

THE HARVARD COLLEGE UNDERGRADUATE RESEARCH ASSOCIATION

MISSION:

To increase the presence of undergraduate research by fostering an interdisciplinary research community and developing projects that enrich the undergraduate research experience.



HCURA

HARVARD COLLEGE UNDERGRADUATE RESEARCH ASSOCIATION

TABLE OF **CONTENTS**

<i>An Introduction to NCRC</i>	3
<i>Welcome from the Co-Presidents</i>	4
<i>About HCURA</i>	6
<i>NCRC 2022 Conference Directors</i>	7
<i>Conference Program and Schedule</i>	8
<i>Keynote Speakers</i>	10
<i>Panels and Workshops</i>	17
<i>Plenary Sessions: Schedule</i>	24
<i>Plenary Sessions: Speakers</i>	27
<i>Poster Sessions: Judges</i>	31
<i>Harvard Partners</i>	34
<i>Board of Advisors</i>	35
<i>Organizing Committees and Staff</i>	36
<i>List of Conference Participants</i>	37
<i>Contact Us</i>	47
<i>Notes</i>	48

The National Collegiate Research Conference (NCRC) is a forum to promote collaboration.

*We connect future researchers
with their peers and specialists
in their fields of interest.*

NCRC provides undergraduate researchers across all disciplines with a platform for sharing their work. As a result of our past experience with hosting local undergraduate research symposia, the Harvard College Undergraduate Research Association (HCURA) strongly believes in the ability of undergraduates to make meaningful and significant contributions through research. NCRC serves as a medium not only to share these contributions, but also to generate a sense of pride and identity in the undergraduate research community.

We maintain that collaboration with researchers from all backgrounds—university faculty, graduate school students, policymakers, experts from industry, and entrepreneurs—can have a profound impact on young and talented aspiring researchers. NCRC seeks to provide undergraduate participants with a forum to collaborate and learn about research from myriad backgrounds.

WELCOME FROM THE **CO-PRESIDENTS**

On behalf of the staff, members, and executive board of the *Harvard College Undergraduate Research Association* (HCURA), welcome to the eleventh annual *National Collegiate Research Conference* (NCRC)!

During this challenging era, we believe that the need for collaboration, academic engagement, and interpersonal connection is paramount to fostering a research community where every member can participate and grow no matter the individual circumstances. Although there is no doubt that the pandemic has stymied the progression of undergraduate research on a global scale, your presence here today showcases your commitment and dedication to carrying forward the torches of scholastic development, as well as sharing your passion with avid members of the undergraduate research community. Each and every one of you should be proud of the indispensable part you are playing in continuing to advance research across an incredibly diverse number of intellectual pursuits.

The challenges facing our world today are great, but the desire for the production of knowledge and for the advancement of social reality has never been more compelling. Our generation stands at the precipice of a century uniquely marked by its pursuit of technological, socio-humanistic, and scientific networks, and as the arc of learning in higher education grows increasingly conscious of institutional and cultural-political circumstance, the presence of undergraduate students in research, scholarship, and innovation expands at an ever quickening pace. At the same time, the traditional lines of demarcation between disciplines have begun to blur as researchers become more attuned to the advantages and limitations within and across individual fields of study.

Born out of a distinct awareness of these underlying needs and norms, the mission of the *Harvard College Undergraduate Research Association* has been, for the last decade, to advance undergraduate access to and involvement in research, so that we, as some of the youngest minds in the scholastic community, can also partake in the processes of scholarly discovery, innovation, interpretation, and discourse.

Since its establishment in 2012, the *National Collegiate Research Conference* has represented the apical culmination of our objective and vision. In annually convening NCRC, we strive to promote a national—and now international—platform for conversations converging from multiple perspectives and grounded in myriad intellectual trajectories and genealogies. Our goal is to enrich the undergraduate research experience around the world by providing an opportunity to connect motivated students from various institutions with one another, in the hope that sharing, discussion, and engagement will further advance and compel each and every individual in his or her own scholastic pursuits.

NCRC provides the opportunity to hear from some of the world's most distinguished scholars, policymakers, writers, educators, and theorists, to attend panels, workshops, and career fairs, and to receive valuable feedback and advising through our poster presentations and mentoring roundtables. It is our hope that with this diverse

WELCOME FROM THE *CO-PRESIDENTS*

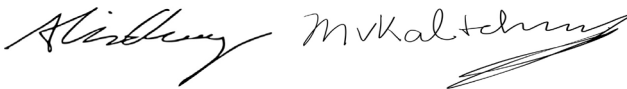
and creative programming, NCRC catalyzes important interactions that inspire undergraduates to continue their research and engagement in the production of knowledge.

Over the past ten years, NCRC has successfully brought together thousands of undergraduates from universities across the nation and the world. NCRC 2022 welcomes over 300 participants from 15 countries and 100+ universities. This number continues to grow each year as our conference gains momentum and recognition, and we are pleased that in the past few years, undergraduate students at several other prominent institutions have also begun similar conference initiatives. NCRC 2015 marked the first year that we were joined by undergraduate researchers from outside the United States, and this year, we welcome our most intellectually diverse group of conference participants to date.

As the first and largest undergraduate-run, national, interdisciplinary research conference, we continue to pride ourselves on being completely student-run, and the three days ahead of you are the product of the tireless efforts, enormous dedication, and sustained enthusiasm of our executive board, members, and staff, who have worked unremittingly over the past year to prepare for this conference, as well as of the continued support from our numerous faculty advisors, collaborators, and financial sponsors. Without them, NCRC 2022 would not have been possible.

NCRC 2022 marks the second year that the conference is held through an online platform, and we hope to build on the transformative experiences of last year's virtual community. We thank you for joining us remotely for NCRC 2022, and look forward to hearing more from each of you. Please don't hesitate to send a message and introduce yourself to us during the conference. We hope you find the three days ahead to be fulfilling and illuminating, as we celebrate such an expansive and accomplished undergraduate research community.

With our best wishes,

A handwritten signature in black ink, appearing to read "Allison Chang & Maria Kaltchenko". The signature is fluid and cursive, with a long horizontal flourish at the end.

Allison Chang & Maria Kaltchenko

Co-Presidents, 2021 - 2022

Harvard College Undergraduate Research Association

ABOUT HCURA

The *Harvard College Undergraduate Research Association* (HCURA) was founded in 2007 upon the mission of building an interdisciplinary research community among undergraduates. Now at the sixteenth year anniversary of our founding, we are thrilled with how the undergraduate research community has expanded in the past decade and optimistic for the future.

Our goal to increase the scope and visibility of Harvard undergraduate research in all disciplines is the focus of our many on-campus initiatives, including the Graduate Student Mentoring Program, where graduate students mentor undergraduates interested in research; the Visitas Research Symposium, which showcases research by experienced Harvard students to admitted high school seniors; and new projects such as Research Week in the fall, which introduces research opportunities to freshmen through panels, socials, and workshops; the Harvard Science Research Conference (HSRC), a two-day conference started in 2015 for exceptional high school students interested in STEM research; and *Brevia*, our general readership publication for short articles that present nontechnical treatments of cutting-edge research. This year, we piloted our High School Mentorship Program, which brings Harvard's undergraduate researchers into local high schools to mentor young aspiring scientists.

Every January, we host our flagship event, the *National Collegiate Research Conference* (NCRC), at Harvard as an extension of our vision to provide the best platform for undergraduates from across the nation to share their research. NCRC features distinguished speakers, panelists, and students, along with workshops and mentoring sessions that highlight important issues in undergraduate research and several opportunities for participants to present their own research through our plenary sessions and poster competition. Through NCRC, we hope, ultimately, to further sustain interest in and access to undergraduate research as well as to foster a community of undergraduate scholars.



NATIONAL COLLEGIATE
RESEARCH CONFERENCE



HARVARD COLLEGE UNDERGRADUATE
RESEARCH ASSOCIATION

NCRC 2022
CONFERENCE DIRECTORS



Allison Chang
Co-President
Harvard College, '23



Maria Kaltchenko
Co-President
Harvard College, '23



Brian Wee
Vice-President
Harvard College, '23



Alyssa Klee
Senior Executive Advisor
Harvard College, '22



Esther Chai
Co-Director of
Programming
Harvard College, '24



Sajeev Kholi
Co-Director of
Programming
Harvard College, '23



Cindy Phan
Co-Director of
Programming
Harvard College, '24

CONFERENCE **PROGRAM AND SCHEDULE**

DAY 1: January 21st (Friday)

10:00 - 10:45 AM	Welcome & Opening Remarks Zoom Password: nrcr2022
11:00 AM -12:00 PM	Keynote: Dr. Leslie Valiant Zoom Password: nrcr2022
12:00 -1:00 PM	Workshop/Panel I Zoom Password: nrcr2022
1:30 -2:30 PM	Lunch Zoom Password: nrcr2022
2:30 -2:55 PM	Plenary Session I Zoom Password: nrcr2022
3:00 -4:00 PM	Keynote: Dr. Sara Seager Zoom Password: nrcr2022
4:00 - 4:25 PM	Plenary Session II Zoom Password: nrcr2022
5:00 - 6:00 PM	Keynote: Dr. Eric Rubin Zoom Password: nrcr2022
9:00 - 10:00 PM	Evening Cocktail Social I Run the World

DAY 2: January 22nd (Saturday)

11:00 AM -12:00 PM	Workshop/Panel II Zoom Password: nrcr2022
12:00 - 1:00 PM	Keynote: Dr. Pippa Norris Zoom Password: nrcr2022
1:30 -2:00 PM	Social Lunch Zoom Password: nrcr2022

CONFERENCE **PROGRAM AND SCHEDULE**

2:00-3:00 PM	Workshop/Panel III	Zoom Password: nrcr2022
3:00 - 3:25 PM	Plenary Session III	Zoom Password: nrcr2022
3:30 - 5:00 PM	Poster Session I	Remo
5:00 - 6:00 PM	Keynote: Dr. William Kaelin	Zoom Password: nrcr2022
9:00 - 10:00 PM	Evening Cocktail Social II	Run the World

DAY 3: January 23rd (Sunday)

11:00 AM -12:30 PM	Poster Session II	Remo
12:30 -1:30 PM	Keynote: Dr. Louis Menand	Zoom Password: nrcr2022
1:30 -3:00 PM	Poster Session III	Remo
3:00 - 4:00 PM	Elevator Pitch Event	Zoom Password: nrcr2022
4:00 - 5:00 PM	Social Break	Zoom Password: nrcr2022
5:00 - 6:00 PM	Keynote: Dr. Shafi Goldwasser	Zoom Password: nrcr2022
6:00 - 6:30 PM	Closing Remarks	Zoom Password: nrcr2022

DR. LESLIE VALIANT



The current T. Jefferson Coolidge Professor of Computer Science and Applied Mathematics at the School of Engineering and Applied Sciences at Harvard University, Leslie Valiant, PhD, is a world-renowned computer scientist and computational theorist. Much of his work seeks to address some of the

deepest unsolved problems in science. He was elected a Fellow of the Royal Society (FRS) in 1991, a Fellow of the Association for the Advancement of Artificial Intelligence in 1992, and a member of the United States National Academy of Sciences in 2001. In 2010 he was awarded the A.M. Turing Award, generally recognized as the highest distinction in computer science, and some of his other awards include the 1986 Nevanlinna Prize and 1997 Knuth Prize.

DR. SARA SEAGER

Prior to joining MIT faculty in 2007, Sara Seager, PhD, was a long-term member at the Institute for Advanced Study in Princeton, NJ, and a senior research staff member at the Carnegie Institution of Washington in Washington, D.C. Her past research into exoplanet atmospheres has been credited with laying the foundation for the field, and she is currently focused on using atmospheric biosignature gases to look for signs of life on planets. Some of her awards include the Sackler Prize in 2012 and the Helen B. Warner Prize in 2007, and she is a member of the National Academy of Sciences and a MacArthur Fellow.



DR. ERIC RUBIN



Eric J. Rubin, MD, PhD, specializes in infectious disease and microbiology where he works as an Associate Physician at Brigham and Women's Hospital. He is a Professor in the Department of Immunology and Infection Diseases at the Harvard T.H. Chan School of Public Health and was formerly chair of the

department. He has served on several scientific advisory boards with a focus on infectious disease therapeutics. He is currently the editor-in-chief of the New England Journal of Medicine as of September 2019. Dr. Rubin has also previously served as the Associate Editor for Infectious Disease at the New England Journal of Medicine, as well as an editor for several basic science journals including PLoS Pathogens, Tuberculosis, and mBio.

CONFERENCE KEYNOTE
SPEAKER ON SATURDAY

DR. PIPPA NORRIS

Pippa Norris, PhD, currently holds the position of the Paul F. McGuire Lecturer in Comparative Politics at the Harvard Kennedy School, as well as the positions of the Founding Directory of the Electoral Integrity Project, Director of the Global Party Survey, Co-Director of the TrustGov Project, and is on the Executive of the World Values Survey. Her work focuses on democracy, public opinion and elections, political communications, and gender politics worldwide.



According to Google Scholar, she is ranked the 2nd most cited political scientist worldwide. She has been awarded the Johan Skytte prize, known informally as the Nobel prize in political science. Other major honors include the Karl Deutsch prize, the Kathleen Fitzpatrick Australian Laureate, the Sir Isaiah Berlin Lifetime Achievement Award, fellowship of the American Academy of Arts and Sciences, the Murray Edelman Lifetime Achievement award, and the Samuel Eldersfeld Lifetime Career Achievement Award, among many others.

DR. WILLIAM KAELIN



Awarded the 2019 Nobel Prize in medicine or physiology for his work on how cells sense and adapt to oxygen availability, William G. Kaelin, Jr., MD is an independent investigator at Dana-Farber Cancer Institute. He also holds a position as the Sidney Farber Professor of Medicine at Harvard Medical School and a Howard Hughes Medical Institute Investigator. He additionally serves as Vice-Chair of Scientific Programs

on the Damon Runyon Cancer Research Foundation Board of Directors; is a member of the Board of Directors and the chair of the Science and Technology Committee at Lilly; and is on the Scientific Advisory Committee of Stand Up To Cancer. Besides being recognized as a Nobel Laureate, Dr. Kaelin has also been awarded the 2018 Massry Prize, the 2016 Albert Lasker Award for Basic Medical Research, and the 2016 AACR Princess Takamatsu Memorial Lectureship Award, among others.

DR. LOUIS MENAND

Louis Menand, PhD, is the Anne T. and Robert M. Bass Professor of English at Harvard University, as well as the Lee Simpkins Family Professor of Arts and Sciences. He has contributed to *The New Yorker* since 1991, and has held staff positions at *The New York Review of Books* and *The New Republic*. He is a prominent essayist and critic. Besides Harvard, he has previously taught at the City University of New York, Columbia, Queens College, and the University of Virginia School of Law. He was awarded a Guggenheim Fellowship in 1990, and his long-awaited book *The Metaphysical Club: A Story of Ideas in America* (2001) was awarded the 2002 Pulitzer Prize for History, the 2002 Francis Parkman Prize, and the Heartland Prize for Non-Fiction. In 2015, President Obama awarded him the National Humanities Medal in consultation with the National Endowment for the Humanities.



Dr. Shafi Goldwasser



Shafi Goldwasser, PhD, currently holds positions as the RSA Professor of Electrical Engineering and Computer Science at MIT and a professor of computer science and applied mathematics at the Weizmann Institute of Science in Israel. She is also the co-leader of the Cryptography and Information Security (CIS) Group and a member of the Complexity

Theory Group within the Theory of Computation Group and the Laboratory for Computer Science. In addition, she is a member of the International Association for Cryptologic Research, National Academy of Engineering, National Academy of Sciences, and the American Academy of Arts and Sciences. Some of her accolades include the 2012 A.M. Turing Award (often referred to as the “Nobel Prize of Computing”), the Gödel Prize twice (in 1993 and again in 2001), the Benjamin Franklin Medal in Computer and Cognitive Science (2010), and the Suffrage Science Award (2016).

WORKSHOP/PANEL I: Friday, 12PM

Workshop: Global Health: Healthcare Equity

ZOOM Password: ncr2022

Ingrid Katz, MD, MHS

Dr. Ingrid Katz is the Associate Faculty Director at the Harvard Global Health Institute, Associate Professor at Harvard Medical School, Associate Physician in the Department of Medicine at Brigham and Women's Hospital, and researcher at the Center for Global Health at Massachusetts General Hospital. An expert in global health, Dr. Katz combines qualitative and quantitative approaches to better understand a wide variety of topics in global health from vaccine nationalism and vaccine equity to social determinants of health. Dr. Katz's remarkable research aims to improve care for underserved populations in low-resource settings by developing sustainable, socio-behavioral interventions. Dr. Katz has studied treatment refusal and stigma reduction for HIV patients in sub-Saharan Africa, proposed the peer-intervention Treatment Ambassador Program to address HIV treatment refusal, and developed biomedical prevention strategies for HIV and STIs. Dr. Katz earned her MD from the University of California at San Francisco and her Masters of Health Science in International Public Health and International Health from Johns Hopkins Bloomberg School of Public Health. She has been a physician-researcher at Brigham and Women's Hospital since 2009. Dr. Katz is an Editorial Fellow and National Correspondent for the New England Journal of Medicine and provides commentary regarding HIV, global health, COVID-19, and related topics for NPR and BBC. Her research has earned her various awards and honors, such as The Harvard Clinical and Translational Science Center and National Institutes of Health Award, Harvard Global Health Institute Travel Award, and The Eleanor and Miles Shore 50th Anniversary Award.

Workshop: Neuron Regeneration in the Mammalian Brain

ZOOM Password: ncr2022

Jeffrey Macklis, M.D., D.Sc.Tech.

Dr. Jeffrey D. Macklis (M.D., D.Sc.Tech.) is the Max and Anne Wien Professor of Life Sciences at Harvard University. He is also a Professor of Stem Cell and Regenerative Biology at Harvard College, Professor of Neurology at Harvard Medical School, a Faculty Member at the Harvard University Center for Brain Science, and an Executive Committee Member at the Harvard Stem Cell Institute. He received a bachelors of science in Bioelectrical Engineering and Literature-Philosophy from MIT, and received his professional degrees from Harvard Medical School and graduate school at MIT. His lab focuses on understanding molecular controls and mechanisms over neuron subtype specification, development, and diversity, and applying developmental controls toward both brain and spinal cord regeneration. Dr. Macklis is the recipient of numerous awards and honors, including a Rita Allen Foundation Scholar Award, a Director's Innovation Award from the NIH Director's Office, the CNS Foundation Award, and the Cajal-Krieg Cortical Discoverer Prize. He is an Allen Distinguished Investigator of the Paul G. Allen Frontiers Group, a Brain Research Foundation Fellow, and the recipient of a 2017 NIH Director's Pioneer Award.

WORKSHOP/PANEL I (cont.)

Panel: Epigenetics: Now and In the Future

ZOOM Password: nrc2022

Dr. David Sinclair, PhD, A.O.

Dr. David Sinclair is a Professor of Genetics and co-Director of the Paul F. Glenn Center for Biology of Aging Research at Harvard Medical School and co-founder and co-editor of the journal Aging. Most well-known for his work in anti-aging research, Dr. Sinclair's research examines the role of epigenetic noise in aging and reprogramming cells following loss of epigenetic information to reverse cell age. Examples of projects in Dr. Sinclair's lab includes developing reprogramming factors to reset cell's epigenetic status, examining the relocalization of chromatin factors upon DNA damage, and looking for therapeutic targets to slow aging. Dr. Sinclair's lab recently discovered resetting the epigenome in old mice with damaged retinal nerves regenerate these damaged nerves and restored vision. After obtaining his PhD in molecular genetics from the University of South Wales in 1995, he began his postdoctoral work at MIT, where he examined aging in yeast and the role of Sir2 in epigenetic changes. Dr. Sinclair has been researching and teaching aging biology and translational medicine at Harvard Medical School since 1999. Dr. Sinclair's work has been recognized with various awards and honors, including the Irving S. Wright Award of Distinction, Australian Society for Medical Research Medal, Garvan International Fellow, Frontiers in Aging and Regeneration Award, and the Thompson Prize.

Fred Winston, PhD

The John Emory Andrus Professor of Genetics at Harvard Medical School Genetics Department, Fred Winston, PhD, is renowned for his research in a key step of eukaryotic gene regulation: control of transcription across the chromatin template. Using genome-wide, deep-sequencing approaches in yeast as a model organism, Dr. Winston's lab examines conserved and essential factors that control transcription, chromatin structure, histone modifications, and newly discovered classes of transcripts to understand the control of transcription and maintenance of chromatin structure in eukaryotic gene regulation. Most notably, Dr. Winston co-discovered the role of histones in controlling transcription in vivo and the gene encoding for TATA-binding protein (TBP). Dr. Winston completed his PhD at MIT, where he studied phage 22 lysogenization. Dr. Winston then began his postdoctoral studies at Cornell University and the Whitehead Institute for Biomedical Research, where he researched transcription in baker's yeast. Dr. Winston has been a member of Harvard Medical School's Department of Genetics since 1983. Dr. Winston is an elected member of the American Academy of Arts and Sciences and the National Academy of Sciences. He served as the President of the Genetics Society of America (GSA), Chair of the GSA Publications Committee, and was named chief editor of the journal Genetics.

WORKSHOP/PANEL I (cont.)

Workshop: Scientific Writing

ZOOM Password: ncr2022

Angela Eggleston, PhD

Dr. Angela Eggleston is a senior editor for primary research manuscripts at Nature. The main areas of manuscripts she handles are DNA and RNA metabolism, structure, and mechanism; biochemistry and biophysics of photosynthesis/photoprotection; protein folding/design; synthetic biology.

Panel: Immunotherapy: Translational studies

ZOOM Password: ncr2022

Kai Wucherpfennig, PhD

Dr. Kai Wucherpfennig is the Chair of the Department of Cancer Immunology and Virology at the Dana-Farber Cancer Institute. He is also a Professor of Immunology and Professor of Neurology at Harvard Medical School. He serves as the co-leader of the Cancer Immunology Program at Dana-Farber/Harvard Cancer Center. Dr. Wucherpfennig has made important contributions to immunology, in particular on the study of T cells which are key effector cells of protective tumor immunity. His work led to the discovery of mechanisms of resistance to cancer immunotherapy which his lab is using to develop next-generation cancer immunotherapies. He has been elected as a member of the American Society for Clinical Investigation, the Henry Kunkel Society at Rockefeller University and as Fellow of the American Society for the Advancement of Science. He serves on the Postdoctoral Fellowship Review Committee of the Cancer Research Institute.

Khalid Shah, M.S., PhD

Dr. Khalid Shah is the Vice Chair of Research for the Department of Neurosurgery at BWH and a Professor at Harvard Medical School. He directs The Center for Stem and Translational Immunotherapy and also a joint Center of Excellence in Biomedicine. He is also the Principal Faculty at Harvard Stem Cell Institute in Boston. Dr. Khalid Shah and his team have pioneered major developments in the Stem Cell therapy field, successfully developing experimental models to understand basic cancer biology and therapeutic stem cells for cancer. These studies have been published in a number of very high impact journals like Nature Neuroscience, PNAS, Nature Reviews Cancer, JNCI, Stem Cells and Lancet Oncology. Dr. Khalid Shah's stem cell work has caught the attention in the public domain and as such it has been highlighted in the media world-wide including features on BBC and CNN. Recently, Dr. Khalid Shah's laboratory has reverse engineered cancer cells using CRISPR/Cas9 technology and utilized them as therapeutics to treat cancer. This work was published in journal Science Translation Medicine and highlighted world-wide including features on Scientific American, New York Times and NPR. Amongst Dr. Khalid Shah's published works are two books featuring groundbreaking insights into stem cell therapies for cancer, Stem Cell Therapeutics for Cancer (Wiley-Blackwell), and Mesenchymal Stem Cells in Cancer Therapy (Elsevier).

WORKSHOP/PANEL II: Saturday, 11 AM

Workshop: Enhancing Research with the Digital Humanities

ZOOM Password: nrcr2022

Christopher Francese, PhD

Christopher Francese is the Asbury J. Clarke Professor of Classical Studies at Dickinson College. At Dickinson, he teaches courses on Latin literature, Ancient Rome, and classical approaches to public speaking. He has published several books such as Parthenius of Nicaea and Roman Poetry (2001), Ancient Rome in So Many Words (2007), Ancient Rome: An Anthology of Sources (2014), and Core Latin and Ancient Greek Vocabularies (2020). He also has a book forthcoming, Giovanni Pietro Maffei , Historiarum Indicarum Libri XVI: A Critical Edition and Translation (est. 2026). In addition to his primary academic work in the Classics, he pursues the growing field of digital humanities, which centers around applying digital tools and techniques to the humanities. He leads several projects in the digital humanities such as Dickinson College Commentaries, a collection of free, digital classical texts with annotations, notes, and spoken passages. Another project is working on providing resources such as a digital Latin-Chinese dictionary for Chinese students. Outside of the classroom, Professor Francese leads a series of professional development workshops for Latin teachers known as the Dickinson Latin Workshops. He also produces the Latin Poetry Podcast, a collection of Latin texts spoken aloud in the original language. In addition, he writes periodic blog posts on the Dickinson College Commentaries website at <https://blogs.dickinson.edu/dcc/>. Professor Francese can be reached at francese@dickinson.edu.

Workshop: Finding Local Research Opportunities

ZOOM Password: nrcr2022

Pam Gaddi, PhD

Dr. Pam Gaddi is an assistant director of the Harvard College Office of Undergraduate Research and Fellowships (URAF), the campus coordinator for Harvard's Mellon Mays Undergraduate Fellowship Program, and program manager of the Harvard College Amgen Scholars Program. She also leads several aspects of programming in Harvard College's summer residential village and provides advising on research and fellowship opportunities offered by URAF. Prior to joining URAF, Dr. Gaddi has served as the Manager of Student Development at Brown University Graduate School to shape the school's special opportunity programs for graduate students, taught Biology as an adjunct faculty member at MassBay Community College, coordinated MassBay's STEM Mentor Program, and conducted post-doctoral research at Brigham & Women's Hospital. She earned a Ph.D. in Medical Science from Brown University Graduate School and a B.S. in Biology from St. John's University.

WORKSHOPS/PANEL II (cont.)

Panel: Medical School Pathway

ZOOM Password: nrcr2022

Nicole Gillette

Nicole Gillette is a first-generation college student and graduate of Widener University ('16) where she studied biology and biochemistry (B.S.) and conducted research with Dr. Itzick Vatnick on the effects of herbicidal exposure on developing crustacean endocrinology and physiology. She then worked as a research technician with Dr. Elizabeth Engle, modeling human variants associated with congenital cranial dysinnervation disorders (CCDDs) and craniofacial abnormalities to elucidate variant-protein function relationships. She is a current MD/PhD candidate at HMS/MIT and is conducting her neuroscience thesis training in Dr. Jonathan Lipton (Boston Children's Hospital). She is studying how local expression and function of core circadian clock proteins in the neuronal synapse influence sleep architecture, synaptic organization and synaptic signaling. At Harvard College, she currently serves as a Pre-Medical tutor in Mather House.

Chelsea Messinger

Chelsea is a sixth-year MD-PhD student at Harvard Medical School currently in her fourth year of a PhD in Population Health Sciences - Epidemiology at the Harvard T.H. Chan School of Public Health. At Harvard College, Chelsea is the Co-Lead of the Adams House Premedical Committee, through which she advises and mentors premedical students. Chelsea graduated from Yale in 2014 with a degree in History of Science and Medicine; while there, she conducted zoonotic disease research in Romania and also interned and conducted maternal health research at the non-profit BRAC in Bangladesh. After graduating from Yale, she spent a year conducting infectious disease research in Malaysia on a Fulbright research scholarship. Her current research focus is on applied epidemiological methods and surgical outcomes. Outside of Harvard, Chelsea works as a medical admissions coach at the company Cambridge Coaching. After completing medical school in 2024, Chelsea hopes to pursue residency training in a surgical subspecialty.

Norma Hylton

Norma Hylton is a third-year MD-PhD student at Harvard Medical School in the Health Sciences and Technology MD program. She is in the Program in Neuroscience for her PhD in the Walsh lab studying cortical development. At Harvard College, Norma is a Pre-medical tutor at Leverett House and also serves as a BGLTQ tutor. Norma graduated from Harvard College as part of the Class of 2018, with a concentration in Neurobiology and a Secondary in Global Health and Health Policy. Between college and medical school, she spent a gap year conducting research in Cuba and at Mass General Hospital. After completing medical school, Norma hopes to pursue residency training.

CONFERENCE PANELS AND WORKSHOPS

WORKSHOPS/PANEL III: Saturday, 2PM

Workshop: Presenting and Communicating Research

ZOOM Password: nrc2022

Christopher Kabacinski

Christopher Kabacinski is the administrative coordinator at the Harvard College Office of Undergraduate Research and Fellowships. In addition to supporting the day-to-day operations, activities, and programs of URAF and the Harvard Summer Undergraduate Research Village (HSURV), he assists with URAF's budget and manages the Office's building at 77 Dunster Street. Prior to his work at URAF, Chris has served as the program coordinator in the Multi-Regional Clinical Trials Center of Brigham and Women's Hospital and Harvard and has worked at Health Story Collaborative and Post Road magazine. Chris received his BA in English with a minor in medical humanities, health, and culture from Boston College and his Masters of Education in Higher Education from the Harvard Graduate School of Education.

Panel: Graduate School

ZOOM Password: nrc2022

Cori Tucker-Price, PhD

*Cori Tucker-Price is a Guarini Dean's Postdoctoral Fellow in Ethnicity, Race, and Migration in the U.S. Context. After completing a B.A. from UCLA, she would continue to earn several graduate degrees from Harvard University: M.T.S., A.M., and a PhD. Her research and teaching focus on African American history, religion and the American West, migration studies and religion, and media. Her current book project, *In the Land of Milk, Honey, and Hollywood! Religion and Black Urban Life in Los Angeles, 1903-1953*, traces the historical and social forces that shaped the practices of African American religious institutions in Southern California. Dr. Tucker-Price has been selected as a Public Fellow in Religion and the American West at the New-York Historical Society, funded by the Henry Luce Foundation. Her work has been supported by the Forum for Theological Exploration (FTE), the Franklin Delano Roosevelt Foundation (FDR), and the Harvard Horizons Scholar program.*

Theodore Betley, PhD

Theodore Betley graduated summa cum laude from the University of Michigan with a B.S.E. in chemical engineering, and he later received his PhD in chemistry from the California Institute of Technology. Afterwards, he was a postdoctoral fellow in chemistry at the Massachusetts Institute of Technology. His lab works in ligand design and determining metal-based properties to elucidate structure, function, and electronic structure/function relationships; he has been credited in over 80 publications and filed three patents. Beyond what he achieves in the lab, he serves on the Editorial Advisory Boards of Chemical Society Reviews, Chem and as the Co-PI for Crystallography Line at ChemMatCARS at the Advanced Photon Source, Argonne National Lab. He is currently the Department Chair at Harvard University, as well as the Erving Professor Chemistry and the Director of Graduate Studies. Several of his awards include, but are not limited to, the Kavli Emerging Leader in Chemistry Lecturer, ACS (2015), the Presidential Early Career Award in Science and Engineering, the DOE (2013), Henry and Camille Dreyfus Teacher Scholar Award (2013), the National Academy of Sciences Award for Initiatives in Research in Area of Catalysis (2013), and the Division of Inorganic Chemistry Young Investigator Award, ACS (2005), among others.

WORKSHOPS/PANEL III: Saturday, 2PM

Panel: Graduate School (cont.)

Josh Lansford

Josh Lansford is a Resident Tutor in Leverett House at Harvard University, and he serves on the Pre-Grad Committee, helping to advise undergraduate students looking to pursue graduate school pathways. Originally from Fairfax, VA, he obtained a degree in chemical engineering from the University of Virginia. After graduate, he worked for Capital One as a Data Scientist. Currently, he is a PhD candidate in chemical engineering at the University of Delaware where he focuses on problems relating to heterogeneous catalysis—specifically electrocatalysis and fuel cells. He works on developing new quantum theory and computational methods to improve the accuracy and applicability of microkinetic modeling for catalyst discovery. He enjoys hiking, kayaking, camping, and all things outdoors.

Workshop: Ethics and Integrity in Academic Research

ZOOM Password: ncr2022

Jeantine Lunshof, PhD

Jeantine Lunshof is a bioethicist at the Harvard Wyss Institute for Biologically Inspired Engineering and a lecturer in the Department of Global Health and Social Medicine at Harvard Medical School. In addition, she is an assistant professor in the Department of Genetics at the University of Groningen in the Netherlands. At Harvard Medical School, Dr. Lunshof has been a long-standing collaborator with the Church Lab as well as the Center for Excellence in Genomic Science and has taught an annual graduate course, "Conduct of Science," since 2013. Her research centers around epistemological and normative questions that appear in some of the most radical and innovative scientific fields such as genomics, synthetic biology, and biological engineering, fields which often generate intense scrutiny due to their innovative methods and technologies. In the past, Dr. Lunshof developed the model of "Collaborative Ethics" that she is currently implementing throughout the field of biologically inspired engineering at the Wyss Institute. Currently, Dr. Lunshof is working on two projects: the neuroethics of bioengineered brain modeling research and the collaborative ethics approaches concerned with synthetic living models of human biology. In 2013, Dr. Lunshof was awarded a Marie Curie International Outgoing Fellowship for the study of conceptual and normative questions in systems biology. Dr. Lunshof can be reached at jeantine.lunshof@wyss.harvard.edu.

Friday, January 21st

Session I: 2:30 PM - 2:55 PM

[ZOOM](#) Password: nrcrc2022

Carissa DuBois: Human Development & Family Sciences, Sociology of Crime and Justice, Oregon State University

Effects of Parenting Style on Response to Adverse Childhood Experiences in Preschool-Aged Children

Alex Hinkle: Chemistry, University of Chicago

Robust Heat-up Synthesis for PbS Nanocrystals via Substituted Thiourea Precursors

Kameel Khabaz: Biology with Specialization in Quantitative Biology, University of Chicago

Sparse Sample of Aortic Shape Predicts Successful Thoracic Endovascular Aortic Repair

Abbey Pan: Neuroscience, Harvard College

Nuclear Magnetic Resonance Spectroscopy-Based Analysis of Plasma-Based Metabolomic Profiles with Exercise

Amesh Sarecha: Biochemistry and Mathematics, Columbia University

Uncovering the Mechanism of Heterotrimeric GTP-Binding Protein, Rap1a, in Hepatic Glucose Production

Friday, January 21st

Session II: 4:00 PM - 4:25 PM

[ZOOM](#) Password: nrcrc2022

Joe Barreto: Physical and Life Sciences, University of Pennsylvania

The Optimization of Brain Extraction Tools for 7T MRI

Mantej Singh: Computer Science, Rice University

Parallel RRT Algorithm for Robotic Motion Planning

Andrew Van Camp: Applied Mathematics, Biological Sciences track, Harvard College

Role of EF1909 in intrinsic beta-lactam resistance in Enterococcus

Nancy Zhou: International Relations & Philosophy, Tufts University

The East-West Dialogue: Methodical Diversity and Frailties of Feminist Accounts

Saturday, January 22nd

Session III: 3:00 PM - 3:25 PM

[ZOOM](#) Password: **ncrc2022**

Shubh Agrawal: Physics, California Institute of Technology
Detecting and analyzing exoplanets at lower separations using high resolution integral field spectroscopy

Abdul Vehab Dozic: Physics/Medical Physics, University of Florida
Development of Microscale Histology-based Tissue Model and Calculation of Radionuclide S-values for Human Kidney

Shanivi Srikonda: Human Developmental and Regenerative Biology, Harvard College
Improving antigen presentation through induction of B2M and MHC-I expression in human cancer cell lines

Marc Ridgell: African and African American Studies; Women, Gender, and Sexuality Studies; Sociology, Washington University in St. Louis
An Examination of Black Queer Youth Resistance Against Homonormativity in Boystown

Katherine Yao: Neuroscience; Psychology, University of Minnesota - Twin Cities
Mechanical injuries of neurons induce tau mislocalization to dendritic spines and tau-dependent synaptic dysfunction

CONFERENCE **PLENARY SESSIONS: SPEAKERS**

Shubh Agrawal

Physics, California Institute of Technology, Class of 2022

Shubh (he/him) is a senior at Caltech, studying physics with minors in computer science and astrophysics. He is interested in designing, calibrating, and utilizing instrumentation that meaningfully contributes to astronomy. As an international student from India, Shubh started working with the Caltech Observational Cosmology group on the development of the first BICEP Array receiver and then worked on improving the performance of low-temperature kinetic inductance detectors. Since this summer, Shubh has been working with the Caltech Exoplanet Technology group on detecting and analyzing exoplanets using high-resolution spectrographs. He will be presenting this latter work during the poster and plenary sessions. He plans to continue working on instrumentation in graduate school starting next year. Outside research, Shubh enjoys spending time with animals and is passionate about diversity and inclusion in academia.

Joe Barreto

Physical and Life Sciences, University of Pennsylvania, Class of 2023

Joe Barreto is a junior at the University of Pennsylvania dedicated to exploring novel scientific methods that address the issue of neurodegenerative disease. In the summer of 2021, he worked with the McNab lab at Stanford University's Radiological Sciences Laboratory to optimize the approach used with different algorithm based brain extraction tools, streamlining the work of radiologists. He has continued to work on similar projects at the intersection of Computer Science and Neuroscience at his home University. After he graduates, Joe intends to pursue a PhD program in Neuroscience where he can continue his research in neurodegenerative disease.

Abdul Vehab Dozic

Physics/Medical Physics, University of Florida

Abdul Vehab Dozic is an international student from Bosnia and Herzegovina currently in my junior year at the University of Florida (UF), majoring in physics and specializing in medical physics. In my sophomore year of college, he joined ALRADS (Advanced Laboratory for Radiation Assessment and Dosimetry Studies), which research is focused on the development of clinically accessible computational tools and models that can be used for the assessment of radiation organ dose and associated secondary cancer risks to patients. He is currently involved in two projects, the first project, which is in collaboration with Massachusetts General Hospital and Harvard Medical School, aims to develop the internal kidney vasculature so estimates of radiation dose to the circulating lymphocytes in the blood can be obtained. In the second project, he works on the development of a microscale kidney tissue model, which will be used to evaluate the alpha particle radiation dose to different structures in the kidney cortex. He also serves as a resident assistant in one of the undergraduate dorms at UF. When not doing schoolwork or researching he goes for a run, plays volleyball, or plays chess.

CONFERENCE

PLENARY SESSIONS: SPEAKERS

Carissa DuBois

Human Development & Family Sciences, Sociology of Crime and Justice, Oregon State University, Class of 2022

Carissa DuBois is a senior at Oregon State University's Honor's College, where she is pursuing majors in Human Development & Family Sciences and the Sociology of Crime and Justice. She has been a preschool teacher for five years specializing in trauma-centered care, predominantly working with groups of children who have gone through the foster care system, homelessness, change in guardianship, or other destabilizing life events at a young age. Understanding the relationships between trauma, cultural dynamics, and child development is the focus of her studies at Oregon State. Carissa is actively involved with the SEARCH Lab, a research lab housed under Oregon State University's College of Public Health and Human Sciences that focuses on interactions between caregivers and children between 12 months and 6 years of age.

Alex Hinkle

Chemistry, University of Chicago, Class of 2022

Alex Hinkle is a fourth-year majoring in chemistry at the University of Chicago. Alex has been a part of the Dmitri Talapin group since the winter of their first year, with an interest in studying nanomaterials synthesis and characterization, particularly concerning nucleation and growth mechanisms. In the lab, they have worked on the synthesis and applications of superparamagnetic iron oxide nanoparticles, electrostatic self-assembly of nanocrystals with ionic ligands, and high-pressure nanocrystal synthesis. Alex is also the President of Benzene, UChicago's chemistry RSO, and tutors in chemistry as part of UChicago's Core Tutors Program. Beyond lab and classroom, they are passionate about further exploring nature through drawing and gardening.

Abbey Pan

Neuroscience, Harvard College, Class of 2022

Abigail Pan is a senior at Harvard College, where she studies Neuroscience. She joined the Wrann lab at Massachusetts General Hospital as a PRISE Fellow in June of 2020 and has since continued her research on the molecular mechanisms underlying the neuroprotective effects of exercise as a Herchel Smith Fellow. Outside the lab, Abbey has served as the director of Harvard College Alzheimer's Buddies and continues to volunteer through the organization while actively dancing with and leading the Executive Board of the Harvard Ballet Company. She hopes to pursue a career in medicine and to ultimately enhance her practice as a physician through the interdisciplinary experiences and perspectives she has gained through research and dance.

Kameel Khabaz

Biology with Specialization in Quantitative Biology, University of Chicago, Class of 2023

Kameel Khabaz is a third year student majoring in Biological Sciences with a Specialization in Quantitative Biology at the University of Chicago. Having taken a number of STEM classes and reached the Finals of the USA Biology Olympiad in high school, he loves learning about science and mathematics. He is also an eager researcher, currently studying the geometric characterization of type B aortic dissections at the Department of Surgery and having worked on several projects at the University of California, Irvine, and the University of Southern California since his sophomore year of high school. His long-term goal is to bridge surgical practice with innovative translational research to improve the treatment of human diseases. In his free time, he enjoys playing tennis and biking as well as spending time with friends and family.

CONFERENCE

PLENARY SESSIONS: SPEAKERS

Marc Ridgell

African and African American Studies; Women, Gender, and Sexuality Studies; Sociology, Washington University in St. Louis, Class of 2023

Marc Ridgell is a junior at Washington University in St. Louis, double majoring in Africana Studies and Women, Gender, and Sexuality Studies. They are also pursuing a minor in Sociology. This past summer, Marc participated in the Summer Research Early Identification Program at the University of Chicago, examining contemporary Black queer resistance against systems of racism and exclusion in gay neighborhoods. At WashU, they are a Mellon Mays Undergraduate Fellow, and their senior thesis will be a geographic and chronological exploration of Black queer community organizing in New York City, Chicago, and St. Louis, examining local and national conceptualizations of Black Pride across history, time, and space. Additionally, they are the producer for Black Anthology, a Black student performance group at WashU. Since their first year, they have served as an intern at the Center for Diversity and Inclusion. They also mentor first-generation and low-income first years and serve as a residential advisor. Outside of school, they love weightlifting, travelling, writing poetry, and hanging out with friends.

Amesh Sarecha

Biochemistry and Mathematics, Columbia University, Class of 2022

Amesh Sarecha is a senior at Columbia University studying Biochemistry and Mathematics. Originally from Queens, New York, he graduated high school as the Valedictorian from a class of over 1000 students. Throughout his time as an undergraduate, he has conducted research at the Icahn School of Medicine at Mount Sinai and is currently researching diabetes at the Columbia University Irving Medical Center. He has been privileged and has had the opportunity to present his research at various well-renowned conferences on both the East and West coast. He has had a keen interest in being able to better understand the underlying mechanism of the pathogenesis of chronic metabolic disorders to one day develop key innovative therapies for the most vulnerable communities. Traveling to rural and under-resourced communities in South America alongside being a certified EMT, he is passionate about creating more equitable health systems and improving the physician-patient experience. Amesh has demonstrated his commitment to biomedical research in addition to bedside care in both the hospital and local clinics that have sparked an interest in him to pursue a medical degree after graduating from Columbia. Outside his research, he is on the executive board of various organizations while serving as the lead teaching assistant for courses in chemistry and calculus.

Mantej Singh

Computer Science, Rice University, Class of 2022

Mantej is a senior studying Computer Science at Rice University. Having an interest in the intersection of Man and Machine (inspired by Isaac Asimov's 3 Laws of Robotics), Mantej wanted to explore how autonomous robots interact with humans in our environment. He joined Dr. Lydia Kavradi's lab with an interest in designing robotic motion planning algorithms for systems such as autonomous cars and surgical robots. Mantej's plenary talk will focus on his research efforts at Kavradi Lab in designing a novel motion planning algorithm that is fast and effective in planning routes for autonomous robots, making them safer for use in our society. Mantej's long-term goal is to push the boundaries of a robot's motion capabilities, making them faster, safer, and more efficient at executing tasks. When not playing with robots, Mantej spends his free time exploring Houston's coffeeshops, rock climbing, and eating good food with friends.

CONFERENCE

PLENARY SESSIONS: SPEAKERS

Shanivi Srikonda

Human Developmental and Regenerative Biology, Harvard College, Class of 2024

Shanivi Srikonda is a sophomore at Harvard studying human developmental and regenerative biology with a secondary in social anthropology. She became interested in science at a young age, and is fascinated by all things cellular and molecular. Shanivi is very interested in studying cancer biology and immunology in the future, and she hopes to combine research and medicine. She works in the Fisher Lab at Massachusetts General Hospital, where she came to deeply love research. Outside of class and lab, she is an avid writer for The Harvard Crimson as part of The Crimson's Editorial Board, where she also serves as an Associate Editorial Editor. Shanivi is a strong proponent for inclusion and diversity in STEM, and is a mentor for Harvard Women in Computer Science's mentorship program. She is also passionate about teaching and education, and has taught for Harvard SPLASH and Wave Learning Festival. As hobbies, she enjoys exploring nature, crocheting, and is a big cinema fan.

Andrew Van Camp

Applied Mathematics, Biological Sciences track, Harvard College, Class of 2023

Andrew Van Camp is a junior studying Applied Mathematics on the Biological Sciences track at Harvard University. Andrew researches the evolution of antibiotic resistance in *Enterococcus* in the Gilmore Lab at Mass Eye and Ear and the Bacterial Genomics Group at the Broad Institute. He has previously worked on the evolution of the squamate immune system with the Edwards Lab in Harvard's Organismic and Evolutionary Biology department and the genetics of non-alcoholic fatty liver disease in the Bauer Lab at Columbia University Medical Center. In his free time, Andrew enjoys playing the cello and writing musical theater lyrics.

Katherine Yao

Neuroscience; Psychology, University of Minnesota - Twin Cities, Class of 2022

Katherine Yao is a senior at the University of Minnesota studying neuroscience and psychology. For the past three and a half years, she has been conducting translational neuroscience research in the Liao Lab studying neurodegenerative tauopathies. She is currently investigating the role of tau in morphine-induced dendritic spine loss to identify novel drug targets for chronic opioid users with an increased deposition of hyperphosphorylated tau in the brain. She has also worked on projects in medicinal chemistry and CTE (chronic traumatic encephalopathy). Her continued interest in interdisciplinary learning led her to join the FamLee Lab, which conducts counseling psychology research related to race, ethnicity, and mental health. Her current research includes understanding the behaviors and perceptions of University members by using data from the longitudinal COVID-19 Wellness Study, which explores feelings about the pandemic, coping strategies, lifestyle changes, and fear of discrimination. Outside of her research, Katherine is devoted to improving healthcare accessibility in her community and is interested in health equity. In her free time, she loves to bake, explore new coffee shops with friends, and go on scenic runs.

Nancy Zhou

International Relations & Philosophy, Tufts University, Class of 2022

Nancy Zhou is a senior from Shanghai, China, currently pursuing a B.A. degree in International Relations and Philosophy and has recently completed the certificate program in Ethics, Law, and Society at Tufts University. In addition to researching about philosophy of law, she has interned at the LA Mayor's Office in 2020 and served as the student translator at inauguration events and art exhibitions at the United Nations Headquarters in New York City. Zhou's main fields of academic studies and research include ethical theories, moral philosophy, and the global political economy.

CONFERENCE **POSTER SESSIONS: JUDGES**

We appreciate the kind efforts of our judges, composed of graduate students, postdoctoral fellows, research associates, individuals from industry, and faculty, most of whom are affiliated with the various departments, institutes, and schools of Harvard University. Please note that due to advance printing, this list may not be a complete list of all judges: we apologize if there have been any omissions.

- Ms. Abbie LeBlanc**, *PhD Student, Government (political theory)*
Mr. Abdelrahman Mahmoud, *Graduate student, GSAS*
Mr. Alexander Reed, *Graduate Student, The Classics*
Ms. Amelia Woo, *Graduate student, Chemistry and Chemical Biology*
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Mr. Andrew Koenig, *Graduate student, English*
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Dr. Anna Maurer, *Postdoctoral Fellow, UC Berkeley, MCB*
Ms. Anne Marie Crooke, *Graduate student, Chemistry and Chemical Biology*
Dr. Arpita Kulkarni, *Postdoctoral fellow, OEB*
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Dr. Bolei Deng, *Postdoctoral fellow, School of Engineering and Applied Science*
Ms. Bota, *Graduate student (PhD Candidate), GSAS (Comp.Lit)*
Mr. Brock Wooldridge, *Graduate student, OEB*
Mr. Canaan R. Morse, *Graduate student, East Asian Languages and Civilizations*
Dr. Carla, *Instructor, Neurology*
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Ms. Caterina, *PhD candidate (graduate student), HKS, Government, Economics*
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Dr. Daren Card, *NSF Postdoctoral Fellow, OEB*
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Ms. Dian Ding, *Graduate student, Chemistry and Chemical Biology*
Dr. Dina Obeid, *Research Associate and Lecturer on Applied Mathematics, SEAS*
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