theoretical energy and power densities of laser-induced graphene capacitors will be reviewed.

CH10

SYNTHESIS OF X-SHAPE MOLECULES AS ELECTRON ACCEPTORS IN ORGANIC SOLAR CELLS. Feruza Turobova, Sujun Wei, and Muhabbat Ahmedova.

Compared to traditional silicon solar cell, organic solar cell (OSC) has advantages of being flexible, cheap and light-weighted. However its light-to-electricity conversion efficiency is not as good as silicon counterpart. Therefore there're tremendous interests to further improve OSC's efficiency. Within OSC, it typically contains donor and acceptor materials. The C₆₀ fullerene based acceptor readily accepts electrons from a wide range of donor materials and exhibits high electron mobility. However, fullerene is not an ideal material due to its weak absorption and very deep LUMO level. Therefore there is a clear need for alternative acceptor materials. We propose to synthesize X-shape molecules as electron acceptors via strain and Hückel aromaticity as the driving forces. The molecule's bottom half is a fluorene unit, and the top half is a fused heterocyclic ring. Both motifs are twisted along a central double bond. We have synthesized first two targets in four synthetic steps. These red compounds show intense green fluorescence. Their structures were preliminarily confirmed by H-NMR and C-NMR. With ~500 mg of these compounds each in hand, further investigations such as fluorescence quantum yield and testing them in an organic solar cell as acceptors are set to go.

ENGINEERING TECHNOLOGY

ET1

SMART VIRTUAL ROOM APP. Ornima Tyeshi and Huixin Wu.

This project was born with the idea of virtual meeting and social distancing due to the COVID19 pandemic. The project consists of creating an algorithm for smartphone application where the application itself looks for the best way to locate the participants in a site according to its space. For example, it can be applied in a doctor's office where it would virtually assign in which chair the patient will sit according to the time and day of the medical appointment, in order to keep to social distance. The Smart Virtual Room App can establish a communication between the nurse or receptionist while you are connected in the virtual room app. On the other hand, the application can also be applied for online meetings where the app virtually assigns a place in the virtual room to each participant, who are connected remotely. Let's say we are creating a virtual office hour room at QCC for the ET department. In the app, professors who have office hours at a certain time and day, can join the office hour room and be virtually active. From there, students who enter this office hour virtual room can see which professors are available and for which classes, and the student can request a one-to-one meeting or a group meeting. Indeed, the objective of this project is to create a virtual App where it can facilitate users to create their virtual space in a real or virtual environment and facilitate communication between participants.

ET3

TRANSFORMING THEORETICAL KNOWLEDGE INTO CREATING A PRACTICAL MODEL USING 3D MODELING SOFTWARE. Ashiquil Tuhin, Md.Shahadat Hossain, and Omar Faruk.

Computer-Aided Design (CAD) is the use of computer technology for design and documentation. CAD software replaces manual drafting tools such as pencil, ruler, compass, etc. with an automated process. It is also used to analyze or optimize the design. The purpose of this project is to create a 3D solid model of a mechanical component, Belt Tightener, using the knowledge acquired in the Parametric Computer-Aided Design course. Belt Tightener is a mechanical component used in the automobile industries as well as medical equipment manufacturing industries. To complete the design and documentation of the belt tightener, a solid modeling program such as Solidworks is used. This model consists of nine different components. The knowledge of creating 2D sketches, making 3D components from 2D sketches, creating internal and external threads, assembling those components, and getting 2D blueprints of the individual components, etc. are implemented in this project.

ET4

ESTIMATION OF UNCERTAINTY FOR PARTICLE IMAGE VELOCIMETRY (PIV) MEASUREMENTS IN UNSTEADY PIPE FLOW. Nell Flores and Dugwon Seo.

Various pulsatile flow conditions of a liquid in a rigid pipe can result in differing types of flow behaviors. The two types of flow that will be focused on are laminar and turbulent flows. The transition between these two flows is studied by varying the Reynolds number and Womersley number. The experimental setup uses a piston to generate the pulses for the flow, and a laser and camera for Particle Image Velocimetry (PIV). The laser is projected onto the flow to reveal particles in the water to a camera. The Camera captures pictures of the particles over time and PIV is used to determine the velocity of the particles from the pictures. The uncertainty for our PIV setup will be found using cross-correlation peak ratios of the PIV data. PIVlab and MATLAB will be used as a tool to analyze the experimentally obtained data. Key Terms: Pulsatile Flow, Turbulent Laminar, Particle Image Velocimetry (PIV), Cross-Correlation Peak Ratios

ET5

3D PRINTING APPLIED TO INDUSTRY-AUTHENTIC MICRO-LITER FLUIDIC HANDLING SYSTEMS IN DNA PROCESSING. William Pollicino and Dimitrios Stroumbakis.

Students gaining authentic Industry experience is a quality highly demanded among hiring companies. In this paper, we present our industry authentic, micro-liter fluidics handling system used in DNA sequencing in the field of human genome research. In this field, researchers have made profound discoveries such as identifying mutant genes that cause cancers and melanomas,

to helping the development of new drugs for conditions ranging from cystic fibrosis to asthma. Specifically, we document the use of 3D printing to create critical fluidic components to be used in the construction of a scaled, robotic-automated, fluidic handling demonstration as a show case for student motivation and awareness. Our 3D printing effort produced an industry-grade, 32-channel parallel dispensing module and its related reagent wash & purge component. These dispensing designs must provide parallel sample processing to get results faster. DNA fluidic handling systems must also be robust with high accuracy and precision to handle fluid volumes at 10-20 micro-liters volumes during various processing stages, where environmental factors can easily render a costly DNA run invalid. To grasp these low fluid volumes, a 750 ml_ wine bottle would empty in 1.2 years this rate. A second purpose of this project was to serve as an industry outreach to raise ET student awareness to the bio-medical industry, which has expressed strong demand for engineering graduates in mechanical, electrical, and computer sciences, otherwise known as mechatronics. Creating an industry authentic 32-channel dispenser using our Stratasys J750 printer, proved yet again, the versatile capabilities of 3D printing.

ENGLISH

EN1

NAZI CONCENTRATION CAMPS AND JAPANESE-AMERICAN INTERNMENT CAMPS: AN ANALYSIS OF CAMP RECOLLECTIONS. Elizabeth Hanson and Ilse Schrynemakers.

This Undergraduate Research Day presentation shares the result of an ongoing Honors Contract project that consists of two main parts. The first part of the Honors Contract project analyzes Takei's memoir (and other primary sources) to dig deeper into the truth about Japanese-American Incarceration Camps, an analysis that challenges many of the media's depictions of life inside the camps. The second part of the project examines the many resources available at the Kupferberg Holocaust Center's current virtual exhibit, "The Concentration Camps: Inside the Nazi System of Incarceration and Genocide." This part focuses on viewing, examining, and analyzing personal accounts and documented photographs to reach some conclusions about what and how these resources contribute to our understanding of the Holocaust.

FOREIGN LANGUAGES AND LITERATURE

FL1

EXPLORING CODE-SWITCHING IN THE CLASSROOM. Teresa Farley and Carolina Chaves.

Code-Switching and Spanglish in the Classroom: A Review of the Effects of Bilingual Childhood Education. English may be the most common language spoken in NYC, but Queens is the most ethnically diverse County in the United States with approximately 138 different languages spoken in our streets, homes, schools and business. This presentation will explore the advantages of bilingual education in our classrooms. I will explain the phenomenon of Code-Switching of English-Spanish speakers and other non-native speakers of English in the classroom. Bilingualism allows children to communicate comfortably in learning environments and potentially utilize a greater vocabulary than their English only speaking classmates. Speaking in a native language helps maintain cultural identity and denying them the ability to do so also has negative consequences on their English only speaking classmates. Enforcing English only policies may impede English language acquisition and promote academic failure. Denying students the ability to communicate in two languages may prevent them access to quality jobs requiring dual language speakers. The goal of this research presentation is to convey information to the audience that bilingualism in education is an asset to students and society alike.

HEALTH, PHYSICAL EDUCATION, AND DANCE

HPED1

NUTRITION IMPACT ON THE COVID-19 PREVENTION AND TREATMENT. Ran Tian and Parisa Assassi.

The current outbreak of coronavirus disease (COVID-19) is a major public health threat worldwide, the prevention and control are priority tasks. Enhancing our immune system could be an important strategy to prevent and control the spread of the disease. Several nutrients are proven effective to boost the human immune system. We conducted a literature review to determine the connections between nutrition and COVID-19. We conducted an online research using PubMed. We used the following keywords "COVID-19", "nutrition" and "immune". We included studies published from May 2020 to current. We analyzed 5 recent articles. One study showed the role of vitamin A, C, D, E and zinc in the prevention of COVID-19. The nutrients may boost the immune system, reduce inflammation and relieve oxidative stress. In another study, taking zinc, selenium and Vitamin D supplements may have impact on COVID-19 prevention. Other studies conducted in Italy indicated that eating more fresh foods other than processed foods is recommended to prevent COVID-19, such as the Mediterranean diet. Also, the COVID-19 mortality rate is relatively low in countries which diets include fermented vegetables and milk. Nutrition therapy is important on treating COVID-19 patients. Enteral nutrition with high protein is recommended

than parenteral nutrition at the intensive care unit (ICU). Results of literature review showed that maintaining a healthy and balanced diet with high intake of fresh fruits, vegetables, vitamins and minerals during the pandemic could help to strengthen the immune system during the pandemic.

HPED2

KATHAK EVOLUTION. Neehaa Rishilakram and Carrie Stern.

Over the years Kathak has changed in the Indian community and globally. The dance started in the 16th century as the art of storytelling where dancers go from one village to another telling tales through the Kathak from the Mahabharata, Bhagavad Gita, Ramayana, Purana and other stories found in India's great Hindu epics and scripture. During the medieval period (late 15th century), "Kathak became an established part of court culture, performed under the patronage of India's Persian kings and Muslim Moghuls. This sealed Kathak's transition from colloquial entertainment to classical art form." Kathak was combined with virtuosic footwork controlled by 100 bells (ghungroo) and dazzling spins with subtle pantomime and soft gestures. The focus goal of my presentation is to talk about how Kathak has evolved from a story-telling dance to how is presented today, whether on stage or in movies. Since dancer started modernizing the dance by using western music and simple clothing it's losing the religious impact left on Indians back then compared to now and this change of kathak is affecting the future generations since they wouldn't be able to experience beauty of telling a story through dance.

MATHEMATICS AND COMPUTER SCIENCE

MA1

A WEB INTERFACE FOR RUNNING PARALLEL IMAGE PROCESSING ALGORITHMS IN AWS CLOUD. Toaha Siddique and Dr. Esma Yildirim.

Running extreme-scale image processing algorithms in the cloud requires a set of steps: identifying the input dataset in the cloud storage, instantiating a cluster of compute nodes, moving application code to the instantiated cluster, configuring cluster parameters and then finally running the application. In this project, we develop a web-interface to automate these tasks for the user and test it with extreme-scale image processing algorithms such as content-based image retrieval and basic transformations. The web interface is a initial version of an image processing portal running on the cloud. The interface is designed by interacting with the AWS cloud through its Java API and uses technologies such as JSP, HTML and CSS.

MA2

MELLIN INTEGRAL TRANSFORM METHOD FOR SOLVING FRACTIONAL DIFFERENTIAL EQUATIONS. Yahao Chen and Lyubomir Boyadzhiev.

Differential equations of arbitrary order (fractional differential equations) appear more and more frequently in various research areas and engineering applications. Most of the known methods for solving such equations have certain disadvantages. For example, some methods work in the case of rational but not of arbitrary real order of the fractional derivatives. On the other hand, there are iteration as well as series methods for solving fractional differential equations of arbitrary order that apply effectively only for relatively simple equations. In a contrast with the methods mentioned above, this talk is about a completely different approach for solving fractional differential equations based on the application of integral transforms. The fundamental properties of the Mellin Integral Transform will be discussed. Some preliminary results related to their application in solving boundary value problem for fractional partial differential equation of Bessel's type (fractional partial differential equations with non-constant coefficients) will be also presented. The topic is one of the most intensively developing calculus areas due to numerous applications of the derivatives and integrals of arbitrary order in medicine, chemistry, physics, engineering, finance, astronomy, fluid mechanics, etc.

MA3

BIG DATA INFORMATION RECONSTRUCTION FOR THE FINITE-STATE HARD CORE MODEL. Siyang Li and Wenjian Liu.

Let $G = (V, E)$ be a finite or countably infinite graph without loops, and let S be a finite set of states. Many applications are subject to "hard constraints" that prohibit certain values of S from being adjacent to one another in the graph G . Ramanan et al. proposed a generalization of the hard core model as an idealized model of multicasting in communication networks. In this generalization, the multi-state hard core model, the capacity C is allowed to be a positive integer, and a configuration in the model is an assignment of states from $S = \{0, \dots, C\}$ subject to the constraint that the states of adjacent nodes may not sum to more than C . The big data information reconstruction problem on the infinite communication tree network G , is to collect and analyze massive samples at the n -th level of the phylogenetic tree to identify whether there is non-vanishing information of the root, as n goes to infinity. This project will focus on the reconstruction threshold of the multi-state hard core model on regular d -ary trees. This problem has a wide range of applications in various fields such as biology, information theory and statistical physics, and its close connections to cluster learning, data mining and deep learning have been well established in recent years.

MA4

ASSESSING THE IMPACT OF HIGH IMPACT PRACTICES: ACADEMIC PERFORMANCE. **¹Magnola Pierre**, ¹Maria Mercedes Franco, and ²Rommel Robertson.

¹Mathematics and Computer Science Department, ²Social Sciences Department.

High-Impact Practices (HIPs) are pedagogical practices known to promote deep learning and student engagement, resulting in increased student satisfaction, acquisition of desired knowledge, skills and competencies, persistence, and attainment of educational goals. And while HIPs have been shown to have a profound impact on traditionally underserved students, first-generation students, transfer students, and Latinos/Hispanics and African Americans/Blacks have lower participation in certain HIPs than their peers despite the fact that these students report similar intentions to participate in HIPs as their peers. The above findings are the result of studies conducted primarily at baccalaureate granting institutions. Given the student population that community colleges serve, these 2-year institutions have much to gain if able to replicate the benefits of HIPs observed at 4-year colleges and universities, by simultaneously improving student learning outcomes and addressing issues of access and equity. In this particular study, we will compare the academic performance of students in mathematics courses taught at Queensborough with the use of HIPs and the academic performance of students in sections of the same courses that were taught without the use of HIPs. We will use different criteria for measuring academic performance, including class averages and scores on specific exam questions. This study is part of a larger, ongoing research project and the presentation will include an overview of the larger project, preliminary results, and the research plan for the current year.

MA5

COVID-19 MORTALITY PREDICTION WITH MACHINE LEARNING. **Jiajun Gao** and Yusuf Danisman. Mathematics and Computer Science Department.

It is critical to predict the mortality of patients who are diagnosed with Covid-19. As machine learning algorithms can quickly determine the mortality rate of patients based on the patients' blood sample, they can help medical personnel identify the patients at risk of dying and implement the targeted treatment as soon as possible. Moreover, the pressure on medical services is reduced as well. This project aims to improve the results of "Yan, L. et al. An interpretable mortality prediction model for COVID-19 patients. Nat. Mach. Intell. 2, 283-288, (2020)". In this paper, the authors padded all the missing values with -1. However, there are more complex and promising imputation methods in the literature that can be applied to the same dataset. In this project, different imputation methods have been applied to handle missing values and build machine learning models with high accuracy in predicting mortality. We have developed models with an accuracy of 96% by using k-Nearest Neighbor Imputation.

PHYSICS

PH1

INVESTIGATION OF IRON IN PLANTS USING X-RAY ABSORPTION SPECTROSCOPY. Kainat Mughal and Sunil Dehipawala.

X-ray Absorption Spectroscopy (XAS) is a widely used technique to investigate the chemical nature and composition of materials. We will use this technique to study iron in different plants. Since plants contribute to our diet, it is important to know the amount of iron in plants. In addition, we will investigate whether and how changes in chemical environment (soil composition) affect iron content in various parts of plant species. This study is important to vegetarians because unlike meat eaters, they (vegetarians) depend on plants to fulfill their daily iron intake. Iron deficiency can cause serious problems such as lethargy, fatigue, reduced resistance to cold, impaired learning, hypoferremia and reduced resistance to cold. Therefore, it is important to know the amount of iron present in different regions of a plant.

PH2

SONIC BOOM PROPAGATION IN A NON-HOMOGENEOUS ATMOSPHERE. Christian Gomez and Kimberly Riegel.

In this study we developed a python program using a ray tracing method to propagate an acoustic ray through a non-homogenous atmosphere. A numerical relation between temperature and the speed of sound has been implemented to describe the atmosphere using the International Standard Atmosphere (ISA). We also compare a straight ray and a curved ray as it propagates through the atmosphere to present numerical differences. Our model will be extended to predict sonic boom propagation in urban environments.

PH3

DESIGNING AND BUILDING AN ELECTRONICS DATA ACQUISITION SYSTEM FOR A COSMIC RAY DETECTOR. Paul Park and Cory Stalerman,

Cosmic ray particles are constantly hitting the Earth. In order to build a cosmic ray detector that is cheap, reproducible, and as widespread as possible for data collection, an Arduino Mega and Raspberry Pi are used as part of a data acquisition system. Every time a particle impact is tracked, the data is sent to the Arduino. The Arduino will track this data and pairs it with data from a Global Positioning System (GPS), and this compiled data is sent to the Raspberry Pi to disseminate to a data storage system. In order to accomplish this, the Arduino will have to use its own built in oscillator to pair the GPS time with the time the cosmic ray particle trigger signal was received, down to nano seconds.

SOCIAL SCIENCES

SS1

THE IMPACT OF COVID-19 NON-TRADITIONAL COMMENCEMENTS ON HIGH SCHOOL GRADUATES' ACADEMIC MOTIVATION AND POST-FORMAL GOALS.

Yvonne Rodriguez, Anissa Moody, and Jody Resko.

Over 3 million American students graduate from high school each year. This year, social distancing guidelines, in response to the COVID-19 pandemic, have impacted commencement ceremonies and other final year rituals. These major milestones are now being conducted via virtual modalities, informal gatherings, or have been non-existent. Commencement rituals are well-documented in the literature as developmental assets supporting academic motivation and self-esteem. With a sudden change in traditions and the current challenges of distance learning, it is hypothesized that a lack of formal commencement will decrease academic motivation and negatively impact post-formal educational goals. Through exploratory research the goals of this study include (1) describing the experiences of high school graduates in the COVID cohort of 2020, (2) describing the effects of non-traditional commencement ceremonies to high school graduates, (3) identifying the impact of COVID-19 to post-formal education, and (4) addressing the gaps in the literature regarding educational rituals and developmental markers. The proposed study will utilize a survey design method. Participants will respond to a detailed demographic questionnaire that assesses commencement experiences, responses to COVID-19, formal academic motivation measure, and post-formal goals. The sample population will be inclusive of high school graduates of 2020, with the exclusion of high school dropouts and those who completed a GED.

SS2

"HIS BACK TURNED SQUARELY ON THE CITY:" CHILD EMIGRATION IN THE EMPIRE STATE, 1853-1929. Kaylyn Kelly and Amy Traver.

From 1853-1929, the Children's Aid Society (CAS), a Protestant child-saving organization, emigrated thousands of New York City children to family farms across the United States. At different points in the CAS emigration program's history, 23 to 49 percent of these children were placed with families in New York State. In fact, over the course of the program's history, more children were placed by CAS in New York than in any other state. This project involves a content analysis of more than 75 years of the CAS' annual reports; identifying, coding for, and analyzing themes related to child placement in New York, and contributing to different theoretical literatures in sociology.

SS3

AT A CROSSROADS: THE IMPACT OF COVID-19 ON 2020 HIGH SCHOOL GRADUATES' ACADEMIC MOTIVATION AND POST-FORMAL GOALS. Yvonne Rodriguez and Jody Resko.

The COVID-19 pandemic has caused unexpected disruptions in education. High school graduates from the COVID cohort of 2020 have especially been impacted by this disruption. In addition to social distancing and distance learning, many major milestones (e.g., graduation, senior prom) were replaced by simulated events, informal gatherings, or were entirely non-existent. Some studies have already documented some of the devastating impacts of COVID-19 to students due to the loss of school routines and rituals (Lee, 2020; D'Orville, 2020). Since these rituals have been shown to support academic motivation and self-esteem, (Klepfer, 2015), it is likely that this unexpected change in the educational experience has negatively impacted academic motivation and post-formal educational goals for recent high school graduates. This study will (1) describe the experiences of high school graduates in the COVID cohort of 2020, (2) describe any changes in their goals and motivation over time (March 2020 - Spring 2021), (3) identify the effects of educational disruptions on high school graduates' academic motivation, and (4) determine the relationship between educational disruptions, post-formal education and goals, academic motivation, and demographic variables. New York high school graduates from the COVID cohort of 2020 will comprise the sample. Participants will complete a brief demographics survey that assesses end of year high school experiences and changes in post-formal educational goals. Participants will also complete Vallerand et al.'s (1992) Academic Motivation Scale (AMS). Keywords: commencement ceremonies; developmental markers; academic motivation; COVID-19; high school graduates; post-formal education

SS4

WHAT'S THE COST OF STAYING CONNECTED? THE RELATIONSHIP BETWEEN TIME SPENT ON SOCIAL MEDIA AND LONELINESS IN YOUNG ADULTS. Bianca Llivicota and Anissa Moody.

Over 90% of 18-to 29-year-olds in the U.S. report using at least one form of social media (SM). The current literature on social media use is observational and mainly focuses on identifying patterns of use. Some studies examine relationships between SM and emotional development, personality, and social skills. The research outcomes are mixed, with some studies reporting associations between SM use and negative impacts on emotional functioning and personality, while others found no such connections. Academic critiques of these studies identify small sample sizes and the preponderance of college student samples. This study will attempt to understand the impact of SM use on the population identified by examining the relationship between time spent on SM and reports of loneliness. This study proposes that an increased amount of time on SM will decrease feelings of loneliness and increase feelings of well-being. This research attempts to deepen the observations of SM's impact by focusing on specific variables identified in the current literature as problematic. However, there has been no experimental examination. This research is

critical to examine in this age group, given the usage rates and the reported impacts on mental health.

SS5

THE COST OF YOUR HEALTH: AN ECOLOGICAL VIEW OF SOCIOECONOMIC STATUS AND IT'S IMPACT ON MENTAL HEALTH ACCESS AND PARTICIPATION. (PSYC201). Steven Zamora and Anissa Moody.

According to the most recent data on the National Survey on Drug Use and Health, out of 11.2 million adults who reported having a past year mental health issue, 44.4% did not receive any treatment. Though numerous factors have been identified as affecting participation in mental health treatment, lack of financial resources remains a constant variable of interest; specifically, financial resources impact mental health participation. Socioeconomic status (SES) is a complex variable reflecting numerous factors like education, class, race, finances, or geography. This study aims to present a more nuanced understanding of SES's impact on accessing mental health treatment by contextualizing SES. By asking study participants a variety of questions relative to their resources in addition to income, this study will present an ecological model of how SES truly impacts access and participation in mental health treatment. The researcher is conducting a thorough interdisciplinary literature review to develop a more modern understanding of SES factors. With a new definition of SES, this study will target the variables that decrease access and use of mental health treatment and aid in targeting individuals for mental health support.

SS6

FROM THE OUTSIDE IN: AN ECOLOGICAL REVIEW OF THE IMPACT OF CLIMATE CHANGE ON SUICIDE RATES IN NY STATE REGIONS. (SIRP). Celine Persad and Anissa Moody.

Climate change is a disastrous global event with severe outcomes. The average global temperature has risen by 32.9 degrees Fahrenheit in the last few decades, giving rise to major climatic events of droughts, hurricanes, tsunamis, and other environmental events. The impact of global temperature change can also be documented as directly impacting the human body. A growing body of research establishes the relationship between temperature and disruption within human biochemistry. Environmental psychology pinpoints the impact of climate change on mental health, specifically aggressive behavior, mood disorders, anxiety disorders, dementia, and suicide. This study will focus on suicide and NY State regions by seeking a relationship between climate events in this region and suicide rates. This study will utilize an ecological approach, considering factors of economic stability, accessible disaster plans, and funding towards health care to see if they hinder or promote stable mental health in relation to climate events. Archival data will be attained from NOAA Nation Centers for Environmental Information Storm Events Data Base, Municipal Emergency Plans, Income by Zip Code Reports, and New York State Community Health Indicator Reports (CHIRS) for the years 2015-2018.

SS7

AN ANALYSIS ON THE IMPACT OF A JUVENILE OFFENDER'S MENTAL HEALTH IN ADULT PRISON. Nathan Lloyd and Celia Sporer.

This project was developed as part of an Honor's Contract from Fall 2020 class in Corrections and Sentencing. This project is a research proposal for a study whose main focus is to understand what factors contribute negatively to a juvenile offender's mental health in adult prisons. A literature review on the topic was completed and a social science research study protocol was developed.

SS8

MYTH AND TRUTHS OF CAPITAL PUNISHMENT - CAN UNDERGRADUATE STUDENTS TELL THE DIFFERENCE. Madison Otway and Celia Sporer.

Executions have been part of social control, punishment and the overall criminal justice system for the entirety of human history. Capital punishment is said to serve the criminal justice goal of deterrence and retribution, yet there is a great deal of controversy about its application and implementation. Many believe they know the truth about capital punishment but when pushed to provide reputable sources for their knowledge they are unable to comply. This study's primary goal is to see if the average person can distinguish between the myths and facts of capital punishment and how such abilities (or inabilities) influences their level of support for capital punishment. Additionally, this study will look to see how Television, movies and other fictionalized accounts portray those who receive capital punishment and how such portrayals can lead to the inability to distinguish between the myths and facts of capital punishment.

SS9

MENTAL HEALTH FIGHT OR FLIGHT? COVID-19'S IMPACT ON PARTICIPATION IN MENTAL HEALTH TREATMENT AMONGST CUNY STUDENTS. (CRSP). Lori Dean and Anissa Moody.

The coronavirus (COVID-19) pandemic has impacted postsecondary public university students in unprecedented ways. Concerns such as employment status, financial stability, the efficiency with remote learning, and limited access to campus resources due to closures have triggered mental health symptoms such as depression and anxiety. CUNY students are especially vulnerable as under-resourced public university students. This study aims to analyze whether COVID-19 has impacted participation in mental health treatment within the CUNY school system population. An online survey questionnaire will measure mental health service utilization rates from CUNY's twenty-five college counseling centers. Mental health participation rates, including formal counseling, crisis interventions, wellness interventions, online apps, and other forms of attempts to address mental health, will be assessed from current CUNY students. We predict COVID-19 has increased attendance rates beyond pre-pandemic reports. However, the increase will be nuanced with a decrease in traditional therapy participation and an increase in a variety of crisis

responses. This pattern will correspond to many student reports of acute mental health needs and attempts to address those needs immediately. Students' participation in services will be moderated by employment, financial support, experience with behavioral health, and mental health knowledge.

SS10

BREATHE OUT. COVID IS STRESSING ME OUT.: EXAMINING THE EFFECTIVENESS OF REMOTE MINDFULNESS INTERVENTIONS. Florencia Gonzalez and Anissa Moody.

Stress is a global problem with far-reaching consequences. In the United States, about 55 percent of adults report experiencing significant stress daily. According to a national survey, Stress in the Time of COVID, Americans report significantly higher stress levels since March of 2020. Current studies suggest that tele-yoga and remote group meditation interventions or apps can be safe, feasible, and useful in improving individual well-being and reducing stress. This study builds on current COVID-19 research and previous studies on yoga and mindfulness's benefits by focusing on coping skills, precisely mindfulness skills provided via remote technology, to managing stress during the pandemic. This study is significant as providing low-cost and accessible treatment for mental health is critical at this time.

SS11

RACIAL INEQUALITY IN THE EDUCATION SYSTEM: HOW SCHOOL SUSPENSIONS INFLUENCE TEST SCORES. Alexis Klein and Kersha Smith.

This study is an investigation of racial discrimination and education. Systemic racial inequities have been shown to produce unequal educational outcomes among various student groups. Research has demonstrated that African American students and other students of color score lower than White students on state exams (reading and math). Research has also indicated the racial inequities students are exposed to in school might be a factor in the differences in state exam results between various racial groups. The current research focuses on the effects of school suspension and how it can contribute to poor school performance. This research is essential because it brings forth evidence that racial discrimination throughout the U.S schooling system is affecting students and their educational outcomes. In order to understand the relationship between school suspension rates and school performance, data will be collected using a survey. A sample of 1,000 high-school-aged students will serve as participants. In addition to survey data, participants will also be invited to join a focus group dedicated to understanding school suspension and school performance. The researcher anticipates that a strong point of this study will be the use of the survey methodology. Factor analysis will be conducted to measure the validity of the survey.

SS12

INVESTIGATING GENDER DIFFERENCES IN FEAR OF PHYSICIANS DURING A PANDEMIC. Nicolette Ilizarov and Rommel Robertson.

The severity of the coronavirus pandemic resulted in many people fearing to leave their homes to carry out even some basic and sometimes necessary functions or activities. The fear of the deadly virus pandemic, for some individuals, has been extremely overwhelming and leading many to ignore symptoms of potentially severe medical issues, delaying important medical self-care appointments (i.e., routine check-ups) and in extreme cases postponing important surgical or non-surgical procedures for fear of contracting coronavirus. The purpose of this study was to investigate gender differences in fear of physicians during the coronavirus pandemic. More specifically, we predicted that females would report greater fear of physicians compared to men during the pandemic. Forty-nine college students in the New York City area completed a 12-item questionnaire that included five items designed to measure participants' fear of physicians. Results revealed that contrary to our predictions females did not report significantly greater fear of physicians compared to men. The significance of the findings along with recommendations for improving the study will be discussed. Further investigation is also recommended.

SS13

THE IMPACT OF THE CORONAVIRUS PANDEMIC AND STRICT ADHERENCE TO QUARANTINE/LOCKDOWN MEASURES ON PSYCHOLOGICAL WELL-BEING AND SLEEP QUALITY IN COLLEGE STUDENTS. Benjamin Menchell, Rommel Robertson, and Kersha Smith.

Assessment of the impact of the COVID-19 pandemic on individuals also requires careful attention to the psychological impact of the virus pandemic and the accompanying quarantine/lockdown measures. The current study investigated the impact of lockdown/quarantine measures on the psychological well-being and sleep quality of college students. We hypothesized that students' rigid or strict compliance with the lockdown/quarantine measures negatively impacted their psychological well-being and resulted in poor sleep quality during the lockdown/quarantine periods. Sixty-five college students in the NYC area completed a 71-item questionnaire that included scale items designed to assess participants' sleep quality, psychological well-being, mental well-being and self-reports about adherence to the quarantine/lockdown measures. Preliminary results showed that students who reported strict adherence to quarantine/lockdown guidelines did not report significantly poorer sleep quality, psychological well-being or mental well-being compared to students who did not. Issues related to sampling will be discussed to explain the observed preliminary results. Further investigation is warranted and data collection for the project is ongoing. The potential findings from this study can inform the formulation of coping techniques/strategies to guide students in effectively dealing with the psychological impact of the pandemic and quarantine measures.

SS14

VIOLENT VIDEO GAMES AND CHILD DEVELOPMENT. Jovanna Trapani and Anissa Moody.

This research is important because as children develop it is crucial that they develop with a strong moral compass. The research's significance is of the utmost as use of tablets, phones and laptops are becoming even more common than ever. The reason or purpose for this research is to show the affect that violent video games has on child cognition and development tendencies such as short temperament, etc. It is crucial to shed light on the result of children playing video games with mature content so parents can be well informed before buying games for their child. The problem at hand is that video games exposing children to maturely rated and violent content can potentially have a negative impact on their social psychology as well as their cognitive development. The methodology used in order to test this theory was to enforce the repetitive enactment of the violence that was displayed in the video games. The results of the research is inconsistent and that more research is needed to fully understand the relationship between the two. The work does add to the knowledge on the topic in the sense that we have more variety in information however, there still does need to be more field research done on the topic in order to make any final conclusions.

SPEECH AND THEATRE

SP1

THE ROMA AND SINTI GENOCIDE. Alyssa Cortez, Suellen Cho, Shania Smyer, Ernestine Rose Estrella, and Franca Ferrari-Bridgers.

This project is a creative expression of students' empathy towards the Roma and Sinti victims of genocide in Nazi concentration camps during World War II. In conjunction with the current Holocaust exhibition "*The Concentration Camps: Inside the Nazi System of Incarceration and Genocide*", in Fall 2020, SP211 students researched, wrote and delivered informative speeches on several aspects of the Roma and Sinti genocide. After the delivery of their speeches, students worked at short 90 second multimedia presentations. In such presentations, students expressed in a creative way a topic of the Roma and Sinti genocide that touched them and helped them to develop empathy towards the victims.

Students selected three pictures related to their topic and then creatively express the visual and emotional content of the images. Students wrote and recited poems, imaginary letters, dialogues, memoirs, monologues, narrated collages of pictures or painted their own expression of empathy in honor and remembrance of the victims.

In today's presentation, three students expressed creatively their empathy towards the Roma and Sinti people by writing and reciting their own poems; while one student, instead, recited the poem "*Mute*" by Hadara Bar-Nadav (2017).



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