

# The daVinci Project 2024

## (Workshops)

### - **Understanding Pain: An Unpleasant Sensory and Emotional Experience in Your Brain**

- **Faculty:** Dr. Bin Feng
  - The current epidemic of prescription opioid abuse can be tracked back to more than a decade ago, when chronic pain became accepted as a disease of its own right and doctors started to prescribe opioids to patients for the humane need of managing pain. In this workshop, teachers will gain hands-on experience on pain as an unpleasant sensory and emotional experience in the brain. In particular, we will demonstrate that pain can be evoked in the absence of any tissue injurious stimuli using a thermal grill device as shown in the above figure. Teachers will learn how to build a low-cost thermal grill of their own, including fundamentals of CAD modeling using the free software Blender ([blender.org](https://blender.org)) and 3-D printing. In addition, teachers will be introduced to the recent advances in various neuromodulation techniques as non-pharmacological alternatives for treating chronic pain.
  - **Fellowships Available:** one (1)
  - **Recommended For:** This workshop is recommended for Biology, Physics, General Science, and Technical Education teachers.
  - **Host Department Major:** Biomedical Engineering
- ### - **Environmental [In]justice Workshop:**

- **Faculty:** Dr. Randi Mendes
- Join us for a workshop looking at environmental justice and injustices that occur in the past and continue to occur in society. Learn more about how different practices we view as "normal" are in fact racist or oppressive to different communities, and what we can do about them. Also, learn how engineers take part in environmental justice and society and how we can apply these lessons in a classroom setting.
- This workshop will be able to accommodate up to 10 teachers.
- **Fellowships Available:** two (2)
- **Recommended For:** This workshop is highly recommended for Environmental Science, Biology, Chemistry, and General Science teachers.
- \*\* Schools could also bring Social Studies or History Teachers, and even collaborate with their peers on interdisciplinary or crosscutting lessons.
- **Host Department Major:** Environmental Engineering
  - Randi Mendes, Ph.D.
  - She | her | hers
  - Environmental Engineering
  - UConn TAB – Community Liaison
  - [Uconn-tab@uconn.edu](mailto:Uconn-tab@uconn.edu)
  - UConn School of Engineering
  - [randi.mendes@uconn.edu](mailto:randi.mendes@uconn.edu)
- **Cybersecurity: Making decisions that keep you safe**
  - Are you concerned about online security and privacy? Do you wonder how may we promote secure online behavior

among your students? If the answer is yes, then this workshop is for you.

- This workshop will explain risk communication and intervention techniques that focus on promotion of secure behavior, detection and prevention of social engineering attacks such as phishing attacks, and mindful usage of social media. You will learn how to design intervention videos/materials, and test their efficacy through user studies. By the end of the workshop, we will learn how to design educational videos that you can use to promote cybersecurity in your school, and design future class projects.
- You can find two sample videos designed in our lab in the past here:
  - [https://www.youtube.com/watch?v=J\\_u6a4ImklM](https://www.youtube.com/watch?v=J_u6a4ImklM)
  - [https://www.youtube.com/watch?v=Z\\_3wd8VGDqI](https://www.youtube.com/watch?v=Z_3wd8VGDqI)
- This workshop will be able to accommodate up to 20 teachers.
- **Fellowships Available:** four (4)
- **Recommended For:** This workshop is highly recommended for anyone who is concerned about online privacy, usage of social media, and cybersecurity in general.
- **Host Department Major:** Computer Science and Engineering
  - Dr. Mohammad Maifi Khan
  - Associate Professor
  - Department of Computer Science and Engineering
  - University of Connecticut
  - [maifi.khan@uconn.edu](mailto:maifi.khan@uconn.edu)
- **Innovative Engineering and National Security**
  - **Faculty:** Dr. Mohammad Maifi Khan

- This workshop focuses on innovative engineering solutions to current national security area's particularly one worked on by the Department of Defense. Teachers will learn the complexity and multi-domain nature of current STEM national security questions. Participants will be introduced to advances in air, undersea, and cyber capabilities, and how to integrate these technologies into the classroom to both make STEM learning fun and to convey a sense of the importance knowing engineering for keeping the country safe and secure.
- **Fellowships available:** This workshop will be able to support four (10) teachers (up to \$600 per participant will be covered by an NSF grant).
- This workshop is highly recommended for General Science teachers, Computer Science or Robotics teachers, English or Ethics teachers
- **Host Departmental Major:** School of Computing
  - Dr. Mohammad Maifi Khan
  - Associate Professor
  - Department of Computer Science and Engineering
  - University of Connecticut
  - [maifi.khan@uconn.edu](mailto:maifi.khan@uconn.edu)
- **Bioinformatics**
  - **Faculty:** Dr. Mukul Bansal
  - Over the past few decades there has been tremendous progress in the ability to sequence genomic information and gather vast quantities of data related to the molecular processes within cells. As a result, biology has now become an information science, with computational, mathematical, and statistical techniques all playing a critical role in

discovering new biology, improving medicine, and understanding how life evolves and works.

- In this course, we will discuss the application of computational algorithms to important problems in biology and medicine. The first half of the course will provide a broad overview of bioinformatics and discuss some exciting, cutting-edge topics in bioinformatics. In the second half, participants will learn how genomic sequence information can be used to reconstruct the evolutionary histories of the millions of species on Earth.
- Participants will learn how to download and assemble their own sequence datasets and will learn how to apply computational algorithms to reconstruct the evolutionary relationships between their species of interest. This hands-on activity can be easily replicated in high-school classrooms.
- **Fellowships available:** N/A
- This workshop is highly recommended for Biology and Math teachers.
- **Host Departmental Major:** Computer Science and Engineering
  - Dr. Mukul Bansal
  - Associate Professor
  - Department of Computer Science and Engineering
  - University of Connecticut
  - [mukul.bansal@uconn.edu](mailto:mukul.bansal@uconn.edu)