









USC WOMEN IN SCIENCE AND ENGINEERING

ANNUAL REPORT 2022-2023

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Executive Summary

The USC Women in Science and Engineering Program (WiSE) is USC's premiere diversity initiative. Founded in 2000 by an anonymous donation of \$20 million, WiSE is an endowed initiative aimed at increasing the representation of women in tenured and tenure-track faculty positions in the sciences, engineering, and mathematics at USC.

Since the program's inception, WiSE has successfully helped to increase the number of women in these positions in the programs it represents -- the departments of engineering in the USC Viterbi School of Engineering (VSoE) and the departments of mathematics, biological sciences, earth sciences, physics and astronomy, and chemistry in the USC Dana and David Dornsife College of Letter, Arts and Sciences -- from 15 in 2000 to 84 in August 2023 (See Appendix 1). By targeting the recruitment and retention of new women faculty members and by establishing a suite of programs aimed specifically at creating an environment in which women at all stages of their careers may thrive, WiSE serves as a role model for successful diversity efforts at USC, as well as across the country and internationally.

During the 2022-2023 recruitment season, WiSE helped add five new women to the tenure-track faculty. VSoE welcomes Assistant Professors Ruolin Li (Civil and Environmental Engineering), Jiachen Zhang (Civil and Environmental Engineering), Paria Rashidinejad (Electrical and Computer Engineering), Paraskevi (Evi) Micha (Computer Science), Ruishan Liu (Computer Science).

WiSE continues to play an active role in helping to increase the representation of women faculty candidates by hosting meetings with department chairs and search committees to outline strategies for broadening the scope of searches for outstanding diversity candidates. WiSE leadership also actively meets with women faculty candidates during the interview process. During the 2022-2023 academic year, WiSE leadership participated in meetings with 32 formal candidates during their interviews (See Appendix 2). WiSE Support for Facilitating Diversity in Faculty Searches provided 1 grant to the department of Biological Sciences, Section Human and Evolutionary Biology.

Additionally, WiSE continued its Industry Partnership Program with The Aerospace Corporation and Northrop Grumman. The program provided top-off fellowships to PhD students, alongside professional development programming and networking and recruitment opportunities.

WiSE Faculty Accomplishments

Current WiSE faculty members continue to distinguish themselves with campus-wide and national-level recognition for their research.

Viterbi School of Engineering

- Shaama Sharada (MFD) received the 2023 Sloan Research Fellowship in Chemistry. She was also promoted to Associate Professor with tenure.
- Mengjie Yu (ECE) won the Optica 20th Anniversary Challenge Award, the 2023 DARPA Young Faculty Award and won the Chan Zuckerberg Foundation Initiative Grant for dynamic imaging for neuron activities.
- **Eunji Chung** (BME) was a visiting scholar in the Department of Biomedical Engineering at Harvard in Fall 2022.
- Sze-Chuan Suen (ISE) received an NSF CAREER Award.
- Maja Mataric (CS) was elected to the American Academy of Arts and Sciences. She also received the Viterbi School of Engineering John O'Brien Service Award.

Dornsife College of Letters, Arts and Sciences

- Susan Forsburg (Biological Sciences) was elected a fellow of the American Society for Biochemistry & Molecular Biology.
- Carly Kenkel (Biological Sciences) was awarded the USC Dornsife Raubenheimer Award in November 2022.
- Megan Fieser (Chemistry) received the Research Corporation for Science Advancement's 2023 Cottrell Scholar Award.
- Helen Berman (Quantitative & Computational Biology) was elected to the National Academy of Sciences.
- Vera Gluscevic (Physics & Astronomy) received an NSF CAREER Award. She also received the USC Dornsife Raubenheimer award and the Research Corporation for Science Advancement's 2023 Cottrell Scholar Award.
- Emily Liman (Biological Sciences) was awarded the 2023 Kenneth S. Cole Award.
- Sami Assaf (Mathematics) was promoted to Full Professor.
- Naomi Levine (Biological Sciences) received the Simons Foundation Investigator in Aquatic Microbial Ecology Award.
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WiSE Activities

Programming

During the 2022-2023 academic year, the WiSE Program hosted 70+ events and meetings. In order to further aid in the retention of women faculty and to encourage undergraduate and graduate students to pursue careers in the academe, WiSE holds various events each academic year.

WiSE planned and hosted the WiSE Alumni Lecture Series during the 2022-2023 academic year.

Speakers in this series discussed their career paths & answered questions on a variety of career-related topics.

September 16: Patrick Case, From Molecules to Space

Patrick Case earned his Bachelor's degree in Chemistry from the University of North Florida and earned his PhD in Chemistry from USC in 2004. He is a Senior Scientist in Chemistry at Northrop Grumman in the Aerospace division. His role is to help other programs figure out what be going wrong with their materials through chemical analysis. He has a hand in helping with satellite parts, jets, propulsion systems and many more exciting programs. Patrick has also worked for a start up company and can share some information about that experience.

September 26: Dieuwertje "DJ" Kast, USC Joint Educational Project's STEM Community Outreach for Low-Income Students of Color

Dr. Dieuwertje "DJ" Kast is the Director of STEM Education Programs for the University of Southern California's (USC) Joint Educational Project. Through her efforts, she has provided STEM instruction to over 29,000 underrepresented minority and historically excluded students, 600 educators, 25 school principals, and countless community members. She coordinates supplemental science and technology programs in Los Angeles for low income elementary school students of color across a gamut of schools through the Wonderkids, Young Scientists Program, and the Medical STEM Program. Furthermore, her doctorate research was focused on preparing elementary school teachers how to integrate science and technology into their classrooms in a culturally relevant manner. She also volunteers with EE Just: a program dedicated to bringing Black youth into marine biology, and the USC Neighborhood Academic Initiative where she teaches research methods to first generation high school Latinx & Black students with expeditions to Catalina Island and research symposiums. She has published in dozens of journals on culturally relevant STEM curriculum and instructional activities. Her work makes an impactful difference by leveling the playing field in STEM for low-income students of color in the Los Angeles area.

October 19: Kelly Babigian, You'll Change, and So Will Your Career

Kelly Babigian is a Technical Program Manager at Microsoft. She currently works in the Microsoft Security business, which enables Microsoft to build the most trusted devices and services, while keeping the company and its customers protected. Kelly recently made this career transition from the Microsoft Devices team, where she was a Sourcing Engineer working in supply chain and manufacturing. With key strengths in organizational leadership and strategic planning, Kelly believes that no matter how your interests, passions, and strengths change, there is always a way to evolve your career. Kelly is a 2018 graduate of the USC Industrial & Systems Engineering program. During her time at USC, Kelly was president of the Institute of Industrial & Systems Engineers, team manager for the USC Swimming & Diving team, on the executive board of Alpha Phi, and a spin class instructor!

October 31: Renee Wang, Scientific Research is Just One Part of a Whole Life

Renée is a 6th year Ph.D. candidate in Geochemistry in the Division of Geological and Planetary Sciences at Caltech, co-advised by Profs. Dianne Newman and John Eiler. Her work focuses on how microbes catalyze key chemical reactions on Earth in both the present and the past, like the evolution of photosynthesis through geological time or identifying sources of greenhouse gases in the present day. She received an M.S. in Geochemistry from Caltech in 2019, and a B.S. in Geological Sciences from USC in 2016. She has also previously interned at Los Alamos National Labs, the U.S. Geological Survey, and in environmental consulting. She will receive her Ph.D. and start a postdoctoral fellowship at UC Berkeley in Summer 2023.

November 16: Elaine Krebs, From Catalina Island to the South Pole

Elaine Krebs is the Lead Educator at the California Science Center where she creates and delivers fun, educational programs to schools and families. She graduated from USC in 2015 with a B.A. in Health and Humanities and an M.S. in Marine and Environmental Biology and was also a four-year student athlete on the Women's Rowing Team. Elaine is passionate about creative and engaging strategies of science communication and has won multiple awards for her scientific animations at the USC Science Film Festival and RAW Science Film Festival.

February 15: Rebecca Wilson, Alternative STEM Careers: Venture Capital

Becky joined Rhapsody Venture Partners as an Associate in May 2021, where she spends most of her time sourcing and diligencing startups. Rhapsody is a Boston-based venture capital firm that invests in early-stage, "hard tech" startups that address industrial problems — new materials, sensors, engineering and process innovations, etc. She received her Ph.D. in Chemical Engineering at USC in 2019, where she worked in Mark Thompson's lab on the design of novel light-harvesting materials through supramolecular chemistry and self assembly. During this time, she co-founded a materials startup, AesculaTech, which came in second place in both the Maseeh Entrepreneurship Prize Competition and the New Venture Seed Competition at USC. After graduate school, she joined a biomaterials startup out of MIT as the Director of Materials Engineering through which she participated in the IndieBio accelerator.

March 8: Daphney-Stavroula Zois, Socially Important Engineering: Breaking Free From Traditional Norms

Daphney-Stavroula Zois is currently an Associate Professor in the Department of Electrical and Computer Engineering at the University at Albany, State University of New York. She received her B.S. degree in Computer Engineering and Informatics from the University of Patras, Greece, in 2007, and the M.S. and Ph.D degrees in Electrical Engineering from the University of Southern California in 2010 and 2014, respectively. During 2014-2016, she was a Postdoctoral Research Associate with the Coordinated Science Laboratory at the University of Illinois, Urbana-Champaign. Dr. Zois has received various fellowships, awards and recognitions including the Viterbi Dean's graduate fellowship, the NSF CAREER award, a Google AI for Social Good "Impact Scholars" award, the UAlbany's President's Award for Exemplary Public Engagement and the UAlbany's Inventor Recognition. She is serving as Co–Chair, TPC member or reviewer in international conferences and journals, such as AAAI, ICLR, NeurIPS, ICASSP, IEEE Transactions on Signal Processing, IEEE Transactions on Information Theory, IEEE Transactions on Artificial Intelligence, and IEEE Transactions on Neural Networks and Learning Systems. Her research interests include machine learning and statistical signal processing with a particular focus on decision making under uncertainty.

March 28: Jamie Clarke, Be the Change You Wish to See

Jamie is a highly motivated fourth-year medical student interested in neuroradiology, technology advancement, and translational biomedical research. This year, Jamie will be graduating with her M.D. from the University of Miami Miller School of Medicine and starting her residency training in diagnostic radiology. As a graduate of the progressive M.S. in Global Medicine program at USC, which she completed in addition to her B.S. in Human Biology and Spanish minor from Dornsife, Jamie has actively pursued her passions for deeply understanding human health on physiologic and sociologic scales. She regularly engages in neuroradiology research, with strong interests in cerebrovascular diseases, congenital brain malformations, and neuroimaging innovation. Jamie has been fortunate to present her work at many highly regarded conferences nationally, including the annual meetings for RSNA, ASPNR, ASNR, AANS, CNS, and AAP, among others, receiving multiple first-place presentation prizes. Jamie has also been honored with the opportunity to have her research works published in top medical journals. In her free time, she enjoys hiking, swimming, beach walks, going to concerts, playing guitar, and exploring diverse cuisines. Jamie is proudly committed to advancing innovative medicine and improving the quality of life of as many patients as possible.

April 11: Cassidy Feltenberger, Opportunities in Unlikely Spaces

Cassidy Feltenberger is a PhD candidate in Chemistry at the University of California, Irvine studying the photophysical characterization of and chemistries relevant to photoacids and other light absorbing molecules under Professor Shane Ardo. Cassidy received her BS in Chemistry from USC while performing research in the synthesis and characterization of organic molecules for organic photovoltaics under the supervision of Professor Mark Thompson. Prior to attending UC Irvine, Cassidy interned at The Aerospace Corporation Physical Sciences Laboratories in the Photonics Technology Department as an Atomic Clocks and Photonics Intern. Her achievements include contributions to several published journal publications, membership in the Liquid Sunlight Alliance (a DOE Basic Energy Sciences Hub), and receipt of a 2018 GEM Fellowship. Cassidy is committed to scientific communication and outreach and has pioneered outreach initiatives within her research group dedicated to promoting STEM interest and fostering trust in scientists with K-12 students. While building this research background and professional experience, Cassidy has realized that some of the best opportunities for growth in her technical skill set or for her research projects come from instances that seem small at the time. Being curious and adaptable, saying yes to learning new things, and challenging herself to excel in the position she is in have all aided in her progress. In this talk, she will share these experiences with you and hope to inspire you to look for the professional opportunities that might not be the most obvious one in front of you.

WiSE also hosted a Symposium on Noncommutative Algebras in honor of Professor Susan Montgomery (Mathematics) on April 14, 2023 (See Appendix 6). The day-long symposium was well attended and followed by a reception at the USC University Club.

WiSE continues to provide professional development and networking opportunities for women. During the 2022-2023 WiSE Undergraduate Research Experience, students had the opportunity to participate in 35 sessions (See Appendix 7). Students also participated in special social events, including a Peaks and Professors Hike in October 2022 with Biological Sciences Professors, Raffaella Ghittoni and Trond Sigurdsen.

Upon the conclusion of the WiSE Undergraduate Research Experience for WiSE Summer Researchers, WiSE held a virtual mini-conference (8/4/2023) where the participating undergraduate researchers presented short talks on their summer research to an audience comprised of faculty, staff, PhD students and postdoctoral researchers (See Appendix 5).

The WiSE Faculty Networking Group met once a month, alternating in person and virtual meetings. On March 29, 2023 WiSE hosted a networking lunch with Kelvin J. A. Davies while he was serving as Interim Vice Provost of Academic and Faculty Affairs. In May 2023, WiSE recognized all WiSE award recipients via its online social media channels and on its website.

During the spring 2023 semester, WiSE-hosted a book club, led by Professor Victoria Stodden, and read "The Exceptions" by Kate Zernike.

WiSE Outreach

WiSE continues to issue regular newsletters. In addition, the Program launched an alumni newsletter to highlight WiSE alum and grow our alumni network in 2022.

WiSE also continues to support the USC Young Researchers Program (YRP) annually. YRP hosts a summer research experience devised and executed by USC graduate students for USC-area high school students in the sciences.

Mentoring

In conjunction with WiSE's stated mission to build a supportive environment for women within the University, WiSE faculty mentor women at all levels – ranging from undergraduate to graduate students and postdoctoral scholars to faculty at all levels. Professor Jessica Parr (Chemistry) continued to coordinate the WiSE Undergraduate Experience. Professor Raffaella Ghittoni joined as the Undergraduate Research Program Mentor beginning summer 2021, and will continue in her role during the 2023-2024 academic year.

The WiSE PhD Advisory Board continued its work on community building for PhD students within WiSE-eligible departments. The Board continued its formal mentorship program across WiSE-eligible departments and held several events throughout the academic year, both virtual and in person. This past year the Board continued its WiSE Liaisons program, in which they appoint liaisons in each department. The liaisons help the board assess their department's needs, interface with department leadership, and organize attendance of WiSE events with the members of their respective departments. For the upcoming year the Board is focused on working with the liaison network to plan more events.

WiSE Students and Postdoctoral Scholars Achievements

Current and past WiSE students and postdoctoral scholars continue to be recognized for their research and accomplishments.

- Selin Bac (PhD student in MFD, Advisor Shaama Sharada) received the Kokes Award at the 28th North American Catalysis Society Meeting in June 2023.
- Kareesa Kron (PhD student in MFD, defended in May 2023, Advisor, Shaama Sharada) was offered a position as a Visiting Assistant Professor of Chemistry, W.M. Keck Science Department, Claremont McKenna, Scripps, and Pitzer Colleges.
- Shiyun Wang (PhD student in Mathematics, Advisor Greta Panova) graduated and accepted a postdoctoral position at the University of Minnesota.
- Anisa Ahsraf (PhD student in Biomedical Engineering, Advisor Eunji Chung) was awarded the Andrew and Erna Viterbi Fellowship and the Annenberg Fellowship.

- Anisa Ahsraf (PhD student in Biomedical Engineering, Advisor Eunji Chung) was awarded the Andrew and Erna Viterbi Fellowship and the Annenberg Fellowship.
- Siyoung Abby Lim (PhD student in Biomedical Engineering, Advisor Eunji Chung) was named an ARCS Foundation Scholar.
- Yi Huang (PhD student in Biomedical Engineering, Advisor Eunji Chung) received a USC Graduate Student Government Travel Grant.
- Noah Trac (PhD student in Biomedical Engineering, Advisor Eunji Chung) was named an ARCS Foundation Scholar.
- Isabella Suzuki (Postdoctoral Scholar, Advisor Eunji Chung) was awarded the 2023 Agilent Fellowship.
- Ali Osouli (Undergraduate, Chemical Engineering), Christian Zixi Chen (Undergraduate, Biomedical Engineering), Sophia Chen (Undergraduate Biomedical Engineering) and Nathan Ho (Biomedical Engineering), all advised by Eunji Chung, were awarded fellowships for the USC Bridge Undergraduate Science (BUGS) Program. Nathan Ho also received the USC Provost Undergraduate Fellowship and the USC Center for Undergraduate Research in Viterbi Engineering Fellowship (CURVE).
- **Colette O'Grady** (Undergraduate, Biomedical Engineering, Advisor Eunji Chung) was awarded the USC AMI Award for Outstanding Research in Biomedical Engineering.
- Suyanpeng Zhang (PhD Student CS and ISE, Advisor Sze-Chuan Suen) and Yiwen Cao (PhD Student ISE, Advisor Sze-Chuan Suen) were finalists in the Lusted Competition at the Society for Medical Decision Making (SMDM) annual conference Zhang in Health Services, Outcomes and Policy Research, and Cao in Applied Health Economics.
- Lauren Klein (PhD Student, Computer Science, Advisor, Maja Matartic) received the Viterbi Graduate Student Award.
- Leticia Pinto Alva (PhD Student, Computer Science, Advisor, Maja Matartic) received the Viterbi Undergraduate Research Mentoring Award.
- Rachel So (PhD Student, Earth Sciences, Advisor Sarah Feakins) was awarded the Gold Family Fellowship.
- Angelina Usibelli (Undergraduate, Earth Sciences, Advisor Sarah Feakins) graduated with the Estwing Pick Award.
- **Stella Baldwin** (Undergraduate, Earth Sciences, Advisor Sarah Feakins) participated in at REU at the California Institute of Technology.

- Maria Ruggeri (PhD Student, Biological Sciences, Advisor, Carly Kenkel) defended in June 2023 and received the Order of Arete Award. She is starting a postdoctoral position at ASU with Dr. Liza Roger.
- **Emily Aguirre** (PhD Student, Biological Sciences, Advisor, Carly Kenkel) defended in July 2023 and will be starting a postdoctoral position at USC with Dr. Julia Schwartzman.
- Sibelle O'Donnell (Undergraduate, Biological Sciences, Advisor, Carly Kenkel) graduated in May 2023. She received a Fullbright Research Fellowship to Brazil and an honorable mention in the 2022-2023 NSF GRFP competition.
- Linfeng Li (PhD Student, Mathematics, Co-Advisor, Juhi Jang) defended summer 2023 and accepted a postdoctoral position at UCLA.
- WiSE Undergraduate Researchers, **Shreya Agrawal** and **Christine Chen** received the 2023 USC Dornsife Scholar Award.
- WiSE Undergraduate Researcher, Isha Sangvi (Neuroscience), was the Valedictorian of the Class of 2023.

Advancement

WiSE continued work on its Corporate Partnership Program by collaborating with the Viterbi, Dornsife and University Corporate & Foundation Relations teams. We hosted a series of professional development programming during the 2022-2023 year for the WiSE Aerospace fellows as part of our partnership with The Aerospace Corporation. Events included, Conflict Management, Performing Art of Science, Acing Your Non-Academic Job Interview, Personal Website Building, and Imposter Syndrome, and a WiSE LEADS: Pathways to Careers in Industry Talk (See Appendix 4).

Aerospace has agreed to continue their support for 2023-2024.

The WiSE foundation grant for the WiSE Burg Communicating Science Program was continued through support by the Anton Burg Foundation. We will continue the communication program for an additional year for both graduate and undergraduate students.

In 2022, WiSE received a donation in memory of early childhood teacher Helen Brooks, who formerly worked at the USC UPC Child Care Center (1988-2008). The gift provides partial coverage of one child care award per year for 5 years. WiSE gave three awards with these funds during the 2022-2023 academic year.

WiSE Leadership

A critical aspect of the success of WiSE is the direct involvement of men and women faculty members, at all career levels and from both the USC Dornsife College and the Viterbi School of Engineering, in planning, evaluating, and guiding the Program's development. With the guidance of its diverse committees, WiSE programs have grown and evolved in response to changing needs. Continued evaluation of the success and utility of programs have helped to keep them relevant and effective.

WiSE Program Staff



Leana Golubchik, Stephen and Etta Varra Professor of Computer Science and Electrical and Computer Engineering in the Viterbi School of Engineering, serves as Director of the WiSE Program. Golubchik was appointed as Director in September 2010.



Mallory Redel, serves as the WiSE Program Manager and leads program development, operations, finance and committee coordination. She also oversees the Corporate Partnership Program. Mallory joined WiSE in November 2014. She holds a Bachelor of Science in Journalism from Middle Tennessee State University and a Master of Science in Social Entrepreneurship from the University of Southern California.



Marie Meneses, joined the WiSE Program in November 2019 and serves as the WiSE Marketing Assistant. She manages the program's marketing, social media, and events. She holds a Bachelor of Arts in Advertising from Pepperdine University.



Jessica Parr, Professor of Chemistry (Teaching) in the Dornsife College of Letters, Arts and Sciences serves as the WiSE Undergraduate Program Coordinator. She has been leading the undergraduate program since Fall 2013.



Raffaella Ghittoni, Associate Professor of Biological Sciences (Teaching) in the Dornsife College of Letters, Arts and Sciences serves as the Undergraduate Research Program Mentor. She began this role in 2021.

WiSE Advisory Board

The WiSE Advisory Board met twice in the fall semester and twice in the spring semester during the 2022-2023 academic year (9/19/2022, 12/5/2022, 2/9/2023, and 4/6/2023) and continues to work with program administration to hone its recruitment and support of programs for maximum impact. The first meeting in the spring semester is joint with the USC Dornsife College and Viterbi School Committees.

During the 2022-2023 academic year, the Board devoted attention to different topics that included allocation of WiSE resources and childcare and pregnancy assistance. As always, the Board remains dedicated to mentorship, as it is key to all WiSE endeavors.

The Board began the last academic year by taking a hard look at WiSE's resources. WiSE had had a record-breaking recruiting season for the 2021-22 academic year with 11 new tenure-track faculty (five in Dornsife and six in Viterbi) and counted over 80 faculty members. Thus, the overwhelming proportion of resources had been devoted to recruitment. This past year, with five new faculty hired in Viterbi, significant resources were expended as well. Given that WiSE programs extend far beyond recruitment, the Board is considering how remaining resources can be optimized. The Board is also in support of fundraising efforts to increase funding for all areas.

WiSE continues to advocate for ample, quality child care. The Board reviewed the amount of assistance that WiSE provides for childcare for students and postdocs (and junior faculty in rarer cases) and agreed to increase the amount, which had been \$1,400 a semester.

This upcoming year, the Board plans to consider how WiSE can assist faculty with young children, above and beyond the options that Major Support and Faculty Bridge Funding currently provides, for example with assistance with costs incurred by traveling to conferences with children etc.

During the 2022-2023 recruitment season, WiSE helped add five new women to the tenure-track faculty, bringing the total number to eighty-four. VSoE welcomes Assistant Professors Ruolin Li (Civil and Environmental Engineering), Jiachen Zhang (Civil and Environmental Engineering), Paria Rashidinejad (Electrical and Computer Engineering), Paraskevi (Evi) Micha (Computer Science), Ruishan Liu (Computer Science). We are enormously grateful to our divisional deans for working with WiSE and departments to recruit these remarkable women.

Finally, mentorship is key to the growth and strength of the WiSE community. Hanna Reisler continues to lead the faculty networking group. This academic year, the group met monthly. Senior WiSE faculty remain available to assist their junior colleagues.

The Board hopes that WiSE's many efforts will continue the acceleration of the rate at which women join the ranks of tenured and tenure-track faculty.

2022-2023 WiSE Advisory Board Member



Judith Hirsch (Chair) Professor of Biological Sciences, Neurobiology USC Dornsife College of Letters, Arts & Sciences



Linda Duguay Associate Professor (Research) of Biological Sciences, MEB USC Dornsife College of Letters, Arts & Sciences



David D'Argenio Professor of Biomedical Engineering USC Viterbi School of Engineering



Raffaella Ghittoni Associate Professor (Teaching), Biological Sciences USC Dornsife College of Letters, Arts & Sciences



Leana Golubchik (Ex-officio, WiSE Director) Professor of Computer Science and Electrical and Computer Engineering USC Viterbi School of Engineering



Sandeep Gupta Professor of Electrical and Computer Engineering-Systems USC Viterbi School of Engineering



Julie Higle Professor of Industrial & Systems Engineering USC Viterbi School of Engineering



Susan Montgomery Professor of Mathematics USC Dornsife College of Letters, Arts & Sciences



Hanna Reisler Professor of Chemistry USC Dornsife College of Letters, Arts & Sciences



Gary Rosen Gabilan Distinguished Professor of Science and Engineering and Professor of Mathematics USC Dornsife College of Letters, Arts & Sciences



Shang-Hua Teng Professor of Computer Science USC Viterbi School of Engineering

WiSE PhD Advisory Board

During the 2017-2018 academic year, WiSE established a PhD Advisory Board to further WiSE efforts in serving the PhD Community. The Board focuses on uncovering topics of interest to the STEM PhD Community at USC, and hosting events based on the findings.

2022-2023 WiSE PhD Advisory Board Members



Heather Culbertson (Faculty Mentor) Assistant Professor of Computer Science and Aerospace and Mechanical Engineering USC Viterbi School of Engineering



Naomi Levine (Faculty Mentor) Assistant Professor of Biological Sciences (MEB) USC Dornsife College of Letters, Arts & Sciences



Kylie Trettner (Chair) PhD Candidate, Chemical Engineering USC Viterbi School of Engineering



Anjali Bhatnagar PhD Student, Biological Sciences (MBBO) USC Dornsife College of Letters, Arts & Sciences



Raven Althouse PhD Student, Civil and Environmental Engineering USC Viterbi School of Engineering



Nripsuta Saxena PhD Student, Computer Science USC Viterbi School of Engineering



Kelly Deweese PhD Candidate, Biological Sciences (MB) USC Dornsife College of Letters, Arts & Sciences



Dannielle Fougere PhD Candidate, Earth Sciences USC Dornsife College of Letters, Arts & Sciences



Natalie Khalil PhD Candidate, Biomedical Engineering USC Viterbi School of Engineering



Mallory Redel (Ex-officio) WiSE Program Manager

USC Dornsife WiSE Committee

Committees composed of faculty in each school serve as advisors on grant-making by reviewing and evaluating the applications and making recommendations for funding.

2022-2023 WiSE Dornsife Committee Members



Jill McNitt-Gray (Chair) Professor of Biological Sciences and Biomedical Engineering USC Dornsife College of Letters, Arts & Sciences



James Boedicker Associate Professor of Physics and Astronomy USC Dornsife College of Letters, Arts & Sciences



Sami Assaf Professor of Mathematics USC Dornsife College of Letters, Arts & Sciences



Joshua West Professor of Earth Sciences USC Dornsife College of Letters, Arts & Science

A summary of the reviews conducted by the USC Dornsife Committee during the academic year follows:

Program	Deadline	Number of Applicants/ Nominations	Number of Awards
Undergraduate Research, Fall	May 16, 2022	9	6
Undergraduate Research, Spring	December 1, 2022	14	7
Graduate Merit	April 10, 2023	0	0
Graduate Top-Off	March 3, 2023	11	3 (8 offered)
Undergraduate Research, Summer	April 3, 2023	7	5

USC Viterbi WiSE Committee

Committees composed of faculty in each school serve as advisors on grant-making by reviewing and evaluating the applications and making recommendations for funding.

2022-2023 WiSE Viterbi Committee Members



Julie Higle (Chair) Professor of Industrial and Systems Engineering USC Viterbi School of Engineering



Felipe de Barros Associate Professor of Civil & Environmental Engineering USC Viterbi School of Engineering



Andrea Armani Professor of Chemical Engineering & Materials Science USC Viterbi School of Engineering



Bistra Dilkina Associate Professor of Computer Science USC Viterbi School of Engineering

A summary of the reviews conducted by the USC Viterbi Committee during the academic year follows:

Program	Deadline	Number of Applicants/ Nomination	Number of Awards
Undergraduate Research, Fall	May 16, 2022	7	6
Undergraduate Research, Spring	December 1, 2022	8	7
Graduate Merit	April 4, 2023	5	2
Graduate Top-Off	March 3, 2023	7	3 (7 offered)
Undergraduate Research, Summer	April 3, 2023	3	1

New Faculty



Ruolin Li will join USC as a Gabilan Assistant Professor in the Department of Civil and Environmental Engineering in Fall 2024. She is currently a postdoctoral scholar with the Department of Aeronautics and Astronautics at Stanford. Prior to that, she obtained a Ph.D. and a M.S. degree in Mechanical Engineering from UC Berkeley in 2023 and 2018. She is broadly interested in the design and control of future mobility systems, particularly those involving automated agents such as autonomous vehicles. Her research lies at the intersection of human behavior modeling, modeling of multi-agent systems, and control and optimization, aiming to enhance the societal benefits of intelligent transportation systems.



Ruishan Liu will join the USC Department of Biological Sciences in the Marine and Environmental Biology Section as a Gabilan Assistant Professor in January 2023. Julia received her PhD in Microbiology from the University of Wisconsin, Madison studying how marine bacteria persist as animal symbionts. She subsequently trained as a Ruth Kirschstein Postdoctoral Fellow at Harvard Medical School where she investigated the evolutionary diversification of asnimal-associated bacteria, and as a Postdoctoral Associate at MIT where her work focused on the ecological consequences of phenotypic heterogeneity in marine bacteria. At USC, Julia's lab will investigate how complex bacterial behaviors shape coastal marine ecosystems through their contribution to nutrient cycling and the development of brown algae.



Evi Micha will join USC as an assistant professor of computer science in August 2024. Her research interests combine computer science and economics, including topics such as algorithmic fairness and computational social choice. Before she joins USC, she will be a postdoctoral fellow at Harvard University. Micha is currently also affiliated with the Vector Institute for Artificial Intelligence and the Schwartz Reisman Institute for Technology and Society. She is currently working towards her Ph.D. at the University of Toronto, where she is part of the Theory Group. In 2023, her paper, "Welfare-Maximizing Pooled Testing" was selected as the exemplary paper in the applied modeling track of ACM Conference on Economics and Computation.



Paria Rashidinejad will join USC as a Gabilan Assistant Professor of Electrical and Computer Engineering in Fall 2024. She is currently a Postdoctoral Scholar at UC Berkeley at the Berkeley AI Research (BAIR) Lab and the Center for Human-Compatible AI (CHAI). Her research is on mathematical foundations of AI and designing capable and general-purpose AI systems for reliable integration into the real world. Her recent research has been focusing on reinforcement learning and machine learning algorithms for autonomous inference, prediction, and decision-making. She also works on machine learning applications in areas such as healthcare, robotics, autonomous driving, and systems. She received her Ph.D. in EECS from UC Berkeley in 2022.



Jiachen Zhang will join the Department of Civil and Environmental Engineering at USC as an Assistant Professor in Spring 2024. Her research group will investigate the interactions of air quality, climate, and society, quantifying the impacts of strategies aimed at mitigating climate change and air pollution. Dr. Zhang holds a Ph.D. in Environmental Engineering from USC and a B.S. in Atmospheric Sciences from Peking University. During her doctoral and postdoctoral studies, she utilized and enhanced various climate and air quality models to assess the environmental impacts of adopting solar reflective cool surfaces and renewable energy. Currently, she is the manager of the Mobile Source Technology Assessment and Modeling Section at the California Air Resources Board, where she leads a team of scientists and engineers to conduct original research projects, develop emissions inventory, and inform first-of-their-kind policies aimed at promoting electric vehicles and reducing air pollutant emissions. She is also a part-time lecturer at the USC, teaching Air Pollution Fundamentals. Additionally, she chairs the Entrepreneurship and Innovation Committee of the Chinese-American Engineers and Scientists Association of Southern California and serves as the secretary of the Air & Waste Management Association West Coast Section.

WiSE Financial Awards

The WiSE Program has adhered closely to the original structure of funds allocation outlined by the 2000 WiSE Task Force: \$500k for Recruitment/Retention; \$100k for Undergraduate Research; \$250k for PhD Student and Postdoctoral Support; and the remaining funds to support new additional programs. Actual distribution of funds may vary slightly each year depending on the return of investment income on the WiSE endowment and on the number of candidates who accept WiSE awards.

WiSE Gabilan Assistant Professorships

During the 2022-2023 academic year WiSE awarded WiSE Gabilan Assistant Professorships to three current faculty members and four incoming faculty members.

- Souti Chattopadhyay | Computer Science | USC Viterbi
- Maral Mousavi | Biomedical Engineering | USC Viterbi
- Weihang Wang Computer Science USC Viterbi
- Ruolin Li Civil and Environmental Engineering USC Viterbi
- Ruishan Liu | Computer Science | USC Viterbi
- Paraskevi Micha Computer Science USC Viterbi
- Paria Rashidinejad Electrical and Computer Engineering USC Viterbi

Formal Program Awards

Program	Number of Awards
Faculty Recruitment / Faculty Retention	22
Major Support for Current Faculty	0
WiSE Gabilan Assistant Professorship	7
WiSE Gabilan Distinguished Professorship	0
Lloyd Armstrong, Jr. Chair	0
Support for Facilitating Diversity in Faculty Searches	1
Faculty Bridge Funding	1
Supplemental Faculty Support	30
Merit Award for Excellence in Postdoctoral Research	2
Graduate Top-Off Awards	6
Merit Fellowships for Current PhD	2
Travel Grants	46
Undergraduate Research Grants	33
Child Care Subsidies (including temporary program expansion awards)	4
Support for Faculty Pregnancy, Childbirth, and Adoption	0
Support for PhD and Postdoc Pregnancy, Childbirth, and Adoption	0
WiSE Leadership Award for Students and Postdoctoral Scholars	0
WiSE Architects for Enduring Change Award	0

Total Program Awards:

Appendix 1: Current WiSE Faculty, Tenured and Tenure-Track (Including New Hires)

USC Dornsife College of Letters, Arts & Sciences

Life Sciences

Sarah Bottjer	Professor	Biological Sciences (Neuro)
Liang Chen	Professor	Quantitative and Computational Biology
Suzanne Edmands	Professor	Biological Sciences (MEB)
Carol Folt	Professor & President	Biological Sciences
Susan Forsburg	Professor	Biological Sciences (MCB)
Judith Hirsch	Professor	Biological Sciences (Neuro)
Emily Liman	Professor	Biological Sciences (Neuro)
Jill McNitt-Gray	Professor	Biological Sciences (HEB)
Lorraine Turcotte	Professor	Biological Sciences (HEB)
Irene Chiolo	Associate Professor	Biological Sciences (MCB)
Naomi Levine	Associate Professor	Biological Sciences (MEB)
Carolyn Phillips	Associate Professor	Biological Sciences (MCB)
Noelle Held	Assistant Professor	Biological Sciences (MEB)
Carly Kenkel	Assistant Professor	Biological Sciences (MEB)
Laura Melissa Guzman	Assistant Professor	Biological Sciences (MEB)
Lauren McElvain	Assistant Professor	Biological Sciences (Neuro)
Jazlyn Mooney	Assistant Professor	Quantitative and Computational Biology
Lindsey Schier	Assistant Professor	Biological Sciences (HEB)
Julia Schwartzman	Assistant Professor	Biological Sciences (MEB)

Physical Sciences / Mathematics

Sami Assaf	Professor	Mathematics
Rosa Di Felice	Professor	Physics & Astronomy
Sarah Feakins	Professor	Earth Sciences
Susan Friedlander	Professor	Mathematics
Heidi Houston	Professor	Earth Sciences
Juhi Jang	Professor	Mathematics
Anna Krylov	Professor	Chemistry
Karen Lloyd	Professor	Earth Sciences
Greta Panova	Professor	Mathematics
Jia Grace Lu	Professor	Physics & Astronomy
Amber Miller	Professor & Dean	Physics & Astronomy
Susan Montgomery	Professor	Mathematics

Physical Sciences / Mathematics (continued)

Elena Pierpaoli
Hanna Reisler
Smaranda Marinescu
Megan Fieser
Vera Gluscevic
Kelly Luo
Caroline Seyler
Kate White

Professor Professor Associate Professor Assistant Professor Assistant Professor Assistant Professor Assistant Professor Assistant Professor

Physics & Astronomy Chemistry Chemistry Chemistry Physics & Astronomy Physics & Astronomy Earth Sciences Chemistry

USC Viterbi School of Engineering

Andrea Armani	Professor	Chemical Engineering and Materials Science
Burcin Becerik-Gerber	Professor	Civil and Environmental Engineering
Amy Childress	Professor	Civil and Environmental Engineering
Leana Golubchik	Professor	Electrical & Computer Engineering
Malancha Gupta	Professor	Chemical Engineering & Materials Science
Julie Higle	Professor	Industrial and Systems Engineering
Andrea Hodge	Professor	Chemical Engineering and Materials Science
Eva Kanso	Professor	Aerospace and Mechanical Engineering
Mercedeh Khajavikhan	Professor	Electrical & Computer Engineering
Yan Liu	Professor	Computer Science
Maja Matarić	Professor	Computer Science
Ellis Meng	Professor	Biomedical Engineering
Urbashi Mitra	Professor	Electrical & Computer Engineering
Mahta Moghaddam	Professor	Electrical & Computer Engineering
Michelle Povinelli	Professor	Electrical & Computer Engineering
Maryam Shanechi	Professor	Electrical & Computer Engineering
Bistra Dilkina	Associate Professor	Computer Science
Eun Ji Chung	Associate Professor	Biomedical Engineering
Stacey Finley	Associate Professor	Biomedical Engineering
Megan McCain	Associate Professor	Biomedical Engineering
Kelly Sanders	Associate Professor	Civil and Environmental Engineering
Shaama Sharada	Associate Professor	Chemical Engineering & Materials Science
Victoria Stodden	Associate Professor	Industrial and Systems Engineering
Phebe Vayanos	Associate Professor	Industrial and Systems Engineering
Kandis Leslie Abdul-Aziz	Assistant Professor	Civil and Environmental Engineering
Souti Chattopahhyay	Assistant Professor	Computer Science
Heather Culbertson	Assistant Professor	Computer Science
Ruolin Li	Assistant Professor	Civil and Environmental Engineering

USC Viterbi School of Engineering (continued)

Ruishan Liu	Assistant Professor	Computer Science
Neda Maghsoodi	Assistant Professor	Aerospace and Mechanical Engineering
Paraskevi Micha	Assistant Professor	Computer Science
Maral Mousavi	Assistant Professor	Biomedical Engineering
Audrey Olivier	Assistant Professor	Civil and Environmental Engineering
Feifei Qian	Assistant Professor	Electrical & Computer Engineering
Paria Rashidinejad	Assistant Professor	Electrical & Computer Engineering
Sze-Chuan Suen	Assistant Professor	Industrial and Systems Engineering
Swabha Swaymdipta	Assistant Professor	Computer Science
Jennifer Treweek	Assistant Professor	Biomedical Engineering
Alejandra Uranga	Assistant Professor	Aerospace and Mechanical Engineering
Weihang Wang	Assistant Professor	Computer Science
Renyuan Xu	Assistant Professor	Industrial and Systems Engineering
Mengjie Yu	Assistant Professor	Electrical & Computer Engineering
Cristina Zavaleta	Assistant Professor	Biomedical Engineering
Jiachen Zhang	Assistant Professor	Civil and Environmental Engineering
Jieyu Zhao	Assistant Professor	Computer Science

Appendix 2: Faculty Candidates Interviewed on Campus

As in previous years, WiSE leadership offered to meet with faculty candidates, both to communicate information about the WiSE Program and resources and to provide opportunities for candidates to ask questions about USC and work-family issues that they might not feel comfortable discussing as part of their formal interview process. Departments continued to take advantage of this offer and senior WiSE faculty met with 32 faculty candidates over the course of 2022-2023. The list of candidates is below:

Irene Kaplow	Quantitative and Computational Biology	1/24/2023
Elizabeth Corson	MFD of Chemical Engineering & Materials Science	1/31/2023
Ria Corder	MFD of Chemical Engineering & Materials Science	2/7/2023
Nicole Immorlica	Computer Science	2/13/2023
Carolyn Mills	MFD of Chemical Engineering & Materials Science	2/21/2023
Corinne Packard	MFD of Chemical Engineering & Materials Science	4/4/2023
Avantika Gori	Civil and Environmental Engineering	2/13/2023
Jean Wilkening	Civil and Environmental Engineering	2/21/2023
Ruolin Li	Civil and Environmental Engineering	2/22/2023
Alexis Block	Computer Science	3/1/2023
Dakshita Khurana	Computer Science	3/2/2023
Isabella Arzeno Soltero	Civil and Environmental Engineering	3/6/2023
Rui Cheng	Civil and Environmental Engineering	3/9/2023
Jennifer Hamilton	Biomedical Engineering	3/10/2023
Sharon Di	Civil and Environmental Engineering	3/10/2023
Rika Antonova	Computer Science	3/20/2023
Weiyu Li	Aerospace and Mechanical Engineering	3/20/2023
Shiray Ginosar	Electrical and Computer Engineering	3/20/2023
Yun Hang	Aerospace and Mechanical Engineering	3/22/2023
Lindsay Sanneman	Computer Science	3/22/2023
Negar Mehr	Aerospace and Mechanical Engineering	3/24/2023
Priyanka Raina	Electrical and Computer Engineering	3/30/2023
Shuang Li	Computer Science	3/30/2023
Tian Li	Computer Science	4/3/2023
Corrine Packard	MFD of Chemical Engineering & Materials Science	4/4/2023
Evi Micha	Computer Science	4/5/2023
Maithilee Kunda	Computer Science	4/6/2023
Yi Ding	Electrical and Computer Engineering	4/6/2023
Sabrina Neuman	Electrical and Computer Engineering	4/11/2023
Paria Rashidinejad	Electrical and Computer Engineering	4/18/2023
Wanrong Zhang	Computer Science	4/25/2023
Carla Stanard	Biomedical Engineering	4/26/2023

Appendix 3: Samples of WiSE Events Flyers



WISE ALUMNI LECTURE SERIES



Tuesday, April 11 11:00 am - 12:00 pm PDT Zoom Webinar

Opportunities in Unlikely Spaces

Finding Direction Where It's Unexpected in Research & Career

Cassidy Feltenberger is a PhD candidate in Chemistry at the University of California, Irvine studying the photophysical characterization of and chemistries relevant to photoacids and other light absorbing molecules under Professor Shane Ardo. Cassidy received her BS in Chemistry from USC while performing research in the synthesis and characterization of organic molecules for organic photovoltaics under the supervision of Professor Mark Thompson. Prior to attending UC Irvine, Cassidy interned at The Aerospace Corporation Physical Sciences Laboratories in the Photonics Technology Department as an Atomic Clocks and Photonics Intern. Her achievements include contributions to several published journal publications, membership in the Liquid Sunlight Alliance (a DOE Basic Energy Sciences Hub), and receipt of a 2018 GEM Fellowship. Cassidy is committed to scientific communication and outreach and has pioneered outreach initiatives within her research group dedicated to promoting STEM interest and fostering trust in scientists with K-12 students.

While building this research background and professional experience, Cassidy has realized that some of the best opportunities for growth in her technical skill set or for her research projects come from instances that seem small at the time. Being curious and adaptable, saying yes to learning new things, and challenging herself to excel in the position she is in have all aided in her progress. In this talk, she will share these experiences with you and hope to inspire you to look for the professional opportunities that might not be the most obvious one in front of you.

Register Here: tinyurl.com/WiSECassidyF

STEM Bytes Seminar

Monday, June 13 9:00 - 10:00 am PDT



Maxey

Maristella Alessio Talks:

Effects of Matrix Stiffness on the Oxytocin Response of Engineered Uterine Muscle Tissue Antonina Maxey, Ph.D. student in Biomedical Engineering

Quantum Chemical Design of Molecular Magnets Maristella Alessio, Postdoctoral Scholar

STEM Bytes Seminar

Monday, June 27 9:00 - 10:00 am PDT





Raktim Sen

Wen Shi

Talks:

wise

wise

Fuel out of Thin Air: Methanol Synthesis using Air as a Renewable Carbon Source Raktim Sen, PhD Student in Chemistry

Visualization of hyperspectral fluorescent data with Spectrally Encoded Enhanced Representations Wen Shi, Ph.D. Candidate in Biomedical Engineering



PEAKS & PROFESSORS HIKE



Rustic Canyon Trail

Open to all USC students.

Sign-ups open on Sunday, October 2 at 9 pm PDT.

Dr. Raffaella Ghittoni Biological Sciences



More info: peaksandprofessors.org

WOMEN IN SCIENCE AND ENGINEERING PRESENTS



The Performing Art of Science Workshop hosted by Nancy Houfek

When giving presentations, many STEM research scientists focus solely on the subject matter and leave the quality of their speaking to chance. This workshop will offer some specific skills to become a more engaging and memorable speaker, whether at a professional conference, public event, job talk, or in the classroom. The workshop will discuss important elements, such as connection to the audience, purpose, physical and vocal presence, best use of PowerPoint, and stories and metaphors. Participants will learn how a few changes can immediately improve communication of their research.

All Ph.D. students welcome! Tuesday, April 25 | 3:30 - 4:30 pm PST

In-Person at EEB 248 (refreshments and pastries provided, RSVP) or Virtual via Zoom (RSVP for link)







Appendix 4: WiSE LEADS: Pathways to Careers in Industry



WISE LEADS: PATHWAYS TO CAREERS IN INDUSTRY



Falgun Patel

Principal Director of the Electronics and Photonics Laboratory at The Aerospace Corporation

Tuesday, April 25 2:00 - 3:00 pm PDT Zoom Webinar

Dr. Falgun Patel is the Principal Director of the Electronics and Photonics Laboratory at The Aerospace Corporation. He manages a multi-disciplinary team and portfolio that includes energy storage and generation, microelectronics, and photonics. Falgun Patel received his B.S. degree (1995) in Optics from the University of Rochester, M.S. (1997) and Ph.D. degrees (2000) in Applied Science from UC Davis (emphasis on solid-state lasers), and an M.B.A. from UCLA Anderson (2007). He has worked in small and large companies (Agilent, Boeing, FLIR Systems) across roles in R&D, applied R&D, engineering, program/product management, business development, and operations.

Talk title: Observations from a 20+ professional career in STEM and a look towards the future

Abstract: By way of training, I am a scientist. With time, while continuing to work in a STEM profession (lasers, optics, photonics), my role as scientist has evolved to include engineer, project/program/product manager, to a manager of people, R&D, products, and operations. I have learned that a career in STEM is very rewarding, but even more so when one embraces the many disciplines that overlap with science. In this presentation I will share key lessons I've learned over the course of 20 years, with the goal that perhaps observations from my journey will help you chart your path to a fulfilling STEM career.

<u>Register at</u> <u>tinyurl.com/WiSELeads4-25</u>

Appendix 5: WiSE Undergraduate Researcher Mini-Conference

WiSE Undergraduate Summer Research Mini-Conference



Schedule

9:00 - 9:05	Introductory Remarks
9:05 - 9:20	Alara Berkmen Professor Maral Mousavi
9:20 - 9:35	Anvi Surapaneni Professor Travis Williams
9:35 - 9:50	Lucia Zhang Professor Doc Edge
9:50 - 10:05	Mira Nigudkar Professor Sarah Bottjer
10:05 - 10:15	Break
10:15 - 10:30	Nettie Serena Ndjuissi Pawa Professor Andrew Gracey
10:30 - 10:45	Chenyang Li Professor Jazlyn Mooney
10:45 - 11:00	Closing Remarks

Home-Based Electrochemical Rapid Sensor (HERS)

Alara Berkmen, Melissa Banks, Maral Mousavi

Bacterial vaginosis (BV) is the most common gynecological infection worldwide, and one of the hardest to diagnose, leaving many unsuspecting patients vulnerable to STIs, severe inflammation, and infertility. Unfortunately, existing diagnostic methods are both costly and time consuming. Our research aimed to optimize the fabrication process of a new BV diagnostic test that employs metallic yards coated with ion-specific membranes that can detect minute concentrations of biomarkers using electrochemical techniques. The surface area of the sensors was the central point of comparison for our study, as a higher surface area enables increased electron transfer between the enzyme and the analyte on the sensor. To optimize the stitch length, we observed 2 mm stitch and 4 mm stitch circuits, which achieved an average surface area of 11.61 5.40 mm2 and 19.73 1.86 mm2, respectively. Consequently, the experiment was continued by implementing the 4 mm circuits on a neoprene surface, known for its hydrophobic and insulating properties. Between two batches, the resulting surface areas were 17.4 5.5 mm2, and 35.07 4.63 mm2, indicating reproducibility within the same batch, but indicating further need for consistency. Future experiments include optimizing the embroidery settings to minimize error in the fabrication process, and assessing the limits of detection when analyzing small concentrations of biomarkers in a sample solution. Once reproducibility is established, we ultimately hope to test the circuits' abilities to detect varying concentrations of the key indicator of BV, trimethylamine, when fully integrated into female healthcare products.

Blood Volume Measurement Using Cardiovascular Magnetic Resonance and Ferumoxytol

Anvi Surapaneni, PI: Travis Williams

This project attempts to use nuclear magnetic resonance (NMR) to measure the volume of blood within the body. Blood volume status indicates disease progress in cardiac patients, useful information for doctors, and blood-volume guided management has been shown to improve heart failure outcomes (Strobeck et al., 2018). Thus, we propose a blood volume measurement method using ferumoxytol, a relatively safe FDA-approved intravenous iron supplement. Based on the volume of ferumoxytol given to a patient, their total blood volume can then be calculated. Iron, as a paramagnetic metal, can be quantified by the property magnetic relaxivity. The magnetization of iron relaxes over time, proportionally to its concentration. First, a calibration curve of relaxivity can be created, with iron or ferumoxytol concentration plotted against 1/ Time. The slope of this curve is an r1 value, which is expected to remain constant across blood samples. Moreover, the feasibility of calculating total blood volume by measuring the relaxivity of ferumoxytol has been demonstrated in pigs (Ramasawmy et al., 2018). Initial experiments have shown that iron r1 curves can be taken with relative precision, confirming a standard procedure. Next steps in the project involve measuring ferumoxytol r1 curves in water and blood. The overall goal of this project is to measure intravascular blood volume based on an indicator-dilution method using commonly available medical instruments, magnetic resonance scanners. This test has good clinical utility for cardiac patients and will be safer than the industry standard and can have broad applications in cardiovascular research

Assessing Linkage Disequilibrium Scores Near the CODIS Forensic Genetic Loci

Lucia Zhang, Doc Edge

The Combined DNA Index System (CODIS) is a set of 20 short tandem repeat (STR) genetic markers that is the workhorse of forensic genetic identification in the United States. Part of the rationale for broad collection and storage of CODIS genotypes is that the CODIS markers are thought to lack information about an individual's traits or other personal information. However, a recent study has shown that the areas around the CODIS markers are enriched for pathogenic variants and for single-nucleotide polymorphisms (SNPs) identified as trait-associated in genome wide association studies (GWAS). In this study, we looked at the linkage disequilibrium (LD) scores of the CODIS loci in 1 kb, 10 kb, and 100 kb surrounding regions as a potential explanation for the observed pattern of enrichment of GWAS hits around the CODIS loci. LD scores provide insight into the correlation of a genotype at one locus with other genotypes in the genome due to inheritance patterns, indicating how informative specific alleles are about alleles at surrounding genetic loci. We find that, compared with random sets of autosomal tetranucleotide-repeat STRs, the SNPs around the CODIS markers displayed relatively low (<7th percentile) LD scores. Thus, LD scores do not seem to account for the high number of GWAS hits around the CODIS loci, which remain unexplained. To account for lower LD scores, further work is needed to look at local recombination rate and background selection around the CODIS markers.

Investigating Direct and Indirect Pathways that Mediate Vocal Learning in Songbirds

Mira Nigudkar, Aditi Jagannathan, Sarah Bottjer

Vocal learning in songbirds provides a powerful experimental model for motor skill learning, the acquisition of a stereotyped behavior through the refinement of variable actions. The neural pathways that mediate vocal learning are localized in two parallel circuits that traverse the cortex, basal ganglia, and thalamus. The basal ganglia are thought to have both a "direct" and an "indirect" pathway to the thalamus, but it remains unclear how these separate pathways may mediate different aspects of vocal learning. We used neuroanatomical techniques to identify "direct" neurons in the basal ganglia with one fluorescent label and antibody staining techniques to label neurons expressing transcription factor FoxP2 with a different fluorescent label. FoxP2 plays a critical role in vocal development, with mutations leading to speech disorders such as childhood apraxia in humans or impaired vocal learning in songbirds. Based on previous research, we predicted that "direct" neurons that send a projection to the thalamus would not express FoxP2. Our results support this hypothesis: thalamus-projecting neurons never expressed FoxP2 (n = 467). Our findings offer FoxP2 as a marker for indirect neurons and support the existence of different subpopulations of neurons that likely correspond to direct and indirect pathways. We will next study whether this nonoverlapping pattern persists in the basal ganglia of juvenile songbirds, further investigating how these separate pathways perform different developmental functions. Overall, our experiment will increase our understanding of the neural mechanisms underlying vocal learning, a crucial area of study to understand human vocal and motor development.

Carbohydrate Metabolism Trends and RNA interference in Cytoplasmic Viscosity of C. elegans through Heat Thermal Adaptation

Nettie Serena Ndjuissi Pawa, Andrew Gracey

A high-profile publication in the journal Cell titled "Cellular Control of Viscosity Counters Changes in Temperature and Energy Availability" (Pearson et al., 2020), revealed that baker's yeast, Saccharomyces cerevisiae, modulates the levels of glucose and their storage molecules, glycogen and trehalose, to modulate the viscosity of the cytoplasm. Glucose was converted to glycogen or trehalose in order to increase viscosity, while viscosity was reduced through the breakdown of these storage products. In this study they applied changes in temperature as a tool to manipulate viscosity: because the viscosity of any medium is negatively correlated with temperature, decreasing as temperature is raised, and increasing with cold. In turn the yeast would actively adjust the proportions of glucose to glucose-storage molecules to match the prevailing temperature. This study explores the effect that the knockdown of gene PYGL-1 and TPS-1 has on the carbohydrate metabolic pathways. For our experiment, we measured the viscosity of the cytoplasm in the knock-down worms by comparing their survival rates when challenged to a gradually increasing heat temperature. The effect of knock-down of genes on the capacity of the worms to adapt their viscosity to the prevailing temperature was done by determining the survival rate, after a certain time at 20C to 65 C of the subject C. elegans. Our results showed a negative correlation between the knockdown of critical RNAi genes relating to carbohydrates metabolism and a higher death rate in cold challenged C. elegans, suggesting that higher cytoplasmic viscosity increases as a function of glycogen increase. The conclusion of our experiments was that warming to 65C for 4hr with the knockdown of PYGL-1 induced about an average 45% survival in the worms affected. Whereas the cooling to 4C for 48hr with the knockdown of TPS-1 had an average of 25 %survival rate. In both cases, there is a clear negative correlation between the percentage of survival in heat challenged regular strand N2 Caenorhabditis elegans and the knockdown of TPS-1 and PYGL-1, suggesting that their viscosity of the cytoplasm increased.

Determining the Most Informative Markers for Population Assignment: Navigating Marker Informativeness and Algorithms

Chenyang Li, Jazlyn Mooney

Conservation genomics is an emerging field that combines wildlife rescue, protection, and genomics. Two crucial steps in the conservation process are to characterize the diversity of populations of interest and identify distinct subpopulations. Often researchers wish to accomplish these goals in the most scalable and cost-effective way possible. One approach is identifying a reduced set of markers, researchers can use to design single nucleotide polymorphism (SNP) panels for the population of interest. The goal of our work was to implement metrics that quantify marker informativeness and accurately assign individuals to a population, while simultaneously reducing the whole genome to a smaller set of informative markers. We achieved this goal by using population genetic summaries of that data and applying algorithms to determine the most informative marker set that we benchmarked against random markers. We simulated genotype data from two populations that represented multiple levels of differentiation, as measured by FST. 6 We found that if FST between populations is large (0.1) then we can accurately assign individuals to a population with as little as 10 markers.

Conversely, if FST is small (0.02) more markers (at least 80) and more individuals are required for accurate classification. This prompted us to create a reduced marker set for classification based on each marker's value of FST. We used the top markers with the highest FST values for classification in empirical data. We found that our selection method outperforms every matched set of randomly selected markers, and observed the largest accuracy gain at 10 markers

Appendix 6: WiSE Symposium on Noncommutative Algebras

SYMPOSIUM ON NONCOMMUTATIVE ALGEBRAS

In honor of **Professor Susan Montgomery's** 80th birthday and her contributions to mathematics and women in science and engineering



Friday, April 14

8:45 am - 5:30 pm

Hedco Neurosciences Building (HNB) 100

For speaker bios and abstracts, please scan the QR code below.





When	Who/What	Where
8:45 AM	Registration Begins	HNB 100
9:30 AM	Welcome by WiSE Director, Leana Golubchik, Stephen and Etta Varra Professor of Computer Science and Electrical and Computer Engineering, University of Southern California	HNB 100
9:35 AM	Remarks by Moh El-Naggar, Divisional Dean for the Physical Sciences and Mathematics in the Dornsife College of Letters, Arts, and Sciences, and Dean's Professor of Physics and Astronomy, University of Southern California	HNB 100
9:45 AM	Richard Ng, Professor, Department of Mathematics, Louisiana State University <i>Frobenius-Schur indicators as invariants of 3-manifolds</i>	HNB 100
10:20 AM	Yevgenia Kashina, Professor, Department of Mathematical Sciences, DePaul University Applications of Frobenius-Schur indicators	HNB 100
10:55 AM	Break	
11:10 AM	Remarks by WiSE Leadership Hanna Reisler, Lloyd Armstrong Jr. Chair in Science and Engineering and Professor of Chemistry, and Judith Hirsch, Professor of Biological Sciences and Section Head Neurobiology, University of Southern California	HNB 100
11:40 AM	Yuri Bahturin, Professor, Department of Mathematics and Statistics, Memorial University Newfoundland Hopf Algebras and Their Action on Rings	HNB 100
12:15 PM	Lunch Break	
1:15 PM	Remarks by Eric Friedlander, Chair, Department of Mathematics and Dean's Professor of Mathematics, University of Southern California	HNB 100
1:30 PM	Peter Schauenburg, Professor, Department of Mathematics, Institut de Mathématiques de Bourgogne, Université Bourgogne Franche-Comté Computing Frobenius-Schur Indicators	HNB 100
2:05 PM	Lance Small, Emeritus Professor, Department of Mathematics, University of California San Diego Base Field Extensions of Certain Ring Properties	HNB 100
2:40 PM	Break	
2:55 PM	Robert Guralnick, Professor, Department of Mathematics, University of Southern California Automorphisms of Certain Matrix Rings	HNB 100
3:30 PM	Susan Montgomery, Professor, Department of Mathematics, University of Southern California	HNB 100
3:50 PM	Closing Remarks (Leana Golubchik)	HNB 100
3:55 PM	Walk to reception	
4:00 PM	Reception (1.5 hours)	University Club Patio

Appendix 7: WiSE Undergraduate Research Program Events



WISE UNDERGRADUATE RESEARCH **EXPERIENCE PROGRAMMING**

FALL 2022

DATE	EVENT	TIME	LOCATION	
Wednesday, August 24	<u>Welcome Event</u>	1-2 pm PDT	DRB 232	This program the Fellows in Undergradua
Wednesday, August 31	STEM Bytes Seminar	11 am-12 pm PDT	Zoom	Research Exp Program for I
Thursday, September 8	<u>Alumni Panel</u>	TBD	Zoom	You may also for STEM Byt
Tuesday, September 13	STEM Bytes Seminar	2-3 pm PDT	Zoom	advance by v linktr.ee/uscv
Thursday, September 22	Career Center	9-10 am PDT	DRB 232	FOLLOW
Wednesday, September 28	STEM Bytes Seminar	11 am-12 pm PDT	Zoom	
Tuesday, October 4	<u>Academic Honors and</u> Fellowships	12-1 pm PDT	DRB 232	@USCWISE
Tuesday, October 18	STEM Bytes Seminar	2-3 pm PDT	Zoom	CONTAC
Wednesday, October 26	Social Event	TBD	DRB 232	Email:
Wednesday, November 2	STEM Bytes Seminar	11 am-12 pm PDT	Zoom	Wiseprog@u
Thursday, November 10	<u>How to Write an</u> <u>Abstract</u>	TBD	DRB 232	wise.usc.edu
Thursday, November 17	STEM Bytes Seminar	2-3 pm PDT	Zoom	Souther
Wednesday, November 30	End of Semester Social	TBD	DRB 232	

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WISE UNDERGRADUATE RESEARCH EXPERIENCE PROGRAMMING

SPRING 2023

DATE	EVENT	TIME	LOCATION
Tuesday, January 17	<u>Welcome Event</u>	12 - 1 pm	DRB 232
Wednesday, January 25	STEM Bytes Seminar	12 - 1 pm	Zoom
Wednesday, February 1	<u>Alumni Panel</u>	2 - 3 pm	Zoom
Monday, February 6	STEM Bytes Seminar	12 - 1 pm	Zoom
Thursday, February 16	How to Dress for Success	4 - 5 pm	DRB 232
Wednesday, February 22	STEM Bytes Seminar	2 - 3 pm	Zoom
Tuesday, February 28	How to Present a Poster	4 - 5 pm	DRB 232
Monday, March 6	STEM Bytes Seminar	12 - 1 pm	Zoom
Wednesday, March 22	Keep Calm and Paint On	12 - 1 pm	DRB 232
Monday, March 27	STEM Bytes Seminar	2 - 3 pm	Zoom
Tuesday, April 4	Faculty Panel	4 - 5 pm	Zoom
Wednesday, April 12	STEM Bytes Seminar	12 - 1 pm	Zoom
Wednesday, April 19	End of Semester Social	TBD	TBD

This programming is for the Fellows in the WiSE Undergraduate Research Experience Program for Spring 2023. However, all USC students are welcome to join. Please contact WiSE marketing assistant, Marie O'Neil, for event details.

You may RSVP for STEM Bytes by clicking the links or visiting: linktr.ee/uscwise

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Office of the Provost University of Southern California 1042 Downey Way, DRB 140 Los Angeles, CA 90089-1111