BIOENGINEERING
Faculty Candidate Seminar

Date: **Monday, February 1, 2021**
Time: **12:00 pm - 1:00pm**
Location: **Virtual**

Join Zoom Meeting—

Meeting ID: 988 0549 4005 Passcode: 454698

Emily Petrus, Ph.D.

Biography: Emily Petrus is a postdoctoral research fellow in the Laboratory of Functional and Molecular Imaging in the National Institute of Neurological Disorders and Stroke (NINDS) at the National Institutes of Health (NIH) in Bethesda, MD. She obtained her BS from Wagner College on Staten Island, NY, pursued MS credits at the University of Bucharest in Romania, and then a PhD in Neuroscience in 2014 from Johns Hopkins University. Her PhD thesis studied the neural circuitry underlying cross-modal plasticity, a phenomenon that enhances spared senses after loss of one sensory modality. Now Emily studies the synaptic, circuit, and systems level adaptations that the adult brain employs to recover after injury. A mouse model of whisker denervation mimics responses observed in patients after unilateral stroke or amputation. By describing the specific synapses, neurons and circuits the brain uses to adapt after injury she hopes to develop more targeted therapies to enhance recovery after these events. Emily is funded by a K99 Pathway to Independence award from NINDS and is seeking a tenure track assistant professor position.

Title: Functional and Specific Recruitment of Synaptic Plasticity after Unilateral Denervation

Abstract: Unilateral loss of sensation causes widespread modifications in the brain, with dramatic changes in bilateral primary sensory cortex. The intact cortex undergoes a re-activation of plasticity usually reserved for the critical period in brain development, while the deprived sensory cortex is recruited in response to intact sensation. Human patients experience a variety of responses to these unilateral injuries, with adaptive plasticity underlying incorporation of prosthetics into daily life and enhancement in sensory processing of the spared limb. Maladaptive responses include chronic pain conditions like phantom limb pain or impaired motor recovery. These phenotypes are observed in humans after unilateral stroke, nerve damage or amputation and have been reproduced in a mouse model by cutting whisker nerves. We hypothesized that the connectivity of neurons and the adaptations they experienced may indicate the type of plasticity observed in this rodent model of amputation. Indeed, neurons underlying beneficial adaptation of somato-motor function experienced modifications which support the theory that the bilateral changes in cortical activity should enhance sensory processing of the intact whiskers. These findings will guide future experiments and attempt to find therapies which may target specific groups of neurons or brain regions which may enhance recovery after injury.