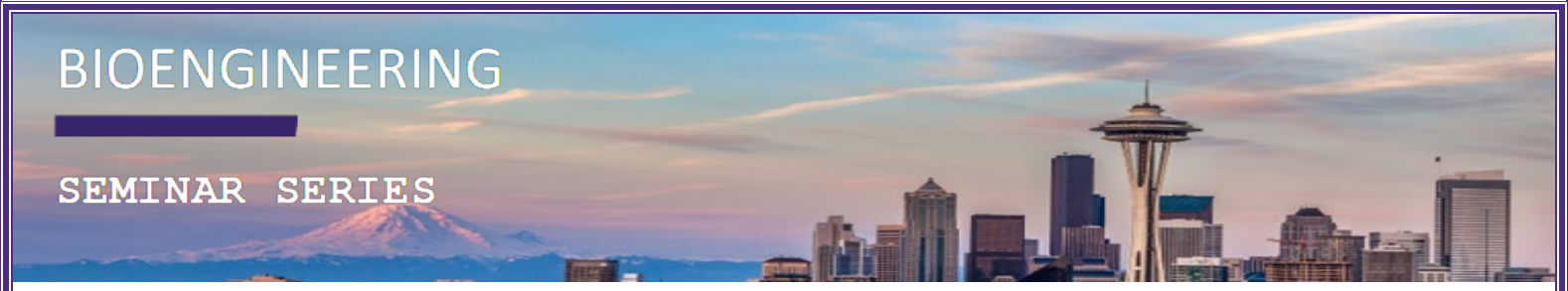

Zach Danziger, Ph.D.

Associate Professor, Emory University
Department of Rehabilitation Medicine &
W.H. Coulter Department of Biomedical Engineering

February 22nd, 2024

12:30 – 1:00 PM Coffee/Pastry Mixer
1:00 – 1:50 PM, Foege N130
live stream: https://washington.zoom.us/j/94375637567

"Learning and Control in High-Dimensional Human-Machine Interfaces"

ABSTRACT: This talk explores how people learn to operate systems with high-dimensional input. Consider the following problems: A brain-computer interface maps the activity of many individual neurons into movement instructions for a computer cursor. What is the best method or algorithm for "decoding" the neural activity into cursor movement? Does the way we tune the decoding algorithm on static example data matter when once a user is engaged with the brain-computer interface and feedback is available? How can we even study this situation when people generally do not like to volunteer to have brain-penetrating electrodes implanted in their heads? We will discuss the development of hybrid models that pair machine learning with human subjects in closed-loop to create a framework for studying these questions rigorously. This yields insights about what aspects of decoding algorithms are important for good performance and which are irrelevant, and the importance of incorporating human learning into models and analyses that address these questions.

BIO: Zachary Danziger is an Associate Professor at Emory University in the Department of Rehabilitation Medicine – Division of Physical Therapy and the W.H. Coulter Department of Biomedical Engineering. He focuses on developing models and theory to understand how people learn to interact with and control high-dimensional systems (i.e., systems that require many inputs, like brain-computer interfaces, and systems that have many controllable parts, like robot arms or hands). His areas of interest in neural control of complex movement include both artificial systems and natural systems physiology (e.g., reflex coordination to control the lower urinary tract). He trained in motor learning at Northwestern University and neural control of the urinary tract at Duke University. His work has been funded by multiple NIH institutes (including NINDS, NIDDK, and the Common Fund), the National Science Foundation (CMMI-M3X) and the Craig H. Neilsen Foundation. His service focuses on biomedical ethics, including authoring the BMES Code of Ethics, co-chairing the 9th International Conference on Ethics in Biology, Engineering, and Medicine, and serving as key personnel on an NSF-funded ethics community of practice.