Interdisciplinary Training Program in Auditory Neuroscience

Information Sheet
Summer 2018

OVERVIEW
This Interdisciplinary Training Program in Auditory Neuroscience will provide graduate student training and research experience at the interface of science and engineering, and in both humans and animal models. This training program will prepare students for independent research careers that can advance our understanding of auditory system function using innovative tools and technologies. It is expected that graduates of this training program will develop creative solutions, devices and strategies to assist and prevent hearing loss in human patients.

BASIC LOGISTICS

- This NIH NRSA T32 Training Grant from the National Institute on Deafness and Other Communication Disorders (NIDCD) begins July 1, 2018.
- Training-grant slots generally provide student funding for 2 years (assuming adequate progress on an auditory neuroscience project after Year 1).
- There will be two new slots each year, with slots running from July 1- June 30.
- Each year, funded trainees receives a tuition waiver, a stipend at the NIH NRSA level*, travel money ($800) for a conference/course/workshop, and some discretionary money ($4200, to cover health insurance and training expenses, e.g., computer, lab supplies/expenses, supplemental travel, etc.).
- Eligibility criteria for training-grant funded slots are:
  - The trainee must be a citizen or a noncitizen national of the United States, or have been lawfully admitted for permanent residence.
  - Students may enter the Training Program in their 2nd or 3rd year of their PhD program (MD/PhD students may enter in 1st year of the PhD portion of their joint degree).
  - Students may enter from one of 6 Graduate Programs (BIO, BME, CHEM, ECE, PULSe, SLHS).
- Funded students will participate in the Interdisciplinary Training Program in Auditory Neuroscience throughout their entire PhD program (i.e., even after training-grant funding ends).
- Students working on relevant projects that are funded from other mechanisms are also encouraged to join and participate in the Interdisciplinary Training Program in Auditory Neuroscience (i.e., you do not need to be funded from the training grant to participate in the Training Program).

TRAINING PROGRAM FACULTY

**Auditory Neuroscience**
- Josh Alexander, PhD (SLHS)
- Edward Bartlett, PhD (BIO/BME)
- Ximena Bernal, PhD (BIO)
- Hari Bharadwaj, PhD (SLHS/BME)
- Donna Fekete, PhD (BIO) [co-Director]
- Michael Heinz, PhD (SLHS/BME) [co-Director]
- Ananthanarayan (Ravi) Krishnan, PhD (SLHS)
- Jeffrey Lucas, PhD (BIO)
- Mark Sayles, MD, PhD (BME/SLHS)
- Elizabeth Strickland, PhD (SLHS)
- Thomas Talavage, PhD (ECE/BME)

**Technology Innovators**
- Alexander Chubykin, PhD (BIO)
- Meng Cui, PhD (ECE/BIO)
- Pedro Irazoqui, PhD (BME/ECE)
- Hyowon (Hugh) Lee, PhD (BME)
- Zhongming Liu, PhD (BME/ECE)
- Scott Pluta, PhD (BIO)
- Mathew Tantama, PhD (CHEM)
- David Umulis, PhD (ABE/BME)
**NIH ABSTRACT**

There is a national need to advance the understanding of hearing in both healthy patients and those with various causes of hearing loss. The objective of the proposed program is to train the next generation of faculty who could populate colleges of science, engineering, and health sciences, as well as to send graduates into industry prepared to work toward creative solutions for treating hearing loss. Specifically, in order to advance auditory neuroscience training, this new graduate program will leverage faculty expertise in basic hearing science and technology development, from three Purdue University colleges (Science, Engineering, and Health & Human Sciences) and 6 doctoral admissions programs. Two types of investigators are included in the training program: 11 hearing scientists with focused research programs related to auditory system neuroscience, and 8 technology innovators who are trained in other disciplines (electrical, computer and biomedical engineering, and chemistry). Collectively and collaboratively, the program will expand knowledge about mechanisms at the molecular, cellular and systems levels that underlie auditory information processing. This fundamental knowledge can then be applied to better understand the changes that lead to pathologies of the auditory system due to damage, disease, aging, and congenital disorders, as well as understanding how hearing evolved and influences behavior and natural selection. Technological approaches to these questions include, but are not limited to, fluorescent sensors to detect purinergic signaling in the intact nervous system, biological implants for neuromodulation, high-resolution four-dimension calcium imaging deep in the mammalian brain, optogenetics and robotics (automated patch-clamping) for brain circuit analysis, and multimodal brain imaging methods. This training program is unique in that it is specifically designed to serve students with undergraduate degrees in the disparate disciplines of life science, physical science or engineering, and merge them into a unified cohort focused on auditory neuroscience. Students will be selected for a 2-year term on the training grant, beginning at the start of their second (or third) year. The training curriculum includes 4 core courses (one each in neuroscience, the auditory periphery, central/perceptual aspects of hearing, and signal processing), several recommended courses (e.g., in neurosurgery or neuroscience), a weekly Hearing Science seminar series, and yearly attendance at extramural hearing-related courses and/or auditory neuroscience conferences. In addition to administrative support for the program, the Purdue Institute for Integrative Neuroscience will provide students with additional resources, such as supervised grant writing, hands-on training in animal behavior and human stem cells, annual neuroscience retreats, and access to in-house competitions for travel grants and pilot funding for collaborative projects. Further, this program builds on Purdue’s extensive history in training graduate students in collaborative research (particularly in hearing science and technology development), and preparing these students for successful research careers in academia, industry and the clinic.

**PURDUE TODAY NEWS RELEASE**

**New NIH training grant to enhance auditory neuroscience and innovative technology research at Purdue**

April 25, 2018

The National Institute on Deafness and Other Communication Disorders (NIDCD) has awarded a $814,703, five-year grant to Purdue University through the National Institutes of Health’s flagship training program, the Ruth L. Kirschstein National Research Service Award (NRSA) Institutional Research Training Grant (T32).

The “Interdisciplinary Training Program in Auditory Neuroscience” grant will fund a training program at the intersection of auditory neuroscience and innovative technologies, such as neuroimaging, stimulation devices, electrophysiology and mathematical modeling. Graduate students will be recruited from five different graduate programs within the Colleges of Science, Engineering and Health and Human Sciences, and from the Graduate School’s Interdisciplinary Life Science (PULSE) program. The training program is expected to help increase research synergies between life science and engineering on the West Lafayette campus.

Four predoctoral students per year will receive tuition and stipend support, along with enhanced student coursework, training and research experiences in both animal models and humans. Ultimately, the training program is expected to prepare students for independent research that advances understanding of auditory system function using innovative tools and technologies, and that develops solutions, devices and strategies to assist and prevent hearing loss in human patients.

As the program’s co-directors, Donna Fekete, professor of biological sciences, and Michael Heinz, professor of speech, language and hearing sciences and professor of biomedical engineering, leveraged faculty expertise and resources associated with the Purdue Institute for Integrative Neuroscience in their application to NIH.

As part of an effort by the Office of the Executive Vice President for Research and Partnerships to support faculty efforts in applying for NIH Institutional Training Grants (T32s), grant writer Patrick Hein also played a key role in preparing the proposal.