











USC WOMEN IN SCIENCE AND ENGINEERING

ANNUAL REPORT 2019-2020

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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 70 in August 2020 (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 2019-2020 recruitment season, WiSE helped add <u>one new woman to the tenure-track</u> <u>faculty.</u> VSoE welcomes Associate Professor **Victoria Stodden** (Industrial and Systems Engineering).

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 campus visits. During the 2019-2020 academic year, WiSE leadership participated in meetings with 24 formal candidates during their campus visits (18 in Viterbi and 6 in Dornsife) (See Appendix 2). WiSE Support for Facilitating Diversity in Faculty Searches provided 6 grants totaling \$23,100.00 to the departments of Electrical and Computer Engineering, Biological Sciences (MCB), Biological Sciences (QCB), Biological Sciences (MEB), Mathematics, and Physics and Astronomy.

Additionally, WiSE successfully began its Industry Partnership Program by establishing its first two partners, Qualcomm and Cisco Systems. The program will provide 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

- Amy Childress (Civil and Environmental Engineering) received a Fulbright grant to work at the Technical University in Demark during fall 2019.
- Mahta Moghaddam (Biological Sciences) was named a distinguished lecturer for the American Society of Microbiology and named a USC Distinguished Professor.
- **Eun Ji Chung** (Biomedical Engineering) was named an Emerging Investigator by the Journal of Materials Chemistry B, a New Innovator by IEEE-Nanomed, a Rising Star in Cellular and Molecular Bioengineering by the Biomedical Engineering Society (BMES), and the Young Innovator in Cellular and Molecular Bioengineering by BMES. She also received the Outstanding Young Alumna Award from Scripps College, the Young Investigator Award from the Chinese Association for Biomaterials, the Viterbi School of Engineering Junior Research Award, and the Young Investigator Award, Oral Drug Delivery Focus Group from the Controlled Release Society.
- Kelly Sanders (Civil and Environmental Engineering) was promoted to Associate Professor with tenure. She received the NSF Early CAREER Award and was invited to participate in the 2019 EU-US Frontiers of Engineering symposium in Stockholm, Sweden.
- Leana Golubchik (Computer Science) was appointed as Editor-in-Chief of ACM Transactions on Modeling and Performance Evaluation of Computing Systems (ToMPECS). She also celebrated her 10th year as Director of the WiSE Program.
- Andrea Hodge (Chemical Engineering and Materials Science) was awarded the TMS Julia and Johannes Weertman Educator Award. She was also appointed Chair of the Mork Family Department of Chemical Engineering and Materials Science.
- Ellis Meng (Biomedical Engineering) received the 2019 IEEE Sensors Council Technical Achievement Award (Advanced Career).
- Stacey Finley (Biomedical Engineering) was appointed Director of the Center for Computational Modeling of Cancer at USC. She also began as a Standing Member of the Modeling and Analysis of Biological Systems (MABS) NIH Study Section July 1, 2019.
- Maja Mataric (Computer Science) was named an ACM Distinguished Speaker and USC Distinguished Professor.

- Aleksandra Korolova (Computer Science) received an NSF CAREER award and was part of a team selected for the NSF SaTC Frontiers award. She was also named a VMware Research Fellow for "Data Privacy: Foundations and Applications" at the Simons Institute for the Theory of Computing, UC Berkeley.
- Malancha Gupta (Chemical Engineering and Materials Science) was promoted to Full Professor.
- Bistra Dilkina (Computer Science) was promoted to Associate Professor with tenure.
- Nora Ayanian (Computer Science) was promoted to Associate Professor with tenure.

Dornsife College of Letters, Arts and Sciences

- **Susan Forsburg** (Biological Sciences) was named a distinguished lecturer for the American Society of Microbiology and named a USC Distinguished Professor.
- **Carly Kenkel** (Biological Sciences) received the Early-Career Scientist Award from the International Coral Reef Society (ICRS) and was named an ICRS Fellow.
- Geraldine Peters (Physics and Astronomy) was awarded 26 orbits of observing time on the Hubble Space Telescope (HST) in Cycle 27 for a project entitled "The Galactic Abundance Gradient for the Fe Group Elements in Early B Stars". Typically, HST receives 850-1050 proposals for observing time, 10-15% of the proposals are approved, and the orbit allocation is around 10 orbits.
- Anna Krylov (Chemistry) received the American Physical Society's 2020 Earle K. Plyler Prize for Molecular Spectroscopy & Dynamics.
- Elena Pierpaoli (Physics and Astronomy) was awarded the Simons Foundation fellowship for 2019/2020.
- Juhi Jang (Mathematics) was promoted to Full Professor. She was also selected by the Mathematical Sciences Research Institute to be a Chern Professor in mathematical problems in fluid dynamics.
- Smaranda Marinescu (Chemistry) was promoted to Associate Professor with tenure.
- Rosa di Felice (Physics and Astronomy) was awarded tenure.
- Irene Chiolo (Biological Sciences) was promoted to Associate Professor with tenure.
- Jill McNitt-Gray (Biological Sciences) was awarded the inaugural American Society of Biomechanics (ASB) Jean Landa Pytel Award for Diversity Mentorship in Biomechanics.

WiSE Activities

Programming

During the 2019-2020 academic year, the WiSE Program hosted 60+ 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.

This year, WiSE hosted its first Presidential Distinguished Lecture with Dr. Emily Carter, Executive Vice Chancellor and Provost of UCLA on October 7. Planning for a WiSE PhD Research Review Day to coincide with the Annual WiSE Awards Reception was underway when stay-at-home orders were mandated due to COVID-19. The event was canceled. Additionally, a WiSE Assistant Professor Workshop – Early Career Development in STEM – was also postponed. We hope to provide the workshop in the Spring of 2021. WiSE also continued its WiSE Burg Communicating Science Program with funds received from The Anton Burg Foundation in 2018. Events were aimed at PhD students from the departments of Chemistry, Biological Sciences, Chemical Engineering & Materials Science, and Biomedical Engineering. Program offerings included: The Performing Art of Science Presentation half-day workshop, Better Communication Through Improv, Communicating with the Media, Alternative Forms of Communication: Science Comics, and Grant Writing. WiSE will continue the communicating science programming in the 2020-2021 academic year and expand it to include all WiSE-eligible departments.

WiSE continues to provide professional development and networking opportunities for women. During the Fall 2019 and Spring 2020 semester, the WiSE teaching faculty committee organized a monthly seminar series on different teaching topics. The committee, which includes teaching faculty members from both the Dornsife College and Viterbi School of Engineering, selected speakers with the intent of providing and sharing information regarding helpful resources for faculty that teach both undergraduate and graduate courses. These meetings, mainly organized as mini-workshops, were an excellent opportunity for USC faculty to acquire knowledge on campus services and projects, and obtain input and ideas to improve their teaching skills, educational approach and ability to communicate with students. Topics included, Instructional Design, Open Educational Resources through the USC Libraries, and Accessibility: Resources through the Disability Service and Programs Office. The WiSE program sponsored these events, providing logistical support and refreshments, as well as hosting some seminars in the WiSE Suite. The friendly and informal atmosphere of the events facilitated the exchange of information between the speakers and the audience and offered a unique opportunity for teaching faculty to ask questions, to contribute to practical problem solving and to create a networking occasion which was very well received by the participants. The WiSE Teaching Faculty group plans to continue its special topics meetings during the 2020-2021 academic year.

During the 2019-2020 WiSE Undergraduate Research Experience, students had the opportunity to participate in 35 sessions, including:

Event	Date
<i>Fall 2019</i> Graduate Student Guests	September 4, 2019
STEM Bytes Seminar	September 12, 2019
Fellowships and Grants	September 18, 2019
STEM Bytes Seminar	September 24, 2019
Katie McKissick (Beatrice the Biologist)	October 4, 2019
STEM Bytes Seminar	October 9, 2019
Graduate Student Guests	October 15, 2019
STEM Bytes Seminar	October 24, 2019
Faculty Guests	October 30, 2019
STEM Bytes Seminar	November 8, 2019
DJ Kast - Joint Educational Project	November 12, 2019
STEM Bytes Seminar	November 20, 2019
End of Semester Celebration	December 5, 2019



End of Semester Celebration Lunch Pictured (left to right): Emma Rice, Helen Salinas, Jessica Parr (WiSE Undergraduate Research Experience Program Coordinator), Dominie Miyasato, Juwon Lee, Sumedha Attanti, and Ashley Chen.



WiSE Burg Communicating Science: Science Comics Pictured: Katie McKissick (Speaker) and USC students

Event	Date
<i>Spring 2020</i> Identifying & Applying for Summer Research Opportunities	January 15, 2020
STEM Bytes Seminar	January 22, 2020
What to Do on a Grad School Visit	January 31, 2020
STEM Bytes Seminar	February 4, 2020
Graduate Student Guests	February 13, 2020
STEM Bytes Seminar	February 18, 2020
Outreach Opportunities	February 26, 2020
STEM Bytes Seminar	March 6, 2020
STEM Bytes Seminar*	March 25, 2020
Preparing a Research Poster*	March 31, 2020
STEM Bytes Seminar*	April 10, 2020
Ask Ari Walk-through*	April 16, 2020
STEM Bytes Seminar*	April 22, 2020

* Held via Zoom due to mandatory social distancing for the COVID-19 pandemic.



WiSE Burg Communicating Science: The Performing Art of Science Presentation Pictured: Nancy Houfek (Speaker) and USC PhD students



STEM Bytes Seminar Pictured: Parisa Pouya (Speaker) and USC students

Event	Date
<i>Summer 2020</i> Introductions, Summer Plans, and Writing a CV*	June 1, 2020
STEM Bytes Seminar*	June 8, 2020
Writing a Personal Statement*	June 15, 2020
STEM Bytes Seminar*	June 22, 2020
Personal Statement Workshop*	June 29, 2020
STEM Bytes Seminar*	July 6, 2020
Writing a Scientific Abstract*	July 13, 2020
STEM Bytes Seminar*	July 20, 2020
Undergraduate Research Mini-Conference*	July 24, 2020

* Held via Zoom due to mandatory social distancing for the COVID-19 pandemic.



Presidential Distinguished Lecture Series Pictured (left to right): Hanna Reisler, Leana Golubchik, Emily Carter, and Carol Folt

Upon the conclusion of the WiSE Undergraduate Research Experience for WiSE Summer Researchers, WiSE held a virtual mini-conference (7/24/2020) 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 continued to meet on the last Thursday of each month and with faculty feedback, WiSE added an additional networking meeting mid-month during the pandemic. The faculty enjoyed WiSE-hosted lunches at the beginning of the Fall and Spring semesters. In February 2020, WiSE hosted USC Ombudsperson, Dr. Katherine Greenwood. An additional lunch was planned for March 2020 with Provost Zukoski, but it was cancelled due to stay-at-home orders. WiSE plans to reschedule as soon as the possibility arises. The celebration of the annual WiSE Awards Reception was put on hold, but WiSE recognized all award recipients via its online social media channels and on its website.

WiSE Outreach

WiSE continues to issue regular newsletters. In addition, the Program launched the redesigned WiSE website with Provost IT and launched the USCWISE Instagram and Twitter pages. These improvements have been especially helpful during the pandemic.

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.

In February 2020, WiSE sponsored four awards for the Palos Verdes Peninsula Science and Engineering Fair (PVPSEF) for Best Science or Engineering Project in 9th, 10th, 11th and 12th grades. Sarah Feakins (Associate Professor, Earth Sciences) served as a judge and presented the awards on behalf of WiSE.

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 Research Experience, mentoring 33 undergraduate researchers and fellows; she will continue in her role during the 2020-2021 academic year.

The WiSE PhD Advisory Board continued its work on community building for PhD students within WiSE-eligible departments. The Board established a formal mentorship program across WiSE-eligible departments and had 35 pairs of mentors/mentees participate. The Board held 6 professional development sessions during the 2019-2020 academic year. A call for mentors for the 2020-2021 academic year has been sent.

2020 Hanna Reisler Mentorship Award

The 2020 Hanna Reisler Mentorship Award, which recognizes individuals at USC who have advanced the careers of women in science and engineering through generous and committed professional mentorship, was awarded to **Megan McCain**, Assistant Professor of Biomedical Engineering, and to **Trina Gregory**, Senior Lecturer in Viterbi's Information Technology Program, to recognize their exceptional mentoring of students.

2020 Leadership Award for Students and Postdoctoral Scholars

The 2020 Leadership Award for Students and Postdoctoral Scholars, which recognizes exceptional students and postdoctoral scholars at USC who are making a positive difference in their scholarly community, was presented to Sophia Plata, PhD candidate in the Department of Civil and Environmental Engineering (Advisor Amy Childress).

WiSE Students and Postdoctoral Scholars Achievements

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

- Ksenia Bravaya (Chemistry, previous Postdoctoral Scholar, Advisor Anna Krylov) received a Sloan award and was promoted to Associate Professor with tenure at Boston University.
- Shirin Faraji (Chemistry, previous Postdoctoral Scholar, Advisor Anna Krylov) was inducted into the Young Academy of Groningen.
- **Connie Zhang** (Computer Science, PhD Student, Advisor Nora Ayanian) was awarded an NSF Fellowship and was part of a team that won the USC Viterbi Min Family Challenge.
- **Ryley Collins** (Earth Sciences, PhD Student, Advisor Emily Cooperdock) was awarded a student research grant from the Society of Economic Geologists for her PhD research.
- Hyejung (Hazel) Lee (Earth Sciences, Former PhD Student, Advisor Sarah Feakins) took a position as a Scientist at Beyond Meat.
- Deborah Chin (Biomedical Engineering, PhD Student, Advisor Eun Ji Chung) received the BMES Career Development Award and 3rd place in STEM oral talks at the USC Graduate Research Symposium.
- Maria Ruggeri (Biological Sciences, PhD Student, Advisor Carly Kenkel) received the Wrigley Bertics Fellowship.
- Alina Garcia Taormina (Chemical Engineering and Materials Science, PhD Student, Advisor Andrea Hodge) was awarded the SHPE Technical Achievement and Recognition (STAR) Award for Graduate Student Role Model.

- **Chelsea Appleget** (Chemical Engineering and Materials Science, PhD Student, Advisor Andrea Hodge) received the NASA Space Technology Research Fellowship and secured a position at Aerospace Corporation as a member of the technical staff (Senior Thin Films Scientist).
- Xuechun Wang (Biomedical Engineering, PhD Student, Advisor Ellis Meng) won an ARCS Scholarship for 2019-2020.
- Qianhui Wu (Biomedical Engineering, PhD Alumna, Advisor Stacey Finley) began a full time position at Scientist at Takeda Pharmaceuticals in June 2020.
- Sara Rivero-Calle (Biological Sciences, PhD Alumna, Advisor Naomi Levine) took a tenure-track position at the University of Georgia.
- Erin McParland (Biological Sciences, PhD Alumna, Advisor Naomi Levine) started as a Postdoctoral Scholar at the Woods Hole Oceanographic Institution in August 2019.

In addition, current and recent WiSE undergraduates continue to show promise as emerging researchers and leaders.

- Catherine Knox (CEE, Undergraduate Alumna, Advisor Amy Childress) received a Fulbright grant for graduate study at Vrije University in the Netherlands.
- Samantha McVety (CEE, Undergraduate Alumna, Advisor Amy Childress) received the NSF GRFP and is attending graduate school at Stanford University.
- Margot Meldefontenay (Biomedical Engineering, Undergraduate, Advisor Eun Ji Chung) won best poster at the 2019 Undergraduate Symposium for Scholarly and Creative Work.
- Kayley Cheng (Biomedical Engineering, Undergraduate Alumna, Advisor Eun Ji Chung) took a position at Medtronic.
- **Sampreeti Chowdhuri** (Biomedical Engineering, Undergraduate Alumna, Advisor Eun Ji Chung) is currently in medical school at Columbia University, College of Physicians and Surgeons.
- **Connie Machuca** (Biological Sciences, Undergraduate Alumna, Advisor Carly Kenkel) received a NOAA Center for Coastal and Marine Ecosystems graduate fellowship to begin her MSc work at CSU Monterey Bay.
- Alexandra Stella (Biological Sciences, Undergraduate Alumna, Advisor Carly Kenkel) will be starting a MSc at Moss Landing Marine Labs in the fall of 2020.
- Maiah Gaines-Richardson (Biological Sciences, Undergraduate, Advisor Carly Kenkel) received the Provost's research fellowship for spring 2020.

- **Collette Gordon** (Chemistry, Undergraduate, Advisor Megan Fieser) and Yvonne Manjarrez (Chemistry, PhD Student, Advisor Megan Fieser) were part of the team that won first place in the Wrigley Sustainability Prize Finals Showcase. Manjarrez was also named a 2020 Wrigley Institute Sonosky Summer Fellow.
- Janeline Wong (Biomedical Engineering, Undergraduate Alumna, Advisor Ellis Meng) was selected to bear the BME department banner for commencement.
- Ariella Simoni (Biomedical Engineering, Undergraduate, Advisor Stacey Finley) was accepted into the Summer Research Experience for Undergraduates at USC, summer 2020.
- Roxanna Pakkar (Electrical and Computer Engineering, Undergraduate Alumna, Advisor Maja Mataric) received the USC Ming Hsieh Department of Electrical and Computer Engineering's Outstanding Undergraduate Senior Award and the USC Order of Arete Award. She also received 1st Prize at the Undergraduate Symposium in Digital Media.
- Sydney Feldman (Physics and Astronomy, Undergraduate Alumna, Advisor Elena Pierpaoli) is starting graduate school at UCLA in fall 2020.

Advancement

WiSE continued work on its industrial partnership model by collaborating with the Viterbi, Dornsife and University Corporate & Foundation Relations teams to execute the plan laid out for 2020. WiSE-hosted tech talks with Goldman Sachs and Wal-Mart and continues to build relationships with both companies. We were able to secure partnerships with Cisco Systems and Qualcomm to provide funding for 16 PhD top-off fellowships. Students who receive these top-offs will participate in a series of programming during the 2020-2021 academic year that includes topics on communication, job preparedness, entrepreneurship, business acumen and conflict resolution. We are continuing to meet one-on-one with companies to build relationships and gauge interest in participation.

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



Raffaella Ghittoni, Assistant Professor of Biological Sciences (Teaching) in the Dornsife College of Letters, Arts and Sciences serves as the WiSE Teaching Faculty Coordinator. She began this role in 2020.

WiSE Advisory Board

The WiSE Advisory Board met once in the fall semester and twice in the spring semester during the 2019-2020 academic year (10/1/2019, 2/11/2020, and 4/21/2020) 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 2019-2020 academic year, the Board devoted attention to different topics that included celebrations and fundraising, childcare, faculty recruitment, and raising the profile of WiSE. As always, the Board remains dedicated to mentorship, as it is key to all WiSE endeavors.

WiSE began the year with the joint goals of celebrating WiSE's 20th anniversary and kickstarting an Industry Partnership Program with the help of University Leadership and Advancement. As in academia, there are too few woman in leadership positions in industry. The long-term goal of this Program is to remedy this situation by developing programming, support, and contacts for young and talented women. Although still in early stages, and held back by current circumstances, WiSE was able to enlist Qualcomm and Cisco Systems as partners.

Unfortunately, the WiSE 20th Anniversary Celebration planned for Fall 2020 had to be canceled. WiSE is currently planning a virtual celebration for October, which will offer social events, alumni talks and networking opportunities.

WiSE continues to advocate for ample, quality child care. While the pandemic created a host of new challenges for working parents, WiSE worked with the Viterbi School of Engineering and the Dornsife College of Letters, Arts and Sciences to find solutions. With the support of the Provost's Office, WiSE initiated a temporary expansion of its Child Care Assistance Program to support faculty while working from home with children. The program will be in effect during the 2020-2021 academic year.

During the 2019-2020 recruitment season, WiSE helped add one new woman to the tenure-track faculty, bringing the total number to seventy. Despite recent successes, our numbers remain below the national average in many disciplines. The Board recommended that WiSE continue to work with department chairs in WiSE-eligible departments to help implement policies that promote diversity.

This past year WiSE expanded the Communicating Science Program that was initiated with an award from the Anton Burg Foundation in 2018. During the 2019-2020 academic year, the program was open to PhD students in the departments of Biological Sciences, Chemistry, Biomedical Engineering and Chemical Engineering and Materials Science. This upcoming year, WiSE will offer participation in the program to PhD students in all WiSE-eligible departments.

WiSE also continues to host its STEM Bytes seminar series, which is geared to introduce undergraduates to research and encourage them to join laboratories. Next year, the Program aims to reinstate other events such as the WiSE Research Symposium. Further, the WiSE Teaching Faculty Group organized symposia devoted to improving education, and hosted a series of seminars on navigating online teaching in STEM, and about other special topics that will continue next year.

Finally, mentorship is key to the growth and strength of the WiSE community. Hanna Reisler continues to lead the faculty networking group. In these difficult times, the group now meets biweekly rather than monthly, scheduled during time slots to coordinate with the demands of fulltime childcare in the home. While plans for formal faculty mentorship workshops were put on hold due to the pandemic, senior WiSE faculty remain available to assist their junior colleagues. In addition, the PhD advisory board had great success with their program of matching incoming graduate students with senior students; there were 35 mentor/mentee pairs this past year. Additionally, Jessica Parr, who leads undergraduate research initiatives yearlong, was successful in organizing this past summer's session by remote participation.

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

2019-2020 WiSE Advisory Board Members



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 Assistant Professor (Teaching), Biological Sciences USC Dornsife College of Letters, Arts & Sciences



Leana Golubchik (Ex-officio, WiSE Director) Stephen and Etta Varra 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.

2019-2020 WiSE PhD Advisory Board Members



Eun Ji Chung (Faculty Mentor) Assistant Professor Biomedical Engineering USC Viterbi School of Engineering



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



Nina Yang (President, Mentorship Committee) PhD Candidate, Marine and Environmental Biology USC Dornsife College of Letters, Arts & Sciences



Megan Franke (Secretary, Culture Committee) PhD Student, Computational Biology USC Dornsife College of Letters, Arts & Sciences



Emily Reed (Mentorship Committee) PhD Student, Electrical Engineering USC Viterbi School of Engineering



Angineh Zohrabian (Mentorship Committee) PhD Candidate, Civil and Environmental Engineering USC Viterbi School of Engineering



Kylie Trettner (Culture Committee) PhD Student, Chemical Engineering USC Viterbi School of Engineering



Sarah Cooney (Culture Committee) PhD Candidate Computer Science USC Viterbi School of Engineering

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.

2019-2020 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



Suzanne Edmands Gabilan Distinguished Professor of Science and Engineering and Professor of Biological Sciences USC Dornsife College of Letters, Arts & Sciences



Joshua West Wilford and Daris Zinsmeyer Early Career Chair in Marine Studies and Associate 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 15, 2019	8	6
Undergraduate Research, Spring	December 2, 2019	7	7
Graduate Merit	April 17, 2020	2	2
Graduate Top-Off	March 3, 2020	10	5 (8 offered)
Undergraduate Research, Summer	April 1, 2020	3	3

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.

2019-2020 WiSE Viterbi Committee Members



Malancha Gupta (Chair) Gabilan Distinguished Professor of Science and Engineering and Professor of Chemical Engineering & Materials Science USC Viterbi School of Engineering



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



Aleksandra Korolova WiSE Gabilan Assistant Professor of Computer Science USC Viterbi School of Engineering



Sze-Chuan Suen WiSE Gabilan Assistant Professor of Industrial and Systems Engineering 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/ Nominations	Number of Awards
Undergraduate Research, Fall	May 15, 2019	3	3
Undergraduate Research, Spring	December 2, 2019	9	9
Graduate Merit	April 17, 2020	2	2
Graduate Top-Off	March 3, 2020	5	2 (5 offered)
Undergraduate Research, Summer	April 1, 2020	6	5

New Faculty



Victoria Stodden will be joining the faculty of Industrial and Systems Engineering from her current position as Associate Professor in the School of Information Sciences at the University of Illinois at Urbana Champaign, with affiliate appointments in the School of Law, the National Center for Supercomputer Applications, and the Departments of Computer Science and Statistics.

She received a Ph.D. in Statistics from Stanford University and a Law Degree

from Stanford Law School. She graduated magna cum laude with her Bachelor's in Economics from the University of Ottawa and holds a Master's degree in Economics from the University of British Columbia. She held the Kauffman Innovation fellowship at Yale Law School and was a Berkman Klein fellow at Harvard Law School. Stodden is an internationally recognized leader in improving the reliability of scientific results in the face of increasingly sophisticated computational approaches to research: understanding when and how inferences from data are valid and reproducible, what it means to have replicated a result, the design and implementation of scientific validation systems, standards of openness and transparency for data and code sharing, and resolving legal and policy barriers to disseminating reproducible research. In 2009, she won the Access to Knowledge Kaltura prize for her publication on legal issues in reproducible research and scientific innovation. She has served on the National Academies of Science, Engineering, and Medicine committees: "Reproducibility and Replication in Science" and "Fostering Research Integrity." She is a former co-chair of the National Science Foundation Advisory Committee for Cyberinfrastructure and was a member of the National Science Foundation Directorate for Computer and Information Science and Engineering (CISE) Advisory Committee. She has been quoted in The Economist (2013) and interviewed by publications such as Nature (2016) on reproducibility in science. She testified on scientific reproducibility before the Congressional House Committee on Science, Space and Technology for the March 5, 2013 hearing on Scientific Integrity & Transparency.

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 2019-2020 academic year WiSE awarded WiSE Gabilan Assistant Professorships to one current faculty member.

Sze-Chuan Suen | Epstein Department of Industrial & Systems Engineering | USC Viterbi

Formal Program Awards

Program	Number of Awards
Faculty Recruitment / Faculty Retention	19
Major Support for Current Faculty	1
WiSE Gabilan Assistant Professorship	1
WiSE Gabilan Distinguished Professorship	6
Lloyd Armstrong, Jr. Chair	1
Support for Facilitating Diversity in Faculty Searches	6
Faculty Bridge Funding	0
Supplemental Faculty Support	24
Merit Award for Excellence in Postdoctoral Research	0
Graduate Top-Off Awards	7
Merit Fellowships for Current PhD	5
Travel Grants	42
Undergraduate Research Grants	30
Child Care Subsidies	6
Support for Faculty Pregnancy, Childbirth, and Adoption	0
Support for PhD. and Postdoc Pregnancy, Childbirth, and Adoption	1
WiSE Leadership Award for Students and Postdoctoral Scholars	1

Discretionary Awards

In addition to its formal suite of programs, costs were incurred in support of program activities (such as receptions, supporting a cohort of new assistant professors, lecturers, website maintenance, etc.) and administrative expenses, WiSE also awarded several discretionary grants to support activities that work toward the goal of increasing the representation of women in science and engineering. In 2019-2020, these awards included:

Groups	Purpose
Women in Chemical Engineering	To support the annual activities of the networking and professional development group among women students in Chemical Engineering.
Women in Chemistry	To support the annual activities for women postdocs and PhD students in the Department of Chemistry.
Young Researchers Program	To support a summer research experience devised and executed by USC graduate students for USC-area high school students in the sciences.
Charlotte's Web (Women in Math)	To support the annual activities of the networking and professional development group among women students in the Department of Mathematics.
WiSE PhD Advisory Board	To support the annual professional development and mentorship activities organized by the WiSE PhD Advisory Board.

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

USC Dornsife College of Letters, Arts & Sciences

Life Sciences

Professor	Biological Sciences (Neuro)
Professor	Biological Sciences (MEB)
Professor & President	Biological Sciences
Professor	Biological Sciences (MCB)
Professor	Biological Sciences (Neuro)
Professor	Biological Sciences (Neuro)
Professor	Biological Sciences (HEB)
Professor	Biological Sciences (HEB)
Associate Professor	Biological Sciences (MCB)
Associate Professor	Biological Sciences (MCB)
Associate Professor	Biological Sciences (MEB)
Assistant Professor	Biological Sciences (MEB)
Assistant Professor	Biological Sciences (MEB)
Assistant Professor	Biological Sciences (MCB)
Assistant Professor	Biological Sciences (HEB)
	Professor Professor & President Professor & President Professor Professor Professor Professor Associate Professor Associate Professor Associate Professor Assistant Professor Assistant Professor Assistant Professor Assistant Professor Assistant Professor

Physical Sciences / Mathematics

Susan Friedlander	Professor	Mathematics
Heidi Houston	Professor	Earth Sciences
Juhi Jang	Professor	Mathematics
Anna Krylov	Professor	Chemistry
Jia Grace Lu	Professor	Physics & Astronomy
Amber Miller	Professor & Dean	Physics & Astronomy
Susan Montgomery	Professor	Mathematics
Elena Pierpaoli	Professor	Physics & Astronomy
Hanna Reisler	Professor	Chemistry
Sami Assaf	Associate Professor	Mathematics
Rosa di Felice	Associate Professor	Physics & Astronomy
Sarah Feakins	Associate Professor	Earth Sciences
Smaranda Marinescu	Associate Professor	Chemistry
Greta Panova	Associate Professor	Mathematics
Emily Cooperdock	Assistant Professor	Earth Sciences
Megan Fieser	Assistant Professor	Chemistry
Vera Gluscevic	Assistant Professor	Physics & Astronomy

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	Computer Science
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
Maja Matarić	Professor	Computer Science
Ellis Meng	Professor	Biomedical Engineering
Urbashi Mitra	Professor	Electrical Engineering
Mahta Moghaddam	Professor	Electrical Engineering
Alice Parker	Professor	Electrical Engineering
Nora Ayanian	Associate Professor	Computer Science
Bistra Dilkina	Associate Professor	Computer Science
Stacey Finley	Associate Professor	Biomedical Engineering
Mercedeh Khajavikhan	Associate Professor	Electrical Engineering
Yan Liu	Associate Professor	Computer Science
Michelle Povinelli	Associate Professor	Electrical Engineering
Kelly Sanders	Associate Professor	Civil and Environmental Engineering
Katherine Shing	Associate Professor	Chemical Engineering & Materials Science
Victoria Stodden	Associate Professor	Industrial and Systems Engineering
Ananya Renuka Balakrishna	Assistant Professor	Aerospace and Mechanical Engineering
Heather Culbertson	Assistant Professor	Computer Science
Eun Ji Chung	Assistant Professor	Biomedical Engineering
Dina El-Damak	Assistant Professor	Electrical Engineering
Aleksandra Korolova	Assistant Professor	Computer Science
Megan McCain	Assistant Professor	Biomedical Engineering
Maral Mousavi	Assistant Professor	Biomedical Engineering
Feifei Qian	Assistant Professor	Electrical Engineering
Maryam Shanechi	Assistant Professor	Electrical Engineering
Shaama Sharada	Assistant Professor	Chemical Engineering & Materials Science
Sze-Chuan Suen	Assistant Professor	Industrial and Systems Engineering
Jennifer Treweek	Assistant Professor	Biomedical Engineering
Alejandra Uranga	Assistant Professor	Aerospace and Mechanical Engineering
Phebe Vayanos	Assistant Professor	Industrial and Systems Engineering
Renyuan Xu	Assistant Professor	Industrial and Systems Engineering
Cristina Zavaleta	Assistant Professor	Biomedical Engineering

Appendix 2: Faculty Candidates Interviewed On Campus

As in previous years, WiSE leadership offered to meet with women 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 24 faculty candidates over the course of 2019-2020. The list of candidates is below:

Malisa Orta	Computer Science	December 5, 2019
Jackie Chen	Aerospace and Mechanical Engineering	December 5, 2019
Ruoxuan Xiang	Industrial and Systems Engineering	January 14, 2020
Marine Carpuat	Computer Science	January 14, 2020
Alexandra Kingston	Biological Sciences, MEB	January 15, 2020
Junyu Cao	Industrial and Systems Engineering	January 23, 2020
Nanyun (Violet) Peng	Computer Science	January 23, 2020
Hanna Yevick	Physics and Astronomy	January 28, 2020
Bushra Raj	Biological Sciences, MCB	January 28, 2020
Allie Graham	Biological Sciences, MEB	January 29, 2020
Victoria Stodden	Industrial and Systems Engineering	January 30, 2020
Leslie Babonis	Biological Sciences, MEB	February 6, 2020
Margarida Cardoso Moreira	Biological Sciences, MCB	February 13, 2020
Crystal Chu	Chemical Engineering and Materials Science	February 13, 2020
Yimin Luo	Chemical Engineering and Materials Science	February 19, 2020
Lili Su	Computer Science	March 9, 2020
Claudia Loebel*	Biomedical Engineering	March 13, 2020
Farnaz Behrang*	Computer Science	March 25, 2020
Sixian You*	Electrical and Computer Engineering	March 30, 2020
Bahara Mirzasoleiman*	Computer Science	March 31, 2020
Yasaman Ghasempour *	Electrical and Computer Engineering	April 1, 2020
Tegan Brennan*	Computer Science	April 2, 2020
Yiting Xia*	Computer Science	April 14, 2020
Hoda Heidari*	Computer Science	April 16, 2020

* Conducted via Zoom

Appendix 3: Samples of WiSE Events Flyers



WISE UNDERGRADUATE PROGRAMMING

SPRING 2020

DATE	EVENT	TIME	LOCATION	
Wednesday, January 15	Identifying and Applying for Summer Research Opportunities	12 - 1 pm	DRB 232	
Wednesday, January 22	STEM Bytes Seminar	12 - 1 pm	DRB 232	
Friday, January 31	What to Do on a Grad School Visit	12 - 1 pm	DRB 232	
Tuesday, February 4	STEM Bytes Seminar	12 - 1 pm	DRB 232	FOLLOW US
Thursday, February 13	Graduate Student Guests	12 - 1 pm	MCB 102	
Tuesday, February 18	STEM Bytes Seminar	12 - 1 pm	DRB 232	@USCWISE
Wednesday, February 26	Outreach Opportunities	12 - 1 pm	DRB 232	CONTACT US
Friday, March 6	STEM Bytes Seminar	12 - 1 pm	DRB 232	Email:
Thursday, March 12	Preparing a Research Poster	12 - 1 pm	DRB 232	wiseprog@usc.edu
Wednesday, March 25	STEM Bytes Seminar	12 - 1 pm	DRB 232	Phone: (213) 740-0996
Tuesday, March 31	Faculty Guests	12 - 1 pm	DRB 232	Website: wise.usc.edu
Friday, April 10	STEM Bytes Seminar	12 - 1 pm	DRB 232	
Thursday, April 16	Career Services Offices Viterbi and Dornsife	12 - 1 pm	DRB 232	
Wednesday, April 22	STEM Bytes Seminar	12 - 1 pm	DRB 232	USC University of Southern California

USC WOMEN IN SCIENCE & ENGINEERING

STEM BYTES SEMINARS Summer 2020 | 12:00 pm - 1:00 pm PT | Join us on Zoom

Monday, June 8



Christine Cheng

Christine Cheng is a PhD student in Chemical Engineering and president of the Materials Research Society chapter at USC. She works with Professor Malancha Gupta, and her research has focused on polymer materials and thin film coatings.

Abstract: Tuning surface properties of materials enhances their capabilities, but conventional surface modification methods are typically solvent-based and environmentally damaging. This work discusses environmentally-friendly, vapor-phase coating processes and aims to bridge the disparity between bench-scale research and industrial-scale processing.



Jaclyn Pittman

Jaclyn Pittman is a PhD student in the USC Department of Earth Sciences, working with Professor Will Berelson. Her research involves learning how deep ocean mud is responding to anthropogenic climate change, specifically how calcium carbonate (the mineral that makes up corals) dissolves under more acidic conditions.

Talk: "What can ocean mud tell us about climate change?"

Abstract: The effects of climate change, and specifically ocean acidification, have reached the depths of the seafloor. I am building a robotic device that descends to the bottom of the ocean to learn more about how deep-sea sediments are responding to anthropogenic climate change.



Dr. Gene J. Yu

Dr. Gene J. Yu is a postdoctoral research scholar working for Dr. Theodore. W. Berger in the Center of Neural Engineering at USC. He received his PhD in Biomedical Engineering at USC in 2019. As part of the HTE program, Dr. Yu was a 1st place prize winner in the Masseh Entrepreneurial Prize Competition in 2015.

 Talk: "A full-scale, computational neuronal network model of rat hippocampus: Biomedical applications"

Abstract: We have developed a computational platform for simulating the full-scale, in terms of numbers of neurons and synapses and the geometric volume, of a rat hippocampus. This platform further incorporates chemical and electrical modeling to explore the interactions between drugs and electricity on neural biology and function.



Monday, June 22

Amrutha Nadarajan

Amrutha Nadarajan is an Electrical Engineering PhD student working in Machine Learning and Speech Processing. She designs algorithms to extract patterns from audio data, wearable biobehavioural data and big data. She worked on the Amazon Alexa audio algorithms team and Disney Research speech team to develop real time algorithms for speech tasks. She is currently heading the speech team for MOSAIC TILES.

Talk: "How to tame big data?"

Abstract: Advances in wearable sensing has made large scale data collection in naturalistic evironments possible. Analyzing and extracting meaningful patterns from this big data, however, can be a difficult endeavour. Case in point - collecting and analyzing large scale behavioral data as part of TILES study.

Monday, July 6



Valerie Thomas

Valerie Thomas, Molecular Biology PhD student, is working under the guidance of Dr. Le Trinh and Dr. Scott Fraser in the Translational Imaging Center at USC. She is interested in understanding how interactions between transcription factors, chromatin and target gene expression control vertebrate heart development in zebrafish.

 $\mbox{Talk:}$ "How to make hearts glow: Zebrafish transgenesis for the study of cardiac development"

Abstract: Fluorescent proteins introduced into zebrafish embryos through transposonbased transgenesis techniques have enabled isolation of specific cell types of interest through Fluorescence-Activated Cell Sorting (FACS), permitting interrogation of molecular pathways specific to targeted developmental processes. The lateral plate mesoderm is an embryonic tissue from which cardiac progenitors, a rare population of cells that give rise to the heart, develop. However, there are limited fluorescent reporters enabling the study of this cell type. Here, we introduce an enhancer that permits fluorescent labeling of the lateral plate mesoderm in the zebrafish embryo, and creation of a transgenic animal for molecular analysis of cardiac progenitor differentiation.



Amanda Meyer

Amanda Meyer is a Molecular Biology PhD student in the McMahon lab. She is highly interested in computational biology and the applications of big data to answer complex biological questions. She has been working in research for 5 years and is currently working on a project aiming to identify interorgan communication networks in a systematic manner.

Talk: "Identifying inter-organ communication networks via proximity labeling"

Abstract: Proximity labeling is a new technology that allows us to tag and track proteins within the vicinity of a promiscuous biotin ligase. Tagged proteins are secreted to target tissues where they are identified via the biotin tag. This allows us to identify new signals originating in one system and traveling to a new tissue.



USC WOMEN IN SCIENCE & ENGINEERING

STEM BYTES SEMINARS

Summer 2020 | 12:00 pm - 1:00 pm PT | Join us on Zoom

Monday, July 20



Shoujie Chai

Shoujie Chai is a Molecular Biology PhD student from the CSI-Cancer Institute, working on cancer liquid biopsy. With the goal of improving patient outcomes, he mainly focuses on molecular deconvolution of circulating tumor cells in advanced prostate cancer.

Talk: "Liquid biopsy in advanced prostate cancer"

Abstract: Single-cell multi-omics deconvolution of circulating/metastatic tumor cells for predicting and monitoring treatment response in advanced prostate cancer from two perspectives:

o Clinical utility of liquid biopsy for precision medicine

o Integrative cancer data analysis for mathematical oncology



Elizabeth Ondula

Elizabeth Ondula, PhD student in Computer Science, spends a lot of her time thinking, designing and building artificial agents running on computational tools. She hopes these theoretical agents will one day be applicable to addressing social infrastructure challenges in emerging markets.

Talk: "Self-Programmable RL Agents for Tracking Bot Followers and Followings"

Abstract: Programmable devices are often used as educational tools to enhance soft skills, technical 'know how', problem solving or critical thinking skills. These tools, often existing as hardware known to scale at a very slow rate with increasing demand for interactive learning tools. In this talk an overview of social engineering attacks on social media will be provided in addition to how such "attack" styles can be adopted by reinforcement learning algorithms to dynamically rank content based on user "lost" human connection.



Monday, August 3

Danielle E. White

Danielle E. White is a Mechanical Engineering PhD student with a focus in Materials Design. Originally from Lynn, Massachusetts, she earned her B.S. in Mechanical Engineering from North Carolina Agricultural and Technical State University.

Karina Hemmendinger

Karina Hemmendinger is a PhD student in

Mechanical Engineering. She is a part of the

Hodge Materials Nanotechnology Research

Group with research interests in advanced

materials characterization, grain boundary

engineering and corrosion.

Talk: "Grain Boundary Engineered Aluminum-Magnesium Alloys"

Abstract: Examining the link between a material's microstructure and its

Talk: "Optimizing Optical Nanomultilayers"

Abstract: Nanomultilayers are a group of composite materials with layers only nanometers thick. Those with optical applications must have optimized parameters to impact both transparency and mechanical response (i.e. individual layer thickness, number of bilayers, material selection, etc.).

Kiersten Formoso

Kiersten Formoso is a vertebrate paleontology PhD student in USC's Earth Sciences department and a Graduate Student-in-Residence at the Natural History Museum of Los Angeles County. She is from New Jersey and received her bachelor of science degree in ecology and evolution from Rutgers University.

Talk: "Examining terrestrial vertebrate posture and its controls on the evolution of secondarily aquatic amniotes"

Abstract: Secondarily aquatic amniotes, which include animals like whales, seals and sea lions, manatees, and various extinct marine reptiles like mosasaurs, plesiosaurs, and ichthyosaurs all have land-dwelling ancestors with different limb postures. Mammals have an upright posture with their limbs underneath their body, and many reptiles have a sprawling posture with their limbs splayed out to the sides. My PhD project is exploring the different ways each posture controls evolution to an aquatic environment.



Karla Abuyen

Karla Abuyen is a Molecular Biology PhD student in the El-Naggar Biophysics lab. Her research involves studying bacteria that can oxidize or reduce minerals for cellular energy gain.

Talk: "Investigation on biochemical mechanisms underlying iron management in iron-oxidizing bacteria"

Abstract: Our understanding of extracellular electron transfer (EET) process has been mainly focused on conduits that mediate outward EET from iron-reducing bacteria to solids. The reverse process of inward EET into cells is comparatively not well understood. In filling this knowledge gap investigations on iron-oxidizing bacteria (FeOB) more specifically (1) the putative iron oxidase, Cyc2, a fused porincytochrome and (2) how neutrophilic FeOB avoid iron encrustation and control the directed formation of the complex iron oxide, will contribute to a more comprehensive description of the ecophysiology of FeOB.

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properties, with a focus on the nanoscale.



For any questions and/or concerns, please contact WiSE marketing assistant, Marie Meneses, at **marieste@usc.edu**.

Monday, July 27

SAVE THE DATE

WISE 20TH Anniversary Celebration

OCTOBER 26 - 30, 2020

Virtual social events. Talks from alumni. Itinerary to come.

Navigating graduate research and academics during COVID-19

The WISE PhD Advisory Board is hosting a panel discussion and Q&A with faculty from Viterbi and Dornsife to discuss graduate research and academics during COVID-19.

Faculty Panel

Naomi Levine, Biological Sciences, Earth Sciences Emily Cooperdock, Earth Sciences Megan Fieser, Chemistry Sami Assaf, Mathematics Eun Ji Chung, Biomedical Engineering Kelly Sanders, Civil and Environmental Engineering



Join via Zoom

WISE UNDERGRADUATE RESEARCHERS: MINI-CONFERENCE

SAVE THE DATE

USC WOMEN IN SCIENCE AND ENGINEERING



Talk titles and abstracts will be announced early next week.

FRIDAY, JULY 24 9:30 AM - 12:00 PM PT ZOOM

- OPEN TO ALL USC STUDENTS, STAFF, AND FACULTY -

REGISTER HERE: TINYURL.COM/WISEMINICONFERENCE

Appendix 4: WiSE Presidential Distinguished Lecture



Emily Carter (Speaker)

Pictured (left to right): Hanna Reisler (Moderator) and Emily Carter

Reception



Attendees of lecture



Attendees of lecture



Attendees of lecture



Attendees of lecture

Appendix 5: WiSE Undergraduate Researcher Mini-Conference

WiSE Undergraduate Summer Research Mini-Conference



Friday, July 24th, 2020 9:30 am - 12:00 pm

Schedule

9:30 - 9:35	Introductory Remarks
9:35 – 9:50	Sarah Schaefer
	Professor Cristina Zavaleta
9:50 - 10:05	Collette Gordon
	Professor Megan Fieser
10:05 - 10:20	Lydia Cardwell
	Professor Maral Mousavi
10:20 - 10:35	Angie Shao
	Professor Gary Rosen
10:35 - 10:45	Break
10:45 – 11:00	Ruby Sekhon
	Professor Jaykanth Ravichandran
11:00 – 11:15	Dottie Yu
	Professor Leonardo Morsut
	Professor Paul Bogdan
11:15 – 11:30	Louise Lu
	Professor David Z. D'Argenio
11:30 - 11:45	Adriane Tam
	Professor Travis Williams
11:45 - 12:00	Closing Remarks
	0

Searching for Gold: Using Nanoparticles for Improved Cancer Cell Detection

Sarah Schaefer, Professor Cristina Zavaleta

When it comes to cancer research, there has been an overwhelming need to improve cancer diagnostics and treatments. A promising method of making such improvements involves cancer imaging, specifically establishing nanoparticle contrast agents capable of achieving multiplexed imaging. Such nanoparticles would have biomarkers on their surface that bind to molecules known to be overexpressed on cancer cells. For example, these nanoparticles could target the epidermal growth factor receptor (EGFR), which is commonly associated with breast cancer. In addition to biomarkers, these nanoparticles would also have reporter molecules that enable multimodal imaging via methods including fluorescence, Raman spectroscopy, or even CT imaging. Thus far, multimodal nanoparticles are still in development. This research has specifically focused on utilizing surface-enhanced Raman spectroscopy (SERS) with nanoparticles. Surface-enhanced Raman spectroscopy depends on the adsorption of a Raman reporter molecule to a metallic surface, like that of a gold nanoparticle. This adsorption then intensifies the narrow SERS peaks associated with that specific Raman reporter, making SERS gold nanoparticles ideal for multiplexed imaging. This research has primarily involved extensive literature research into current SERS nanoparticle fabrication methods in Dr. Zavaleta's lab and the value of SERS imaging to future multiplexing capabilities, as well as additional types of SERS nanoparticles that are not currently being made in Dr. Zavaleta's lab. This literature research has brought about a potential future research project – creating a single gold nanoparticle capable of both fluorescent and SERS imaging. Creating this kind of nanoparticle would bring the medical imaging field one step closer to the ideal multiplexed nanoparticle contrast agent.

Novel Gloved-Based Microtear Detection System

Lydia Cardwell, Professor Maral Mousavi

As research to alleviate the COVID-19 pandemic progresse, BSL (Biosafety Level) II- IV labs maintain an essential role in developing tests, treatments, and vaccines for the novel coronavirus. Incidents of safety measure failures in such labs have led to public concern about the security of such facilities, causing affected communities to protest the construction of laboratory sites (Eaves 2020). Additionally, systematic review has shown that worker infection in laboratories often correlates with more extreme cases and abnormal disease progression (Pedrosa 2011). Consequences of BSL safety breaches can be far-reaching and pose a threat to public health.

Thus, the following project seeks to provide additional safeguards that integrate smoothly with existing laboratory equipment. This will be achieved via a novel sensor system that indirectly detects microtears in the gloves used by staff in BSL III labs. As remote research remains the safest option in the face of the ongoing novel coronavirus pandemic, work thus far has focused on developing a literature review and identifying a potential analyte for sensor detection. In particular, the substances used by the CDC to culture cells for the growth of SARS-CoV-2 viruses, such as DMEM (Dulbecco minimal essential medium) or Gibco antibiotic-antimycotics, have a particular potential and relevance as analytes (Harcourt et al, 2020). In the future, remote research will focus on the development of the alerting component of the system and interviews with clinicians. Ideally, future in-person work will consist of the design and testing of the necessary assays to create the sensor component.

Magnifying Plastics

Collette Gordon, Professor Megan Fieser

As our society faces a global pandemic, plastic pollution now, more than ever is a pressing issue that we need to solve in our community and globe. The accumulation of plastics in the streets, landfill, oceans, and globe call for a more sustainable plastic that can reduce our plastic footprint. However, sustainable plastic is not enough. Improved plastic collection and recycling, increased public awareness of plastic pollution, and solutions to plastic pollution are vital steps that need to be taken.

My research in the Fieser Lab has helped address these challenges both in and out of the laboratory. I have recently been focused on synthesizing rare-earth metal catalysts are aimed to facilitate the synthesis of a wide range of degradable plastics with different properties. My work to synthesize ketoimine ligands to stabilize these complexes, as well as my future plans to synthesize the target metal complexes will be discussed.

Due to the current research conditions for undergraduates, I have devoted my time to design a website that will educate the public about plastic pollution, recycling guidelines, and education on how to know if a product is a good replacement. Initially, my research focused on compiling as much information as possible, which then will be consolidated to clear messages to be communicated on the website. I aim to communicate about plastic packaging today, including current plastic products on the market, the applicability to our daily lives, potential health threats, and governmental action that has been taken against them. Along with a strong platform of plastic packaging, I researched the plastic pollution problem in our country and globe to better understand where our plastic waste ends up. The Fieser Lab strives to communicate how our daily actions lead to plastics (both bulk items and microplastics) in our environment. In addition to my research focus on plastic pollution, I also researched solutions to plastic pollution namely recycling techniques that are used on a national level including industrial recycling, curbside recycling, and drop-off recycling. Since there is no nationwide guideline for what to recycle, we intend to make it easy to find the individual county rules in every state, ideally making it easier for the public to recycle properly. Another solution to plastic pollution is the development of plastic alternatives that can utilize naturally prevalent resources in order to create biodegradable alternatives that can be made out of materials like seaweed, fungus, and a variety of others. But while businesses have coined the use of sustainability as a marketing tactic, it is important to look out for common misconceptions of users when purchasing sustainable products. The website I am designing will include tips on how to identify flaws in sustainability marketing. A brief summary of the key points I have compiled will be discussed.

Through my summer research experience, I aimed to bridge the understanding of the general public and researchers in order to spark a necessary environmental change for our future.

Adaptation of the Hidden Markov Model for Alcohol Bio-sensors

Angie Shao, Professor Gary Rosen

The overall purpose of this project is to improve the performance of biological alcohol sensors used for public health research. The current prevailing method for studying alcoholism behavior is for the subject to come into labs for a physical detection using breathalyzer, or manually identify the amount of alcohol consumption. Both methods are hard to perform to great accuracy for studies across long periods of time. Therefore, a more convenient and accurate data gathering method is needed. One of the solutions is a portable bio-sensor. Designed to be placed on the wrist or ankle, an alcohol bio-sensor can record the Transdermal Alcohol Concentration (TAC) in real time, this data can then be collected by researchers to study the overall behavior of the subject. However, the process of alcohol diffusion through sweat and body vapor is a mathematically un-invertible process due to the presence of the skin acting as filter of information. We must therefore find a way around the traditional process. This project takes advantage of machine learning, assuming that there exist a relationship between TAC and the desired Blood-breath Alcohol Concentration (BrAC), attempts to model this process by using the properties of Hidden Markov Models.

Hidden Markov Models have two main properties — hidden, and Markovian. We assume that the TAC and BrAC at each time step are solely dependent on the alcohol percentage of the previous time step — hence satisfying Markovian properties. Since the changes of alcohol percentage in the subject's body are dependent on many unidentifiable variables including but not limited to: liver's processing of alcohol, general drinking behavior, social environment, etc., we must consider there is an unidentifiable general variable impacting the changes we see in TAC and BrAC. To do so, we use the property of hidden Markov models, where there exists a hidden state — the general behavior state — that impacts the states we see in observation — TAC and BrAC. Since our final goal is to model a transferable connection between TAC and BrAC, we do not need to create a detailed model of the general behavior state. Rather, we can train the model using TAC and BrAC both as our output: observation state, and present the general behavior as a probability matrix. We can then use this probability matrix to substitute into the desired function between TAC and BrAC for real life application. Doing so creates a general profile of drinking behaviors that can be improved upon with further training according to the researcher's need.

Wide Band Gap Semiconductors

Ruby Sekhon, Shantanu Singh, Professor Jayakanth Ravichandran

High power electronic devices are ubiquitous from cell phones to electric vehicles. Silicon is the most common semiconductor found in electronics because it is relatively cheap and abundant. However, it has many limitations, such as low band gap and low power figure of merit. There is a dearth of alternatives, which includes silicon carbide (SiC) and gallium nitride (GaN). Therefore, it is desirable to explore novel materials candidates for high power electronics.

Researchers have done extensive research on oxides and nitrides, but many chalcogenides -materials made of sulphur, selenium, or tellurium- have been left largely unexplored due to their tendency to be more unstable. However, chalcogenides can offer some benefits -such as, they tend to have a high electron mobility, they can operate at high temperatures, and they are often easier to be p-doped- that cannot be found in other alternatives to silicon. As a result, the Laboratory for Complex Materials and Devices is focusing on investigating chalcogenides that could improve on the current state of high power electronics.

In order to identify materials that have a high potential of being successful, a list of materials was made based on some calculations. Baliga's Figure of Merit is a formula that allows us to identify materials that would have the least conduction loss. Based on this figure of merit, we can identify a short list of materials that can be tested in the lab in order to experimentally identify whether they could show benefits when used in the place of silicon in high power electronics. However, Baliga's Figure of Merit can be difficult to use with many materials that do not have a known value for the dielectric constant. As a result, the dielectric constant is determined using the summation of the polarizabilities of the ions that make up each material. Then, the Clausius-Mosotti relation can be used to calculate the dielectric constant.

With these calculation, we anticipate identifying materials for faster and smaller power electronic devices that can revolutionize the world of electronics.

Evomorph: in silico Tissue Development Optimization

Dottie Yu, Professor Leonardo Morsut, Professor Paul Bogdan

Embryonic development is an early phase that all mammalian organisms go through in which a single fertilized cell develops and differentiates into a complex multicellular life form. This development depends on critical cell-cell communication pathways, which are encoded by the organism's cellular genome. Understanding these pathways is critical to the field of synthetic development, which seeks to build smart synthetic tissues in lab and thus holds immense regenerative medicine applications. In synthetic development labs, these cell-cell communication pathways and their underlying genetic circuitry are engineered to elicit a host of user-defined intracellular morphological responses including both physical and transcriptional changes; for instance, several former experiments (Toda et al 2018, Lam & Morsut 2020) have manipulated Notch, a contact-dependent (juxtacrine) pathway to build complex synthetic structures capable of regeneration, self-organization, and response to injury. In this light, synthetic tissue development holds tremendous potential for regenerative medicine applications. However, due to our limited understanding of embryonic development and pattern formation, current methods rely on trial and error to engineer the genetic circuitry yielding a desired synthetic structure. Here we introduce a computational program capable of systematically optimizing the genetic programming to yield the desired tissue structure, avoiding the need for trial and error. This machine-learning program, named Evomorph, optimizes tissue development systematically and rationally through black-box optimization. Currently, we are testing Evomorph with an in silico trial structure: a 2-dimensional "checkerboard"-like multicellular structure encoded by a lateral inhibition circuit, chosen for its convenience, simplicity, and appearance in nature. In an initial 1-dimensional parameter scan of the beta parameter, which encodes the sensitivity of the cells in the in silico lateral inhibition structure to Delta ligand levels, we ran 100 lateral inhibition simulations with varying beta levels between 0 and 4000 units for 15000 monte carlo steps, allowing their in silico development into phenotypically mature structures. We found that higher beta levels correlated to lower phenotypic fitness. In the future, we hope to run higher dimension parameter scans on the lateral inhibition structure. Furthermore, we are interested in optimizing more complex structures, such as a 3-dimensional elongating tube structure also previously built through in vitro and in silico trial-anderror experiments (Lam & Morsut 2020). One other future direction is to test other optimizers, such as the more flexible and versatile Distributed Evolutionary Algorithms in Python (DEAP) optimization package. Ultimately, our goal is to create a novel program that foregoes the need for trial-and-error tissue development, brings scientists closer to understanding the genetic networks underlying morphogenesis and patterning, all in order to advance the nascent and high potential field of synthetic tissue development.

Using Minimal Model to Study the Glucose Effectiveness in Current Diagnosis Method of Type 2 Diabetes

Louise Lu, Professor David Z. D'Argenio

Type 2 diabetes is a chronic condition that affects the way human body metabolizes glucose. With type 2 diabetes, patient's body either resists the effects of insulin, or cannot produce enough insulin to maintain normal glucose levels. Glucose effectiveness (SG) is the ability of glucose per se to stimulate its own uptake and to suppress its own production under basal/constant insulin concentrations. In an individual, glucose tolerance is a function of insulin secretion, insulin action and SG. Under the condition of declining insulin secretion and action that usually caused by type 2 diabetes, the degree of glucose effectiveness assumes increasing significance in determining the level of glucose tolerance both in fasted and postprandial states. However, the role of glucose effectiveness in the regulation of the glucose tolerance is often ignored. Thus, my study focuses on the Minimal Model approach to quantify the glucose effectiveness in the type 2 diabetes patients versus control group with five different parameters of sex, age, weight, height and BMI.

This study collects 1280 sets of clinical data of standard intravenous glucose tolerance test (IVGTT) from multiple pharmaceutical companies and hospitals. Several computer programming tools are used to analysis the data and plot data graph. MATLAB are used to format raw data for the minimal modeling scripts and conduct the follow-up analysis of the minimal models including bar graph, linear regression and histograms. R scripts are used to recursively fit the data to minimal models.

From the hitherto results we got, it can be concluded that the correlation between BMI versus SG and glucose tolerance are the strongest among all parameters. Meanwhile, sex also causes difference in SG. Males tend to have lower SG than females on average in control groups, but the difference decreases or even reverses in the type 2 diabetes group that males have slightly higher SG than females on average. These results might suggest some improvement on the current diagnosis methods of type 2 diabetes that they should take BMI and sex into consideration while modeling the patients' glucose and insulin data.

Diazacycle Synthesis in Ruthenium Catalyzed Diamine and Diol Coupling

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Dilazep is used as a vasodilator. Homochlorcyclizine is used as an antihistamine. Sitagliptin isused to treat diabetes. Imatinib is used to treat leukemia. These four medications represent alarge group of drugs that contain a diazacycle substructure. Piperazine, a six-membereddiazacycle, and homopiperazine, a seven-membered diazacycle, are especially ubiquitous in the structures of many pharmaceutical drugs. The aim of our project is to develop a novel synthetic route to access these diazacycle analogs. Our synthetic route involves a newly developed amination reaction with diamines and diols. This reaction involves a base and solvent-free ruthenium catalyst that only generates water as a byproduct, which makes it more environmentally-friendly. An example of the optimized synthesis of a homopiperazine derivativeis shown in Figure 1. The focus of this work was to identify important medicinal diazacycles to target as well as research current synthetic routes for these diazacycles. Three main databases, USC Libraries, SciFinder, and Reaxys, were used to explore the current landscape fordiazacycle synthesis. Based on this work, we have gained a better understanding of where our project fits into the landscape of diazacycle synthesis. Numerous strategies and various starting materials have been reported to synthesize piperazine and homopiperazine. In fact, there have been several reported methods to synthesize piperazine and homopiperazine from diaminesand diols, which is the same starting material that we use in our project. However, most of these published methods require high temperatures and harsh conditions, which shows the applicability of our work. In addition, published methods have demonstrated that there is still a need to efficiently synthesize homopiperazine, a seven-membered diazacycle, in good yields, which also highlights the relevance of our work. The importance of other diazacycles such as 1, 4-diazocane, an eight-membered diazacycle, is also indicated in the literature. Therefore, we plan to expand our substrate scope to generate other homopiperazine derivatives with different substituents as well as optimize the synthesis of 6-, 7-, and 8-membered diazacycles.



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