Course Announcement!

NeuroEngineering (ENGN1220)

Spring 2011

Professors: Leigh Hochberg and Arto Nurmikko

Course Goals:
To develop an advanced understanding of how signals are generated and propagated in neurons and neuronal circuits, and how this knowledge can be harnessed to design devices to assist people with neurologic disease or injury.

Fundamental topics include:
Neuronal action potential generation, field potential generation, methods of recording single neuron activities (intracellular and extracellular), basics of functional neural microcircuits, methods of recording multiple neurons simultaneously, principles of neural stimulation (electrical, magnetic, photon-based), neural coding/decoding.

Clinical/Translational topics include:
Electroencephalography (EEG), electrocorticography (ECoG), magnetoencephalography (MEG), structural and functional neural imaging (MRI, fMRI), cochlear implants, retinal prostheses, transcranial magnetic stimulation (TMS) and transcranial direct current stimulation (tDCS), brain-computer interfaces (BrainGate, P300-BCI, and other BCIs), acute stroke therapy, functional electrical stimulation, deep brain stimulation, neurointensive care, design and regulatory issues in Neurotechnology, bioethics and Neurotechnology,

Prerequisites:
NEUR 0010 and ENGN 0510. Waivers may be provided after discussion with course faculty. This is an upper level course, designed for sophomores, juniors, seniors, and graduate students.

Teaching and Evaluation:
The course is team-taught by a neurologist/neuroscientist/neuroengineer (Dr. Hochberg) and a physicist/electrical engineer/neuroengineer (Dr. Nurmikko). Lectures are supplemented with “Master Classes” led by renowned experts in translational neuroengineering, as well as site visits to the Brown MRI facility and the Neuro Intensive Care Unit at Rhode Island Hospital. Course readings accompanying each lecture are selected from key textbooks and papers. Homework, take-home midterm and take-home final exam.

Questions? Contact course administrator Sandra Van Wagoner (svw@brown.edu)