

Sigma Xi Today

A NEWSLETTER OF SIGMA XI, THE SCIENTIFIC RESEARCH HONOR SOCIETY

Voting Begins November 9

Active members may vote from November 9 through December 8, 2020, in the Sigma Xi elections to determine who will become president-elect, directors, associate directors, and members of the Committee on Nominations.

Richard Boudreault and Nicholas A. Peppas are the president-elect candidates.

Boudreault is a repeat STEM entrepreneur with 12 successful corporations. He is serving his second term as the director of Sigma Xi's Canadian/International Constituency and served as vice president of the McGill Chapter in Montreal from 2016–2018. Boudreault is chair of the Committee on Global Outreach and served on the executive, awards, and development committees. As chair of Polar Knowledge Canada, a national agency, he is engaged in understanding the impacts of climate change and practices international science diplomacy. He was inducted into Sigma Xi in 2006.

Peppas, of The University of Texas at Austin, is a researcher in biomaterials, drug delivery, and chemical/biomedical engineering with 137,000 citations (H=173). Inducted in 1973, he was the Purdue University Chapter president and awarded the Sigma Xi Monie A. Ferst Award. He is a member of the National Academy of Engineering, National Academy of Medicine, National Academy of Inventors, and American Academy of Arts and Sciences, plus European, Chinese, Canadian, French, Spanish, and Greek academies. He is deputy editor of *Science Advances* and past president of groups such as the Society for Biomaterials.

Sigma Xi Today is
managed by Heather Thorstensen
and designed by Dena Verdesca.

From the President

Join Us in Finding Solutions through Research

Dear Sigma Xi members,

This summer, the world has been challenged to address both racial inequality and the COVID-19 pandemic. Sigma Xi and other scientific organizations have issued, and signed on to, statements supporting equity and inclusion in scientific research. Scientists, some of whom are members of Sigma Xi, are leading the search for a vaccine or treatment for COVID-19. The bottom line is that the research we do is foundational to creating the new knowledge required to address problems in our society. It is more important now than ever that as Sigma Xi members we redouble our research efforts to provide a path to solutions to address society's challenges. It is also important that we communicate those solutions to the public and wider research community. Paraphrasing the words of Representative John Lewis, we must "never be afraid to make some noise and get in good trouble, necessary trouble" on behalf of science.

The Sigma Xi Annual Meeting and Student Research Conference is coming up on November 5–8 and will provide a perfect platform to share the work we're doing to achieve solutions. Given that this is now a virtual event, we can reach audiences who may not have been able to attend the conference in person. I urge you to register and share the invitation. At the meeting, we will explore the benefits of interdisciplinary collaborations that can push our research to the next level with new perspectives and ideas. The theme, *Hacking the Brain: The Intersection of Art and Neuroscience*, places emphasis on collaborations between the arts and science, technology, engineering, and math (STEM). Abstracts for virtual student poster presentations will be accepted through October 1.

Sigma Xi has set a priority in its strategic plan to cultivate a diverse and inclusive research community. Sigma Xi's Statement on Racial and Social Justice says, "we have a responsibility to advocate for equity and inclusivity in all segments of society." Whether at the local level or at the global level, it is our duty to encourage all qualified scientific researchers to become members of Sigma Xi, to be active participants in promoting the well-being of the research sector, and to create a welcoming community for each other so we can benefit from each other's perspectives and knowledge.

Our core values—excellence, integrity, diversity, scholarship, leadership, and cooperation—are embodied by so many of our colleagues and students. Sigma Xi always welcomes more, and diverse, voices who will speak up for research and promote science to the public and to policymakers. Who could you honor with a nomination for membership? Thank you for your commitment to research excellence.



Sonya Smith

Sonya T. Smith

Using How We See, Hear, and Move for Research

Can using what we know about how our minds process visuals, sounds, and movement attract more people's attention to science, technology, engineering, and math (STEM) topics? What are we learning about the human brain that could advance your research? The keynote speakers, listed below, at the virtual Sigma Xi Annual Meeting and Student Research Conference from November 5–8, 2020 will explore these questions and more. Find details and register at <https://www.sigmaxi.org/amsrc20>.



ANJAN CHATTERJEE
University of Pennsylvania

The Aesthetic Brain: On Beauty, Buildings, and Art

We are surrounded by people, places, and things. Chatterjee will review the basic conceptual underpinnings of neuroaesthetics, a relatively new field that examines the biological bases for aesthetic experiences. He will argue that our brains respond automatically to our aesthetic environment, and discuss recent results from his lab that focus on the neuroaesthetics of faces, architectural interiors, and art. He will also discuss the implications of our automatic responses on the relationship between our environment and our sense of well-being.



RACHAEL CUSICK
WNYC Studios' *Radiolab*

Searching for Genius

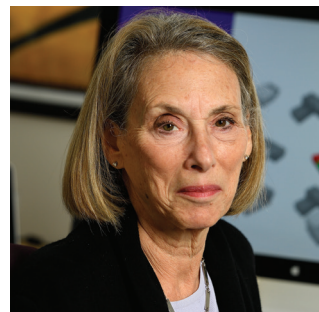
Cusick will discuss "Radiolab Presents: G," *Radiolab's* 2019 documentary series on intelligence, which had her diving into the oddest search for genius the world has ever seen. Notably, the series explored how art and science together have unlocked mysteries that neither could have accomplished alone. Her team collaborated with artists for original music, illustrations, and voice acting to present scientific ideas in vivid and emotionally resonant ways. The result was a powerful journey through IQ tests, eugenics, the secret to genius in Albert Einstein's brain, and much more.



LARRY S. SHERMAN
Oregon Health and Science University

Every Brain Needs Music: A Lecture and Performance

The human brain has the unique ability to create, perform, and listen to music. Recent studies indicated that practicing and performing music can significantly impact how nerve cells are formed, how they transmit their signals, and how they connect with one another. These findings have implications for how music can influence brain development and brain repair in people with brain injuries and neurodegenerative diseases. These topics will be discussed in combination with live music.



BARBARA LANDAU
Johns Hopkins University

When an Amnesic Artist Remembers

Classical theories of memory, starting with patient H.M., suggest two distinct kinds of memory: declarative (i.e. factual) and non-declarative (including skills), that can be differentially impaired after damage to the hippocampus. Landau will explore the case of a highly accomplished graphic artist who sustained major damage to the hippocampus, leaving her with significant amnesia. This case allows us to probe how the brain represents factual knowledge of art, as well as the practice of art, including underlying skills.

What Can Art and Science Achieve Together That Neither Could Accomplish Alone?

This year's conference theme will be *Hacking the Brain: The Intersection of Art and Neuroscience*. Talks, workshops, and panel discussions will explore interdisciplinary research investigating how we see, hear, and move. Other sessions will be organized under the following tracks: Research Ethics; Research Enterprise and Professional Development; and Science Communication, Education and Public Engagement. The conference also includes a College and Graduate School Fair, to help students explore higher education options, and a public STEM Art and Film Festival.

Grants in Aid of Research Recipient Profile: Anne Xuan-Lan Nguyen

Grants: \$5,000 total in Fall & Spring 2019–2020, with designated funds from the National Academy of Sciences

Education level at the time of the grant: First-year medical student, undergraduate

Project Description: These grants have allowed me to investigate vision-related research questions. The goal of these studies is to inform the general public, patients, health care professionals, and the scientific community, as well as health administrators, on 1) the potential effects of heavy metals on the eyes, and 2) the impact of ethnicity and race on surgical outcomes.

1) Toxic exposure to metals can lead to deadly conditions and highly impact patients' quality of life. Our goal is to assess the potential relationship between ocular diseases and abnormal metal levels, which can be due to work exposure and other environmental factors. We have data-



Anne Xuan-Lan Nguyen

mined a large-scale database in order to assess the potential relationship between metals and ocular diseases.

2) Identifying racial determinants of health is imperative for understanding patient care and treatment outcomes. Ophthalmology is a unique specialty in medicine with complex follow-up parameters that can yield invaluable data for patient care. While mining of electronic health records using automatic patient stratification is increasingly

popular in medicine, this precision health approach is fairly new in ophthalmology. We are currently exploring this methodology on a large dataset in order to answer our research questions.

How the projects have influenced you as a scientist: I would like to thank Sigma Xi for funding my vision-related research projects. These grants have encouraged me to pursue a career as a clinician–scientist. Working in the laboratory of Dr. Albert Wu, an ophthalmologist at Stanford University, has reinforced my desire to bridge the gap between ophthalmology, research, and public health.

Where are you now? I am a second-year medical student at McGill University and am the Med-2 representative for the Medical Student Society Ophthalmology Interest Group at McGill. I am passionate about health innovation, education, and research. Outside of the classroom, I can be found leading volunteer initiatives, playing ultimate frisbee, and organizing global health projects.

Students may apply for Sigma Xi research grants by March 15 and October 1 annually at <https://www.sigmaxi.org/giar>.

How Academic Communities Can Address Inequitable Student Outcomes

As protests were being held across the United States for racial and social justice in early June, Robbin Chapman gave a public, livestream lecture on the roles that academic institutions, faculty, and others in science, technology, engineering, and math (STEM) can play in improving inequitable STEM student outcomes.

Chapman was wrapping up her two-year term as a Sigma Xi Distinguished Lecturer. She is an associate dean of Diversity, Inclusion, and Belonging at the Harvard Kennedy School. She is also an adjunct associate professor of education at the Graduate School of Education at the

University of Pennsylvania.

The lecture, “Rendering the Invisible Visible: Student Success in Exclusive Excellence STEM Environments,” was cohosted by the Linda Hall Library and the Kansas City Sigma Xi Chapter.

Chapman described institutional bias as consisting of positive bias, which elevates certain groups, and negative bias, which normalizes unfair treatment of other groups. Both types need to be noticed.

“What are the institutional drivers of inequity that for many of us are either invisible, or it’s just the water we swim in and we don’t realize that it’s

having a real impact on real people?” she asked.

Chapman says that the opposite of exclusive STEM communities are inclusive communities, which engage in self-growth and have “intentional and sustained engagement across an academic community.” She provided examples of what people at higher education institutions can do to improve their inclusiveness to support underrepresented minority students.

Distinguished Lecturers are available as speakers for Sigma Xi chapter events. Chapters may apply to Sigma Xi by March 1 for a subsidy that pays a portion of the cost to host a lecturer. Chapman’s lecture recording can be found at <https://www.sigmaxi.org/news/article/chapman-lecture>.

Advice for Virtual Research Presentations

Students who participated in the Society's Virtual Student Scholars Symposium (VS³) in May, and Sigma Xi members who judged, share their advice for students giving virtual research presentations. The next virtual student presentation opportunity will be the Society's Annual Meeting and Student Research Conference, November 5–8, 2020. Students may follow instructions at <https://www.sigmaxi.org/src> to submit abstracts for virtual poster presentations through October 1.

You definitely want to discuss the significance of your research and where it fits in the bigger picture. Try to answer the question, "Why should I care?" . . . People can't step closer to read your poster the way they can in person, so using big font sizes makes it a lot easier for evaluators. This means you may have to cut down on words or pick and choose certain illustrations or graphs to include.

— Hanna Kiryluk, Student, Virginia Beach, Virginia

Avoid placing important information at the bottom of the slides, because when sharing the screen, toolbars may appear and cover that portion. Use animated arrows to point out the information to be emphasized because sometimes the cursor can't be seen when sharing the screen.

— Miguel G. Rodriguez Reyes, Student, Guayama, Puerto Rico

The presenter might also consider making sure to design the presentation to be inclusive of individuals who have special visual or auditory needs. For example, designing figures with color deficient/color blind-compatible palettes.

— Robert Youker, Judge, Cullowhee, North Carolina

I would recommend practicing your presentation beforehand using the appropriate virtual platform with a friend or family member, so that you know how your audience will view your presentation and any adjustments that you might have to make.

— Ángel Garcés, Student, Houston, Texas

When the student finishes talking, the judge should know 1) what they did, 2) why they did it, 3) how they did it, 4) what their results were, and 5) why the results are important.

— Stephanie Tristram-Nagle, Judge, Pittsburgh, Pennsylvania

Several digital tools like PowerPoint and Zoom allow you to record your presentation. You can record and play back your practice presentation to experience it for yourself from the audience's perspective . . . Make sure that you are well lit, the camera is in a good position, and there is no background noise. Also check that your background appears professional: A blank wall, simple painting or bookshelf, or Zoom background image from your school can be good choices that won't distract the audience.

— Jennifer Patterson, Judge, Leuven, Belgium

If I think of a presentation as a big scary separate *thing*, then I'll freeze up, forget what to talk about, and get nervous. But if I remember that all I need to do is tell people about my research, then I gain confidence. I never memorize what I'm going to say, because then I would get stressed if I forgot something. Instead, I memorize the basic points I'm going to cover, and then I explain them in my own words.

— Kaija Gahm, Student, Newton, Massachusetts

During virtual presentations, presenters receive less feedback from the audience, and audiences can be distracted more easily. To overcome the challenges, presenters can 1) use a mouse pointer or stylus to guide the audience, 2) tell an interesting story to improve engagement, 3) limit the number of messages to be delivered, and 4) speak clearly and concisely.

— Yuebing Zheng, Judge, Austin, Texas