SCIENCE RESEARCH SYMPOSIUM

2022-2023

3:00-4:00 Gallery/Food/Activities
4:00-4:20 First Student
RAFFLE
4:20-5:00 Keynote Speaker
RAFFLE
5:00-5:20 Second Student
5:20-5:40 Third Student
RAFFLE
5:40-6:00 Closing

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Science Research Symposium 2022-2023

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ASRS/SRS Advisor
Mr. Brian Park

SRS Python Instructor
Mr. Mannix Cheng

On behalf of ASRS and SRS students past and present, we would like to extend gratitude for Judy Lewent for her continuous funding and support for science research at Hunter College High School. We would like to thank Dr. Fisher, Ms. Antonio, Ms. Siegmann and other members of the administration for helping make this program and event possible. We would like to thank Mr. Park and Mr. Cheng as well as many other teachers for inspiring and teaching the next generation of scientists. Finally, thanks to Tech Club for helping us run Science Research Symposium.

Master of Ceremony

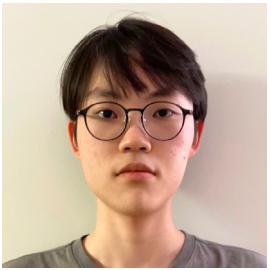
JEFFREY TAO is a senior who studied diabetes with Stewart Laboratories at Mount Sinai over the past two summers. Stewart Laboratory is an authority on insulin-producing pancreatic beta cell replication and regeneration for people with diabetes, including discovering a small molecule, harmine, that induces beta cell replication. At Stewart Laboratories, Jeffrey shadowed various lab members, learned lab techniques, and worked on various projects including a harmine PCR experiment, immunocytochemistry to explore the structure of p57 using adenovirus transductions, and testing various antibodies for future lab experiments. In the fall, he will attend Yale University, where he plans to continue his research. In his free time, Jeffrey likes to listen to podcasts, play video games, and enjoys graphic design/digital creation (including putting together this very program)!

Keynote Speaker

DR. SCHAHRAM AKBARIAN, M.D., Ph.D., is Professor of Psychiatry and Neuroscience at the Icahn School of Medicine at Mount Sinai in New York, where he is Chief of the Division of Psychiatric Epigenomics. He studied medicine and conducted his thesis work on the central representation of the primate vestibular system at the Freie Universität Berlin, Germany. He is a board certified psychiatrist and molecular neuroscientist who trained at the Massachusetts General Hospital in Boston, the Whitehead Institute for Biomedical Research in Cambridge, and the University of California at Irvine. In 2002, he joined the University of Massachusetts Medical School in Worcester where he established a research program in psychiatric epigenetics and served as the Director of the Brudnick Neuropsychiatric Research Institute.

Dr. Akbarian's laboratory explores epigenetic regulation of gene expression, in order to identify epigenetic drug targets and novel treatment avenues for psychosis, depression and other psychiatric disease. In addition, his laboratory explores genome regulation in the HIV-infected brain, in collaboration with the Manhattan HIV Brain Bank. He has published close to 100 articles in scientific journals, including Nature Neuroscience, Molecular Cell, Molecular Psychiatry, Nature Communications, and Acta Neuropathologica. He is a recipient of the Klerman Prize for Exceptional Clinical Research and Lieber Prize for Outstanding Achievement in Schizophrenia Research from the Brain & Behavior Research Foundation, the Eva King Killam Award for Outstanding Translational Research of the American College of Neuropsychopharmacology and the Judith Silver Memorial Award of the National Alliance for the Mentally Ill. Dr. Akbarian also serves on numerous Scientific Advisory Boards, including the Brain & Behavior Research Foundation and the American Foundation for Suicide Prevention, and Editorial Boards of journals such as Biological Psychiatry, Neuropsychopharmacology, Schizophrenia Bulletin, and European Neuropsychopharmacology.

Student Presenter 1



CHRISTOPHER KIM is a senior researching neuroscience and chemistry with Dr. Laibaik Park at the Brain and Mind Research Institute of Weill Cornell Medical College. His project seeks to understand how Alzheimer's disease disrupts the fundamental neurovascular unit, the coherent mechanism by which the brain couples its activity to cerebral blood flow, through chemical interactions on a molecular scale. By comparing mice models of the different genetic precursors for the disease, his research aims to illuminate similarities across the pathological processes of the different facets of Alzheimer's disease, and relate its diverse pathology by a common thread. In addition to his research at Weill Cornell Medicine, Christopher is also leading an independent study with Dr. Mrinalni Sharma at Hunter College High School in neurochemistry, and is in the process of publishing his review article on the chemical underpinnings of neurodegenerative diseases, amalgamating existing literature on the topic to identify commonalities between not only the unique processes of Alzheimer's, but also across its greater family of diseases. Next year, he hopes to continue to pursue his passion for chemistry and its biological applications at the University of Michigan. In his free time, Christopher loves playing the violin and badminton.

Student Presenter 2

RACHEL LEE is a senior studying data and environmental science with Dr. Mohamed Badran and Riyasad Iqbal at the International Socioeconomics Laboratory. Her research analyzes the efficacy of market based instruments on curbing national annual carbon emissions, with a focus on the implementation of carbon taxes. Data was collected for an in-depth analysis into the implementation of current market based instruments and historical national carbon emissions of several countries. The group conducted a literature review and built multiple machine learning models and statistical analysis tools to isolate and determine the influence of carbon taxes on carbon emissions. Currently, Rachel is working with Dr. Daniel Osgood at the International Research Institute for Climate and Society at Columbia University to build Index Insurance for rural farmers. She focuses on the building of the Decision Engine for Socioeconomic Disaster Risk (DESDR) tool, which predicts conditions for payouts. She plans to continue using data science to inform environmental policy and investigate ways to mitigate the effects of climate change at The Cooper Union. In her free time, Rachel likes to read, swim, and play piano.

Student Presenter 3

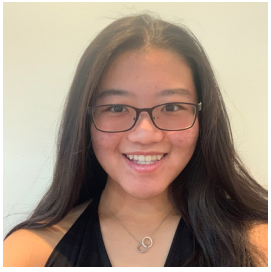
JASON WU is a current senior studying the intersection of dark matter and machine learning with Michael Toomey under the Deeplense project. In his work, a convolutional neural network was trained to differentiate between simulated strong lensing images of no dark matter, cold dark matter, warm dark matter, and ultralight dark matter based on the substructure in the image. He hopes to continue studying the application of AI to astrophysics at Brown University. In his free time, Jason enjoys fencing, reading, and hanging out with friends.

Advanced Science Research Seminar

Advanced Science Research Seminar (ASRS) is a program for older students who have already completed research or are in the process of conducting research, whether through a lab with a mentor or independently. Most often, ASRS students are those who completed Science Research Seminar (SRS) in the past. However, ASRS is not a direct continuation of SRS, rather, it is for anyone successfully completing research. Every week, Mr. Park meets with ASRS students who share their completed and ongoing projects. Mr. Park and the students also support each other in entering outside competitions and exploring oppurtunities to best continue research in the future.

ASRS students also aim to increase awareness of research in the school community and inspire younger students to get involved in the future. ASRS students present their research to the school in Hunter's Annual Science Fair and Annual Science Research Symposium. They also mentor SRS students as they search for lab placements and mentors. This year, ASRS students have worked on diverse research projects from examining the efficacy of carbon taxes to examining music using AI to new dental procedures to determining the shape of galaxies to traditional wet labs researching diabetes and Alzheimers.

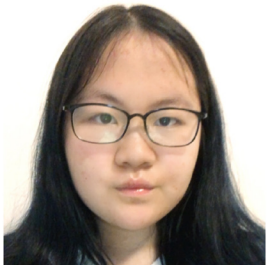
ALEXANDRA BERNSTEIN is a junior studying chemistry and materials science. Last summer, she worked with Doctors Sasan Rabieh and Timothy Bromage at the NYU College of Dentistry, studying how UV light can be used in monomer conversion to harden silver diamine fluoride, which is used in arresting pediatric cavity growth. In her free time, Alexandra likes to run and pole vault on the Hunter Track team, play the harp, and walk her corgi, Maisy.



ANGELA CHAN is a senior studying diabetes cures with Stewart Laboratories at Mount Sinai. Her research primarily focuses on the mechanisms of harmine, a small molecule that can induce the replication and regeneration of insulin-producing pancreatic beta cells. She hopes to continue doing research and major in Chemistry at Emory University. In her free time, she enjoys reading, building jigsaw puzzles, and discovering new coffee shops.

ELIZABETH CHASEN is a senior and a research volunteer at the NYU Langone Department of Radiology, Center of Biomedical Imaging. The team's research focuses on using MR imaging to study Alzheimer's and other neurodegenerative diseases. We are looking to find early markers of disease, as well as sensitive markers of disease progression. We use diffusion MRI, a noninvasive and sensitive method for the detection of neuroinflammation and neurodegeneration. Presently, my role involves the quality control of MRI image processing and analysis, as well as patient screening for retrospective analysis.

BIANCA DWORK is a senior studying Alzheimer's disease at Columbia University Medical Center. Her project focuses on the relationship between microstructural alterations of the white matter of the brain and dementia, utilizing novel image analysis techniques to examine the orientations of axonal projections and their possible degeneration. She hopes to continue her work and pursue the genetics of Alzheimer's at UChicago. Outside of research, she enjoys violin and making crossword puzzles.



SOPHIE GAO is a junior studying the RASopathies (a class of genetic disorders affecting the RAS pathway) at the Icahn School of Medicine at Mt. Sinai with Dr. Tirtha K Das and Dr. Bruce Gelb. Her project employs Drosophila mutation models to imitate common mutations and determines optimal regimens of four drugs: rigosertib, AD80, trametinib, and pimasertib. In the future, her work will focus more deeply on developing and analyzing the function of the Drosophila models. In her free time, she likes to play the cello, read, watch excessive television, and take aimless walks while listening to copious amounts of Taylor Swift.

COLE HOWE is a current Junior studying immunizations in a lab with Dr. Malkin of Duke University. He is conducting a clinical trial on the adverse effects of the COVID-19 vaccine in adolescents with pre-existing lung, immune, and cardiac conditions. The study has already received IRB approval and is in the data collection phase. Cole plans to continue this research through the next year. In his free time, Cole enjoys reading, writing, and cooking.

AYAN KOHLI is a junior researching deep learning systems at a CUNY AI lab. The project aims to formulate safe, semantics-preserving transformations for deep learning systems, which differ from traditional deterministic software systems. In his free time, Ayan enjoys playing tennis, working on coding projects, and learning about new cultures and languages.

SOPHIA LENG is a junior researching neuropsychology at Mount Sinai Medical School. Specifically, she is working on a project exploring the behavioral and metabolic differences between diabetic and healthy mice, through a "Restaurant Row" model measuring their dietary choices and differences. She plans to continue this research over the summer and upcoming school year. In her free time, Sophia likes to draw, write, and go on long walks.

JAYANTI LESLIE-IYER is a senior studying developmental biology with Dr. Danwei Huangfu at Memorial Sloan Kettering Cancer Center. She is studying genes involved in the development of pancreatic cells, namely onecut1. She is working on using a recently published genome editing technique, prime editing, in pancreatic lineage cells. She hopes to continue pursuing research in biology or perhaps other fields of science in college. In her free time, Jayanti trains in martial arts and does various forms of art.

SOPHIA MANZO is a junior studying biomedical engineering in orthopedic surgeries with Dr. Alice Huang of Columbia University Medical Center. Through mouse histological analyses, her project focuses on the implication of immune cell response in tendinopathy, specifically the pro-or anti-inflammatory effects of the IL-33 cytokine in fibrotic scarring, focusing on improving tendon healing processes. She plans to continue her work over the summer, but with a focus on mechanobiology studies. Sophia also likes to write music, swim, and bike.

LOGAN REICH is a junior studying AGN astrophysics with Professor Muller-Sanchez, He is working on three separate projects, focusing on a detailed model of the active galactic nucleus in galaxy NGC 7469, an analysis of possibility of a binary or recoiling black hole in galaxy NGC 4151, and a precessing outflow in galaxy NGC 4388. In his free time, Logan is captain of the science bowl team and co-captain of the science olympiad team, and also enjoys cooking, model rocketry, clay modeling, and reading sci-fi.

EDEN REINFURT is a junior studying oncology and immunology at the Horowitz Lab at Mount Sinai. She is studying the effects of BCG treatment, an immunotherapy and the most common bladder cancer treatment. So far, the lab has found that BCG therapy can cause adaptive immune resistance by the cancer, decreasing the effectiveness of the treatment, and is now working on further understanding this mechanism and finding more effective therapies. Eden also likes to read, make stop-motion animations, and learn Japanese.

KYLER RNO is a current junior studying post COVID-19 lung fibrosis treatment with Dr. Sandra Ryeom and Dr. Bangjin Kim at the Columbia University Irving Medical Center. He plans to research possible post COVID-19 lung fibrosis biomarkers this summer. In his free time, Kyler likes to play the drums, play the guitar, and fence.

VICTOR ROBILA is a junior who studied bioinformatics with Dr. Zijun Zhang at Cedars-Sinai. His research focuses on benchmarking machine learning methods on bioinformatics datasets. He is also passionate about comp sci communication and is developing an interview series at cschats.org. Currently, he is working on tracking the use of government-created censuses in agricultural extension reports. Victor also likes to play the double bass, swim, and help improve diversity, equity, and inclusion at Hunter.

CAROLINE STOHRER is a junior studying COVID-19 at the Montefiore Einstein Medical Center under Dr. Tim Duong. At this leading center in clinical and scientific discoveries, research groups use state of the art technology and data mining to pioneer research in neuroscience and COVID-19. Caroline's group was focused on the concept of long COVID, specifically on how COVID may cause new onset asthma for those hospitalized with COVID. In her free time, Caroline enjoys reading Latin, collecting rocks, and baking.

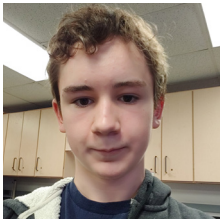
OLIVIA TUNG is a current junior studying biomedical engineering for neuroscience at Sinai Biodesign at Mount Sinai. She has been working on creating anatomically and texturally correct models, specifically of the vascular system, aorta, and brain. She is currently working on creating a hydrogel brain model that can be used in order to train medical students to do various procedures involving the ventricles of the brain, such as an extraventricular drain. In the future, she hopes to continue to work on creating surgical models and devices. In her free time, Olivia likes to read, bake, and paint.

Science Research Seminar

Science Research Seminar (SRS) is a program for tenth and eleventh graders interesting in conducting research and finding laboratory placements for the following summer. Every week, Mr. Park meets with SRS students to gain skills to seek out research internships and be successful in future laboratory settings. Students read and present journal articles, write resumes, write cover letters, and prepare for interviews. Students receive guidance as they apply for prestigious summer research programs and contact mentor scientists. SRS students also visit laboratories and meet with scientists about their work. In addition, students also learn statistics, research ethics, and how to use Python for data analysis in a research setting with SRS coding teacher Mr. Cheng.

Science Research Seminar is a selective program. A test is administered every spring to ninth and tenth graders interested in the program. Students are asked to read a research paper and understand it to the best of the their ability in the weeks leading up to the exam. The test focuses on understanding of the paper, experimental design, and interest in science research. This year SRS students are going to be researching everything from psychology to astrophysics to drug design over the summer.

BILLY CHEN is a current sophomore interested in studying genetics.



HENRY BURTON is a current junior studying biliary tract cancers with Dr. Daniela Sia at Mount Sinai next summer..

MICHELLE YANG is a current sophomore interested in studying psychology.

ARI MERRILL is a current sophomore interested in studying children's psychology and linguistic development.

DAVID CASE is a current sophomore interested in studying Astrophysics.

MAGGIE SUN is a current sophomore interested in studying astrophysics.

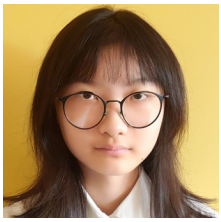
SYDNEY BRATTON is a current sophomore interested in studying neurodegenerative diseases.

ANJALI RAVICHANDRA is a current sophomore interested in studying drug design.

DEETYA VINOD is a current sophomore interested in studying cancer genomics.

DEMARIE HAO is a sophomore who is interested in studying the mechanisms and potential therapeutic targets of lymphoma cancer as well as nanoparticles as drug delivery vehicles.

DAVID LI is a current sophomore interested in studying photochemistry.



ALISON WANG is a current sophomore interested in studying human developmental and regenerative biology.

CELIA HERNANDEZ is a current junior interested in studying biochemistry.

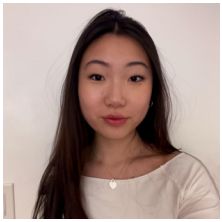
AUDREY O'HEIR is a current junior interested in studying behavioral neuroscience or biochemistry.

JUDY WEINTRAUB is a current sophomore studying Parkinson's at the New York Stem Cell Foundation with Gist Croft next summer.

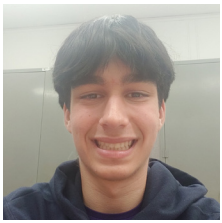
ALISON BADEN-GLICKSMAN is a sophomore interested in studying toxicology and identification and treatment of various medical diseases.

NILE GRAHAM-LAWRENCE is a sophomore who is interested in biomedical engineering research and studying AI over the summer.

ANGELA WANG is a current junior studying RASopathy at Mount Sinai next summer.



LOGAN LEE is a current sophomore planning to study ion channel interaction with animal toxins with Dr. Poget at the College of Staten Island late this summer.



TAJ CHHABRA is a current sophomore interested in studying robotics.

Matthew Fields is a sophomore studying neurodevelopment and Parkinson's disease at the Benson and Huntley lab at Mount Sinai next summer.

Dear Mr. Park,

As seniors, we're nearing the end of our Hunter careers and starting to reflect on all the ways Hunter has shaped us. SRS gave us the knowledge, experience, and CONFIDENCE we needed to pursue research. Without this class, we would have never thought it was possible for tiny 15-year-olds to intern at a lab and gain research experience. We came in knowing that the mitochondria is the powerhouse of the cell and we've come out having worked on some incredible projects with inspiring and accomplished mentors. For many of us, SRS and ASRS and the science research community have been cornerstones during our time at Hunter, providing us with skills, life-long memories, and even potential career paths. Despite heading the program last year, we couldn't imagine ASRS or SRS without you. Thank you for being our advisor and mentor.

We'll leave this class with an increased passion for research, invaluable knowledge, and stories we'll tell years from now. You helped make ASRS and SRS enjoyable, and while the classes took place during our lunch periods, we never once regretted coming. With the retellings of your quest to determine if cats have 9 lives and your pet burial adventures, you put a smile on our faces during every class.

You helped push us out of our comfort zone, encouraging us to read The Particle at the End of the Universe, A Crack in Creation, and The Philadelphia Chromosome. You sparked debates on the ethics of gene editing, the use of antibiotics, and what to do about climate change. You challenged our beliefs and forced us to think outisde the box.

From all the seniors, we'll miss you dearly. We're endlessly grateful for your humor, enthusiasm, and wisdom. From the rising ASRS students and current juniors, we're excited to hear what you will do.

Love,
ASRS and SRS

Dear Mr. Cheng,

For the students of SRS learning computer science without you just doesn't compute. So Mr. Cheng, we are so grateful that you took up the job of teaching, mentoring, and advising us.

First of all, thank you so much for guiding us through the vast streams of data, concepts, and depth that is involved in coding, especially in research. You help guide us to the future as we make our ways into lab work and apply our coding knowledge. The problems specialized toward lab work are not only extremely helpful but make learning new skills engaging. Thank you for always being there to help no matter what while keeping us on our toes and reminding us that even the seemingly littlest thing is important.

Besides being our computer science mentor, you're a fun person to talk to and laugh with. Whether it's incorporating Pokemon within our problems (we loved the semi-pokedex project) or just chatting with us, you're amazing. We ASRS and SRS students will always be grateful for you teaching us whether you're our first programming teacher or someone who pushed us further. We can't wait to one day tell you what we have done with the skills you taught us.

We will all miss your class incredibly and are forever grateful for the lessons taught whether about Python or not.

Love,
The current and former ASRS and SRS students

SENIOR THANK YOUS

JEFFREY/ANGELA
Thank you so much for organizing symposium!
Thank you so much for just being so organized and making sure that things get done (and also not getting annoyed at everyone sorry for being so slow at stuff!) We appreciate you lots.
Thank you so much for all of your hard work, without which Symposium would not have been possible!!

JAYANTI
Thank you so much for being such an exemplary member of ASRS, with your mentorship of SRS students last year and your fascinating research presentations!

ELIZABETH
Thank you so much for being such a kind person and a great science fair co-presenter!
Thanks for making AP Chem and ASRS so fun!

JASON
Thanks for being such a great science fair co-presenter!

BIANCA
Thank you so much for finding the symposium keynote speaker!!

RACHEL
Thank you so much for being just the absolute nicest person ever and having very entertaining sweatshirts!
Thank you so much for being one of the sweetest people I know and making me laugh all the time! Sending you lots and lots of hugs!!
Thank you for having such an interesting and comprehensible presentation — I learned so much!!

CHRIS
Thank you so much for making ASRS meetings so fun and entertaining! We love your banter!