2024 Undergraduate Educator Award Recipient: Hollie Swanson

Hollie I. Swanson, PhD
University of Kentucky, Lexington, KY

This award, sponsored by the SOT Endowment, recognizes an SOT member who is distinguished by outstanding contributions to the teaching of undergraduate students in toxicology and toxicology-related areas and whose efforts support the Society's strategic efforts to “build for the future of toxicology.”

Hollie I. Swanson, PhD, is awarded the 2024 SOT Undergraduate Educator Award for her significant contributions to the introduction and instruction of toxicological topics to undergraduate students.

An active pursuer of extramural funding for undergraduate education in toxicology, Dr. Swanson’s impact on undergraduates goes beyond the classroom. Since 2016, she has served as the principal investigator for a National Institutes of Health R25 training grant that supports a program entitled, “Summer Undergraduate Research in Environmental Health Science.” Successfully renewed through 2027, this program has supported 84 undergraduate students in a 10-week summer program that introduces them to lab-based research and significant professional development in the health sciences. An additional grant from the Howard Hughes Medical Institute awarded to colleagues at the University of Kentucky was used to develop a program focused on first-year undergraduates, helping Dr. Swanson introduce toxicological and scientific concepts in an engaging and interactive manner, helping increase retention and interest in the STEM fields.

Within the University of Kentucky, Dr. Swanson is the Faculty Representative to the Board of Trustees and serves on the Coalition of Faculty Senate Leadership, a faculty advisory board of the Kentucky Council on Postsecondary Education. These roles allow her to address high-level challenges in undergraduate education.

As an educator, Dr. Swanson teaches a multitude of undergraduate courses on toxicology, exposing undergraduates to key concepts in a variety of disciplines. Equally as important, Dr. Swanson is a frequent publisher and presenter on classroom pedagogy, sharing her knowledge and experience in papers and conferences at national scientific meetings.
Undergraduate Educator Award (con't)

Dr. Swanson earned her doctorate in food science/toxicology from Purdue University in 1991 and has been an active member of SOT since then. She has been a member of the SOT Research Funding Committee, the K–12 Subcommittee, and the Scientific Program Committee. Additionally, Dr. Swanson is a contributor within the SOT Undergraduate Educator Network and Undergraduate Diversity Program—longstanding SOT activities that provide resources and exposure to toxicology for undergraduate educators and students alike!

In light of her profound impact on undergraduate students and undergraduate educators and her leadership in undergraduate education, Dr. Swanson is awarded the 2024 SOT Undergraduate Educator Award.

Please join us in congratulating Dr. Swanson for receiving the SOT Undergraduate Educator Award!

Undergraduate Educator Network Webinar Series

The next Undergraduate Educator Network Webinar “Strategies for Boosting Student Undergraduate Engagement in the Classroom” will be Friday, February 16, 2024, at 1:00-2:00 pm ET.

Within STEM, many educators at the undergraduate level have found themselves grappling with a noticeable decline in student engagement. This challenge has prompted educators to explore innovative approaches aimed at reigniting interest and enhancing the overall learning experience in their classrooms. This webinar, hosted by the SOT Faculty United for Toxicology Undergraduate Recruitment and Education (FUTURE) Committee for the Undergraduate Educator Network, will highlight two examples of creative techniques implemented by faculty teaching undergraduate toxicology and STEM courses to try to better engage their undergraduate students throughout the course of the semester.

Interested? Register here

Have an idea for a Undergraduate Educator Network Webinar? Contact FUTURE

Looking to Network with Amazing Undergraduate Educators? Join ToXchange Undergraduate Educator Network

ToXchange is an excellent venue to exchange ideas, learn about resources and opportunities, and receive SOT announcements for undergraduate faculty. Subscribe to the ToXchange Undergraduate Educator Network (UEN) to harness the power of our community!

1. Log in to ToXchange https://toxchange.toxicology.org/home
2. Click the “Communities” tab
3. Select “Open Groups”
4. Find “Undergraduate Educator Network” and select the “Join” button
SOT Recognizes Outstanding Undergraduate Researchers

FUTURE is pleased to announce the 2024 recipients of the SOT Undergraduate Research Award. These sixteen students were selected from a large and impressive pool of applicants. The award recognizes outstanding undergraduates who have not yet received their bachelor’s degrees and are presenting research at the SOT Annual Meeting and ToxExpo. The goal is to foster interest in graduate studies in the field of toxicology. Awardees receive travel support to attend the SOT meeting as well as recognition and pairing with mentors. Congratulations to the students! FUTURE also extends a special thank you to the research mentors of the 2024 award recipients!

Please add these posters to your schedule and stop by to congratulate the award recipients. The author will be at the poster at the time listed.

**Mina Alaaldin**  
University of Arizona  
#3297: Alterations of Eluxadoline Pharmacokinetics in a Rodent Model of Metabolic Dysfunction-Associated Steatohepatitis  
Mon 9:15 AM–11:15 AM  
Research Mentor: Nathan Cherrington, University of Arizona

**Vishnupriya Alavala**  
Virginia Commonwealth University  
#3811: Neurodevelopmental Vulnerability to Gestational Ozone Exposure  
Tues 2:15 PM–4:15 PM  
Research Mentor: Andrew Ottens, Virginia Commonwealth University

**Caylee Brown**  
University of Maryland  
#3769: Exploring the Role of Microglia Cells in Dysregulated Orexin System Function in Rats Exposed to Bisphenol-A During the Peripubertal Period  
Tues 2:15 PM–4:15 PM  
Research Mentor: Morgan James, Rutgers, The State University of New Jersey

**Keishla Colón Montañez**  
University of Chicago  
#3984: Exposure to Acute Ambient Ozone Triggers Differential Lung Inflammation in Lung Tissue from Asthmatic Male and Female Mice  
Tues 9:15 AM–11:15 AM  
Research Mentor: Patricia Silveyra, Indiana University Bloomington

**Emily Dai**  
University of North Carolina at Chapel Hill  
#3469: Challenges and Solutions in Measuring Commonly Used Drug Induced Liver Injury Biomarkers in a Liver-On-A-Chip Platform  
Mon 9:15 AM–11:15 AM  
Research Mentor: Qiang Shi, FDA NCTR

**Mae Esquibel**  
New Mexico Highlands University  
#3431: Polystyrene Microplastics Impair the Growth, Survival, and Macrophage Differentiation of Human THP-1 Monocytes  
Mon 9:15 AM–11:15 AM  
Research Mentor: Sebastian Medina, New Mexico Highlands University

**Gabrielle Gonzalez**  
University of Florida  
#3868: Developmental Exposure to TCDD Alters Sperm Motility and Whole-Body Hormone Parameters in a Zebrafish Model  
Tues 11:45 AM–1:45 PM  
Research Mentor: Tracie Baker, University of Florida

**Alan Ibarra**  
University of New Mexico  
#3407: Astemizole Induces Necrototic Cell Death in Cancer Cells via Lysosomal Damage  
Mon 11:45 AM–1:45 PM  
Research Mentor: Todd A. Thompson, University of New Mexico
**Hannah Joo**  
Kenyon College  
#3220: Lead Exposure Impacts Calcium (Ca) Transients and Ca Transporters in a High-Throughput Human iPSC-Derived Cardiomyocyte Model  
Mon 9:15 AM–11:15 AM  
Research Mentor: Laurie K. Svoboda, University of Michigan

**Paige Lindberg**  
University of Arizona  
#3273: Quantitative Identification of Xenobiotic Transporters in MASH Progression Using Human Urine-Derived Extracellular Vesicles  
Mon 2:15 PM–4:15 PM  
Research Mentor: Nathan Cherrington, University of Arizona

**Audrey Luo**  
University of California, Davis  
#3584: Seizure Inhibition Mitigates Blood-Brain Barrier Impairment in a Male Rat Model of Acute Organophosphate Intoxication  
Mon 2:15 PM–4:15 PM  
Research Mentor: Pamela Lein, University of California, Davis

**Adira Safar**  
University of Illinois Urbana-Champaign  
#3898: Long-Term Dietary Exposure to an Environmentally Relevant Mixture of Phthalates Affects Ovarian Aging Markers  
Tues 2:15 PM–4:15 PM  
Research Mentor: Jodi Flaws, University of Illinois Urbana-Champaign

**Winter Stubblefield**  
University of Illinois Urbana-Champaign  
#3897: The Effect of Imidacloprid on the Expression of Steroidogenic Genes in the Mouse Ovary  
Tues 2:15 PM–4:15 PM  
Research Mentor: Jodi Flaws, University of Illinois Urbana-Champaign

**Shine Wang**  
Rutgers, The State University of New Jersey–New Brunswick  
#4651: Cadmium Accumulation and Metal Stress Response in the Kidneys of Transgenic Mice with a Polymorphic Efflux Transporter  
Wed 11:45 AM–1:45 PM  
Research Mentor: Lauren Aleksunes, Rutgers, The State University of New Jersey

**Maggie Wurster**  
Salish Kootenai College  
#3913: Gene Expression Analysis of Environmental Xenoestrogens in Breast Cancer  
Tues 2:15 PM–4:15 PM  
Research Mentor: Clay Comstock, Salish Kootenai College

**Maximiliano Zablah**  
McGill University  
#3217: CRISPR-Screen Identifies ASC1-Complex (ASCC) as a Potential Mediator of Tungsten Toxicity  
Mon 9:15 AM–11:15 AM  
Research Mentor: Koren Mann, McGill University
Undergraduate Activities

Undergraduate Education Program Sunday, March 10
Undergraduate students learn more about the breadth of science related to toxicology through presentations and a case study, with the opportunity to network with graduate students and toxicologists. Breakout sessions feature tips on applying to and succeeding in graduate school and career opportunities in different employment sectors. The afternoon ends with time to meet with representatives of various graduate programs in toxicology. Grand Ballroom D, Marriott Downtown, 8:00 am-5:00 pm. Registration required.

Student/Postdoctoral Scholar Mixer Sunday, March 10
This event, which follows the SOT Welcome Reception, is the opportunity for undergraduates to network with other undergraduates, graduate students, and postdoctoral scholars as well as learn more about involvement in SOT component groups. Room 355, Salt Palace, 7:30 pm-9:00 pm. Registration required.

In Vitro Lecture and Luncheon Monday, March 11
During lunch, the speaker will present a case study topic which will then be discussed at each table. Guests at this event include undergraduates, graduate students, and postdoctoral scholars, and the toxicologists who serve as hosts and discussion facilitators. Room 255A, Salt Palace, 12:00 noon-1:30 pm Limited seats. Registration Required.

Undergrad Gab with a Grad over Grub Tuesday, March 12
All undergraduate students are invited to this informal gathering to learn more about engaging with SOT and to network with graduate students. Learn about their experiences as trainees and what different graduate programs are like. Room 255F, Salt Palace, 12:30 pm-1:45 pm

Activities for Undergraduate Educators

CDI Reunion Saturday, March 9
Meet the 2024 Undergraduate Diversity Program students and greet friends and supporters of the program at this networking event. Grand Ballroom D, Marriott Downtown, 7:30 pm-8:30 pm

Undergraduate Educator Network Meeting Monday, March 11
The Undergraduate Educator Network Meeting is for all faculty involved in the teaching of toxicology to undergraduates, trainees thinking about teaching, and for those interested in including toxicology at the undergraduate level. Learn about initiatives for undergraduate faculty, provide your input, network with your colleagues, and discuss shared interests. Room 355A, Salt Palace, 4:30 pm-5:30 pm

Educating Future Toxicologists and Communicating with the Public Poster Session Monday March 11
Come to discuss new educational innovations with the presenters and your Colleagues. ToxExpo, Hall C, author attended 2:15 pm-4:15 pm

Education-Career Development Session (FUTURE-endorsed) Tuesday, March 12
Preparing the Next Generation of Toxicologists: Integrating Practical Applications and Diverse Career Paths into the Student Experience; Room 251D, Salt Palace, 1:00 pm-2:20 pm
ToxScholar Undergraduate Outreach

Planting Seeds of Our Discipline in the Fertile Minds of Undergraduate Students: A Year Visiting Colleges in North Carolina

Bob Roth, PhD, DABT

After a career at a R1 academic institution doing toxicology-related research, training graduate students, and lecturing to medical and veterinary students, I retired a couple years ago to North Carolina. In my career at Michigan State, I hosted undergraduate students in my laboratory to help them gain research experience, but I don’t recall giving a single lecture to undergraduates in my entire career. In my “retirement,” a hobby has become traveling to undergraduate institutions in the area to lecture in courses or participate in sessions encouraging students toward careers in toxicology.

In the past year, several opportunities emerged for interacting with students and their faculty at nearby universities and colleges that focus on undergraduate education. The topics and organization of these sessions have taken several forms. Two of my first visits were to North Carolina Agricultural &Technical State University (NCA&T) and North Carolina Central University (NCCU), where I was invited to present a couple of lectures at each school on liver toxicology. I worked quite hard to revise lectures I had given formerly to graduate students so that they would be appropriate for an undergraduate audience. I knew that the students at both universities enrolled in the courses where mostly juniors and seniors, and I assumed that they had had some training in biology. In the midst of my lecture at NCCU, I learned to my surprise that some students were Geospatial Sciences majors and had never had a course in biology so, I found myself doing a bit of reorienting on the fly. This was a learning experience, indeed, and taught me to ask more questions as I prepare for a visit. Subsequently, I constructed a checklist of questions to ask and details to resolve that helps in planning for visits.

Later in 2023, I presented “Introduction to Toxicology” lectures to early undergraduates at NCA&T and Bennett College. In this lecture, I speak briefly about ADME/PK, but I emphasize the concept of dose-response. This allows me to delve into the rudiments of how risk is assessed and to provide for students a framework to think about whether their own exposures to chemicals are likely or unlikely to be harmful. For this and other lectures, I have prepared an interactive exercise that illustrates dose-related toxicity and thresholds. I’ll be presenting a Tiny Tox Talk on this simple demonstration in March in Salt Lake City; if you are interested, please attend (shameless advertising). Introducing toxicology in a way that engages students typically generates much discussion and many questions and leaves the students enthused about what they’ve learned.
ToxScholar Undergraduate Outreach (con’t)

In the Fall of 2023, I was asked to host a review of a research paper in an undergraduate course in Genetics at University of North Carolina Pembroke (UNC-P). UNC-P serves a Native American population in North Carolina and has a very diverse student body. The students in this course had biology and/or chemistry training, and the course focused in part on CRISPR, so I was asked to choose a study that employed this technique. I settled on a research article in which CRISPR had been used in a toxicology-related study that employed CRISPR to modify a gene, with the goal of improving a zebrafish model for toxicity testing. Using this article, I was able to introduce a bit of toxicology to the students, including talking about zebrafish as a toxicity testing model and discussing metabolic bioactivation of chemicals and its role in toxicity. I planned for the session to last about an hour but was told that it could lapse into a laboratory period that immediately followed the session. There were so many questions and so much discussion that the one-hour session I had planned turned into three hours! I have found that moderators of courses in biology or chemistry are pleased to have a toxicology-oriented topic woven into the lecture sequence.

In addition to ventures on my own, I’ve been fortunate to be part of a team that has made a couple of visits to schools in North Carolina to inform students about career opportunities in toxicology. In October, SOT members AtLee Watson and Gina Hilton and I visited Chowan University to meet with undergraduates in a science club. Our team comprised a representative from industry, a NGO, and academia. After introducing ourselves and showing just a few slides to introduce toxicology, the floor was opened to student questions and discussion. A month later, we participated in a panel at Fayetteville State University in which the major focus was on helping senior students with career choices, resume writing, and interviewing. The students were highly engaged and motivated, and our counsel was received enthusiastically.

For me, this effort continues to be fun, and knowing that my visits have made a difference in the outlook of at least some students is satisfying. For SOT members planning such visits, materials promoting SOT opportunities for undergraduates and slide sets that can help in preparation are available on the ToxScholar page of the SOT website. Also, I am happy to share slides and other materials that I have developed with anyone planning a visit.

Discussing career opportunities in toxicology with undergraduate students is key to ensuring a robust toxicology workforce for the future. I did not hear the word “toxicology” during my undergraduate years and happened into it through a stroke of serendipity. I have learned that this is true for many of my toxicologist colleagues as well. Even now, many undergraduates are not familiar with toxicology or know it only through television series like NCIS and CSI. Recruiting students into the discipline starts with educating them about what toxicology is and what career opportunities the discipline affords. Notably, all of the universities mentioned above predominately serve groups underrepresented in the sciences; visits to such institutions stand to enhance diversity in our field. As a scientific society and for the future of the discipline, we should be doing all we can to reach out to undergraduates who are in the formative stages of decisions about career.

Interested in becoming a ToxScholar visitor?
If you are interested in planning a visit yourself and have identified a college and potential host, you can use SOT resources such as introductory toxicology slides and interest cards. For more information, visit the SOT ToxScholar page.
The Fall 2023 Mountain West Society of Toxicology (MWSOT) regional meeting was focused on trainee mentoring and career development. This meeting was co-hosted with the Rocky Mountain Wildfire Smoke Symposium (RMWSS) which enabled both societies to enhance opportunities for a diverse group of undergraduate students, including a career development workshop. Career mentoring covered a broad array of professional opportunities across industrial, academic, consulting, and government positions. Over the two-day meeting time was devoted to peer-mentoring with graduate and undergraduate students. Importantly, undergraduates presented 11 out of a total of 38 poster presentations and three provided platform presentations. Poster and platform presentation award winners attended from undergraduate programs at the University of New Mexico (UNM) and Colorado State University (CSU) including Dewie Roth (CSU), Emma Smith (CSU), Crystal Cevering (UNM), and Genova Mumford (CSU).

The LSSOT Regional Chapter held their annual meeting at the University of Texas Medical Branch in Galveston in January. The meeting featured a poster session and 10 talks selected from submitted abstracts. Two of the talks were by undergraduate students as a part of a special session highlighting undergraduate research: Keerthana Prayaga (Baylor University) and Nathan Abalos (Lamar University). There was also an evening of career development, including a trainee mixer (where trainees, including undergraduates, can mix and mingle and meet one another) and a mentor mixer (where trainees, including undergraduates, can meet and mingle with faculty and any attendees from industry and get informal advice on careers in toxicology). A new “talks by the fireplace” format where graduate students give chalk talks about their research to a friendly audience for practice and feedback. Undergraduate students are encouraged to attend to see what it’s like as a graduate student in toxicology.
The National Capitol Area Chapter had programming geared toward undergraduate students at their NCAC-SOT and FDA Center for Food Safety and Nutrition Joint Fall 2023 Symposium “Applied Toxicology and Risk Assessment,” including providing free registration to students to attend the symposium either virtually or in-person. Students also had the opportunity of a free mentoring lunch during which the students were grouped with mentors (Patrick Crittenden, PhD from USFDA, Ryan Hitzman, PhD from IIVS, and Melissa Badding, PhD, DABT from Exponent). Furthermore, undergraduate students could apply for abstract awards for poster presentations with first, second, and third place being awarded to Cynthia Xi, Risa Verma, and Chiara Santoro, from the Joint Institute for Food Safety and Applied Nutrition (JIFSAN) program at the University of Maryland. Additionally, an Excellence in Science award was awarded to Prof. Mindy Reynolds, PhD, Washington College, for her continued dedication to undergraduate education and mentorship.

Undergraduate awardees (from left to right): Cynthia Xi, Risa Verma, and Chiara Santoro from the JIFSAN program at the University of Maryland

The Ohio Valley Chapter regional meeting had undergraduate poster presentations and several undergraduates participated in the chapter’s Big Picture Science short oral presentation format event. Undergraduates won awards associated with these presentations. The winner of the undergraduate Big Picture Science award was Jack Morehouse, Purdue University. For undergraduate posters, Sierra Saldana, Purdue University, and Alyssa Johnson, The Ohio State University, tied for first place and Breeann Mild and Jacob Eyster, both from Purdue, tied for second place. Additionally, undergraduates participated in a lunch with an expert event where they learned about careers in toxicology.

Undergraduate Awardees:
Big Picture Science: Jack Morehouse (left, middle)
First Place Posters: Sierra Saldana and Alyssa Johnson (right, middle)
Undergraduate Activities in Regional SOT Chapters (con’t)

The North Carolina Society of Toxicology (NCSOT) Regional Chapter hosted its annual meeting September 14, 2023, at the Research Triangle Institute (RTI) International campus in Durham, NC. This year’s theme, “Mountains to Coast: The State of Toxicity in North Carolina,” featured keynote speakers Drs. John Bang (NC Central University), Jamie DeWitt (University of Oregon), and Frannie Nielsen (North Carolina Department of Environmental Quality), discussing important toxicological issues facing North Carolina residents. Overall, approximately 250 individuals attended the meeting from 28 organizations including 11 universities, four state/federal government institutions, and 13 businesses and nonprofits. As in the past, the 2023 meeting showcased research from more than 75 undergraduate, graduate, and post-doctoral trainees. There were 13 undergraduate and postbaccalaureate poster presenters.

Undergraduate-focused programming consisted of a Lunch and Learn Career Panel and Q&A Session moderated by NCSOT Vice President-elect and FUTURE Committee member, Dr. AtLee Watson. The panel included SOT Vice President-elect Dr. Cynthia Rider (Toxicologist, Division of Translational Toxicology, National Institute of Environmental Health Sciences (NIEHS)), Dr. Samantha Snow (Director, Toxicology, ICF), Dr. Imari Walker-Franklin (Analytical Chemist, RTI International), and Dr. Checo Rorie (Department Chair, Biology, North Carolina A&T). The conversation ranged in topics from what is a typical workday to graduate school to networking. In addition, exhibitors from the US EPA and NIEHS gave an overview of internship and fellowship opportunities available for students eager to gain more research experience.

To reduce barriers of attendance, NCSOT coordinated charter bus transportation for undergraduate students and faculty advisors from UNC Greensboro, North Carolina A&T University, and North Carolina Central University. This effort represents an on-going NCSOT initiative to increase diversity and inclusiveness at its annual meetings, foster professional networking opportunities, and build a greater network of toxicologists across the state.

St. John's Celebrates Second Annual Toxicology Week

This year’s Toxicology Week (November 5–11) at St. John’s University was jam-packed with activities. Events included an online Toxicology Career Night, spotlighting toxicology career opportunities. Diane Hardej also scheduled the annual ToxiCarnival for Toxicology Week, which was sponsored by Mid-Atlantic SOT. The final event of the week was Toxicology Movie Night, showing “Silkwood” with popcorn, pizza, and goodies.

Mindy Reynolds and her students at Washington College also observed Toxicology Week with Movie Night, featuring “Dark Waters.”

This year FUTURE has been working with Council to explore broadening the reach of National Toxicology week, a proposal Sue Ford brought forward in Spring. The vision of such a week is twofold: first, to make students, especially those in high school and college, aware of toxicology as a science and as a career path, and second, to bring much needed awareness to the public of the important role of toxicology in fostering human and environmental health and safety.

Diane, Mindy, and Sue will have a poster presentation “National Toxicology Week: A Chance to Celebrate Our Discipline” at the Annual Meeting in the afternoon session “Educating Future Toxicologists and Communicating with the Public,” March 11, 2024. Please drop by the poster and chat about the topic. They would love to hear your ideas!
SOT Partners with ToxMSDT to Develop New Learning Resources

New Toxicology Learning Resources Released: Biochemistry and Pathophysiology Modules and Lead Case Study

Three new toxicology learning resources have been released by the Toxicology Mentoring and Skills Development Training (ToxMSDT) program. These engaging and interactive online products are available at no cost and are designed for undergraduate students and independent learners who have had basic biology and basic chemistry. Those who successfully complete the examination at the end of each unit receive a certificate of completion.

Two modules are updates of resources developed early in the ToxMSDT project. Modules provide an overview of basic concepts in a disciplinary area related to toxicology. The revised modules have increased interactivity, updated content, and are written for undergraduates who have taken basic biology and chemistry. Case studies are new additions to the project and give learners the opportunity to explore toxicology concepts related to specific toxicants. These new resources are adaptable and can be used by the independent learner as well as for formal course assignments or in informal education. These and existing resources can be accessed via the Toxicology Learning Resources page.

Pathophysiology: A Toxicology Module reviews basic physical and functional changes that occur at the biochemical, cellular, tissue, organ, and organismal level when organisms respond to exposure to a toxicant. Diagrams and micrographs illustrate key concepts.

Biochemistry: A Toxicology Module illustrates how biochemical interactions are fundamental to the responses of organisms to toxicants. Specific examples illustrate concepts, and the biochemistry of some common toxicants are highlighted.

Lead in Drinking Water: A Toxicology Case Study spotlights the potential health effects of exposure to lead in drinking water, using the water contamination incident in Flint, Michigan. The new case study guides the learner through the circumstances that led to the contamination, the potential health impacts, the basic toxicology related to lead exposure, and regulatory considerations.

The ToxMSDT program is funded by grant R25GM139200 from the National Institutes of Health, Wilson Rumbergh (University of California, Davis) and Jodi Flaws (University of Illinois Urbana–Champaign), principal investigators, and is hosted at the University of California, Davis. The Society of Toxicology (SOT), a partner in the grant, is the lead in developing and updating asset of ToxMSDT learning resources. Materials are correlated with the SOT Undergraduate Toxicology Learning Framework, which is tuned to national standards in undergraduate biology education. Pathophysiology and Lead in Drinking Water were authored by SOT members and undergraduate educators Mindy Reynolds, Washington College; Joshua Gray, US Coast Guard Academy; and Jayanta Das, Florida Memorial University; with the assistance of Betty Eidemiller, SOT Director of Education. That team has provided oversight for the SOT project. Biochemistry was authored by Michael Borland, lead, Commonwealth University of Pennsylvania–Bloomsburg; Eva Oberdorster, Southern Methodist University; and Xiang Xue, University of New Mexico. Additional ToxMSDT modules will be updated, and authors will create several new modules and case studies for release in the next two years.

Providing learning resources is a skills development component of ToxMSDT. The program selects a cohort of undergraduate students each year who participate in mentoring and job shadowing activities with a toxicologist as well as learning toxicology principles and participating in workshops and the SOT Annual Meeting.

For more information about ToxMSDT, contact program manager La Cole Blackshire.
You can learn more about ToxMSDT resources during two opportunities at the SOT Annual Meeting, both on Monday, March 11, in the ToxExpo.

**Tiny Tox Talk**

**“Undergraduate Toxicology Teaching Resources Available through ToxMSDT”**

Monday, March 11
1:20-1:40 pm

**Poster #3253**

**“The Toxicology Mentoring and Skills Development Training (ToxMSDT) Program Launches New Case Studies and Revised Skills Development Online Modules for Undergraduates and Undergraduate Educators”**

Monday, March 11
Authors will be present from 2:15 pm-4:30 pm.

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**Do You Know a Qualified Undergraduate Who Would Benefit from the ToxMSDT Program? ToxMSDT Applications Due April 26**

The Toxicology Mentoring and Skills Development Training Program (ToxMSDT), housed at the University of California Davis, is a special opportunity for underrepresented undergraduate students to participate in a year-long mostly remote toxicology training and mentoring program. Funded by the National Institutes of Health, the goal of this program is to attract diverse undergraduate students from around the United States to pursue careers in biomedical research, especially in the field of toxicology. Successful applicants will be teamed with a mentor, meeting remotely throughout the year. In-person activities include the program kickoff workshop at the University of California Davis, a visit to the mentor’s work site, and attendance of the annual Society of Toxicology meeting. There is a celebration of the program successes at the Capstone Event coordinated by Tuskegee University. Students review online learning modules throughout the program to increase their knowledge of toxicology. Travel cost support for program activities is provided by ToxMSDT. This program supplements the regular academic pursuits of students.

**ToxMSDT Eligibility Requirements:**
- Minimum cumulative GPA of 3.0
- Completion of at least one semester of general biology and general chemistry
- Enrolled in an accredited undergraduate institution at the time of application, with continuing enrollment for the next academic year concurrent with the ToxMSDT program
- Member of a group underserved in the biomedical sciences (more information can be found in this [NIH notice](https://www.nih.gov/)).
- US citizen or US permanent resident

For more information, please contact La Cole Blackshire.

Learn more about the program at Annual Meeting Poster #3249 “ToxMSDT: A National Program Mentoring STEM Undergraduate Students in Toxicology” on Monday, March 11. Authors will be present from 2:15 pm-4:15 pm.

**ToxMSDT Mentee Applications** can be submitted until April 26, 2024.
Resources for Educators

Enduring Legacies: Native Case Studies

Want to present case studies that have a unique perspective? Consider some options from the “Enduring Legacies: Native Case Studies” collection. These resources provide an opportunity to engage your students and expand your curriculum with cases studies on Native American subjects. A wide range of key topics identified by Native leaders provide culturally relevant curriculum and teaching resources. Some of the toxicology-related titles include:

- Evil Water: The Problem of Alcoholism in Indian Country
- Salmon and Contamination in the Columbia River
- Blowing in the Wind: The Navajo Nation and Uranium.

You may also consider signing up as a reviewer for the Toxicology section of CourseSource.

Don’t forget to check out the SOT-sponsored podcast Adverse Reactions for unique ways to mix-up your lesson plans!

Universal Design for Learning

Curious about employing Universal Design for Learning to encourage retention in STEM? This framework “guides the design of instructional goals, assessments, methods, and materials that can be customized and adjusted to meet individual needs.” The article entitled “Diversity, Equity, and Inclusion by Design: Getting Started with Universal Design for Learning” by Patricia Marsteller, is a guide to the topic.

Beyond Benign has multiple resources for those wanting to include toxicology-related green chemistry in their courses. Resources include the course “Toxicology for Chemists” and also lessons such as:

- Design for Biodegradability
- Hazard Evaluation—Understanding Toxicological Endpoints
- pKa and Skin Irritation

Photo courtesy of: oregonstate.edu/dept/ncs/photos.html
FUTURE Committee Member Profile: Dr. Karen H. Watanabe

This newsletter feature highlights a FUTURE member in their final year of service on the committee. The full list of FUTURE Committee members can be found on Page 16.

Q: Describe your journey in toxicology. When did you first become interested in the subject?
As a doctoral student at the University of California, Berkeley, I worked part-time at the Reproductive and Cancer Hazard Assessment Section of the California EPA. My background in engineering and a passion for mathematical modeling of biological systems was a natural fit for working on physiologically based pharmacokinetic models to predict target tissue toxicant doses, extrapolate across species, and to perform high to low dose extrapolation. At the time, developing probabilistic methods to account for interindividual variability and uncertainty in model predictions was an emerging topic, and became the topic of my doctoral research.

Karen H. Watanabe, PhD, Associate Professor, Arizona State University

Q: How has being a member of the FUTURE Committee of SOT helped you from a faculty development perspective?
As a member of the FUTURE committee, I learn a lot from other educators, and their approach to teaching toxicology at the undergraduate level in terms of what works/what doesn't work. I especially like learning about employers' workforce needs from industry members. As an educator, I care about whether my students can be gainfully employed when their academic ends – whether it's with a Bachelor's degree, or other graduate or professional degree. It's important that educators remain current with workforce needs and align academic curricula to those needs so that students are well-positioned for employment when they graduate.

Q: In three to four sentences, which is not easy to do, describe your research to our readership.
With respect to toxicology and risk assessment, my recent research focuses on developing quantitative adverse outcome pathways (AOP). In particular, my group developed an AOP for acetylcholinesterase inhibition leading to neurodegeneration, and modeled different aspects of reproductive effects in fish exposed to endocrine active chemicals. I do not have a wet lab, so everything my group does focuses on data integration into biologically based models and computational analysis.

Q: Aside from toxicology, what hobbies or other interests do you pursue?
I enjoy the outdoors, yoga, and spending time with my family and our dog Maya.

Q: This is your final year on the FUTURE committee. What will you miss most about serving SOT in this way?
I'll miss having an impact on the early education and research careers of future toxicologists through the programs and activities that FUTURE supports.
FUTURE Committee Member Profile: Dr. Karen H. Watanabe (con’t)

Q: How can toxicology help to make a more equitable and inclusive world?
I think it’s safe to say that a common goal for people in general is to remain healthy. Yet, many toxicant-induced diseases disproportionately affect people of color through environmental exposures, personal care products, etc. Toxicology is at the core of those diseases, e.g., in terms of how chemicals in the environment elicit adverse health effects. Environmental health equity may be improved by empowering communities with education, methods, and portable and inexpensive technologies to test environmental samples and personal care products in order to advocate for themselves. As professionals with privileges that others don't have, we should strive for community engagement as volunteers, providing resources, and opening doors to toxicology. In terms of the profession, we need strategies that increase a sense of belonging among those who are underrepresented from students to working and retired professionals.

Q: What do you think is an important next step for undergraduate toxicology education?
With the explosion of data, e.g., from -omics research and high-throughput chemical testing, mathematical and computational skills are needed to analyze these data sets. We need professionals who are interested in working at the interface of toxicology and math/statistics/computational analyses. My recommendation is that toxicology undergraduate programs begin to incorporate math and statistical computing (e.g., with R or Python) modules into their core curriculum and scaffold those skills through upper-level courses so that by the time students graduate, they've been exposed to quantitative analysis and simple programing. This will allow them to transition to working with large data sets upon entering the workforce or graduate school while improving their quantitative skills overall.

Have questions you want answered? Contact members of the FUTURE newsletter group to include new questions in our member profiles.

Session Proposals for the 2025 SOT Meeting Due May 15

Workshops and symposium sessions at the SOT Annual Meeting provide an opportunity for undergraduate educators to emphasize the importance of training undergraduates in toxicology. There have been many forces influencing toxicology education in the last few years, and these could be highlighted in a workshop or symposium at the 2025 Annual Meeting. Topics could touch on innovative teaching strategies, novel risk communication approaches, affordable toxicology laboratory activities, summer training activities and opportunities for undergrads, active learning and problem-based learning approaches in toxicology, translating toxicology to the public, or any other area or issue that would be of interest to SOT members, especially those involved in training of students or educating laypersons.

The deadline to submit session proposals for the 2025 Annual SOT Meeting is May 15, 2024. It takes time to put together an attractive session proposal, to line up speakers, and to obtain buy-in from one or more component groups before submission, so get together soon with a colleague or two to brainstorm and write a great proposal. Bring your ideas to the Undergraduate Educator Network meeting during SOT or share them with a FUTURE member for more discussion.

Helpful information can be found on the SOT website beginning in March.
SOT FUTURE Committee

The Faculty United for Toxicology Undergraduate Recruitment and Education (FUTURE) Committee is tasked with recruitment, retention, training, and education of undergraduates interested in toxicology. “Faculty” in FUTURE is inclusive, including those outside of academia, who promote toxicology career paths for undergraduate students.

Members (2023-2024)
- Jaime Mirowsky, PhD, Chair, SUNY ESF
- Robert Roth, PhD, DABT, Co-Chair; Michigan State University (Emeritus)
- Tracie Baker, DVM, MS, PhD, University of Florida
- Eva-Maria Schoetz Collins, PhD, Swarthmore College
- Tirupapuliyar Damodaran, PhD, North Carolina Central University
- Nick Filipov, MS, PhD, ATS, University of Georgia
- Gina Hilton, PhD, PETA Science Consortium International
- Meghan Rebuli, PhD, University of North Carolina at Chapel Hill
- Courtney Roper, PhD, University of Mississippi
- Phillip A. Wages, PhD, Estee Lauder Companies
- Karen Watanabe, PhD, Arizona State University
- Atlee Watson, PhD, DABT, Inotiv
- Kimberly Zaccaria, PhD, DABT, SRC, Inc.
- David Blake, MS, PhD, Liaison from CDI, Fort Lewis College
- Hannah B. Lovins, BS, Graduate Student Rep, The Ohio State University
- Jephte Akakapo, PhD, Postdoc Rep, University of Kansas Medical Center
- Jennifer L. Rayner, PhD, DABT, SOT Council Liaison, SRC, Inc.
- Robyn Leigh Tanguay, PhD, SOT Council Liaison, Oregon State University
- Betty Eidemiller, PhD, SOT Staff Liaison, SOT Headquarters

Thanks to the members completing their terms.
New committee year begins May 1, 2024.

Jaime Mirowsky, PhD, Chair 2023-2024,
Member 2021-2024
Robin Bright, PhD, 2022-2023
Karen Watanabe, PhD, 2022-2024

Ideas for the SOT Undergraduate e-Newsletter?
Contact Kimberly Zaccaria, Newsletter Lead;
Tirupapuliyar Damodaran, Courtney Roper, Phillip Wages, Newsletter Team; or
Jaime Mirowsky, FUTURE Chair

Published by the Faculty United for Toxicology Undergraduate Recruitment and Education (FUTURE) Committee

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