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**Syllabus**

**EN.500.111 Section 9**

**Melding Mind and Machine:**

**Exploring Neurotechnologies that Can Read Our Minds and Alter Our Brains**

**Fall, 2014**

**(1 credit)**

**Description**

In this course, we will explore technological developments which have allowed us to measure and manipulate brain activity. In the first part of the course, we will study brain computer interfaces that record signals from the brain and use those signals to perform a task. We will cover the basic principles of such devices and review the cutting-edge research that is being conducted at Hopkins as well as around the world. In the second part of the course, we will study neuromodulation technologies. These technologies will include transcranial magnetic stimulation, deep brain stimulation, and optogenetics. We will explore how neuromodulation has been used as both a tool to study the brain and a treatment for brain disorders.

**Prerequisites**

None

**Instructor**

Robert Yaffe, [yaffer@jhu.edu](mailto:yaffer@jhu.edu)

**Meetings**

Thursdays, 5:00–7:00 pm, Maryland 110

**Online Resources**

Please log in to Blackboard for all materials related to this course.

**Course Objectives**

1. Students will learn about the basic principles of brain computer interfaces
2. Students will learn about neuromodulation technologies
3. Students will learn about ongoing research in these areas

**Course Topics**

* Invasive BCI
* Non-invasive BCI
* The p300 response
* SSVEP (Steady state visual evoked potentials)
* Emotiv EEG
* Ethics of BCI
* Deep brain stimulation
* Transcranial magnetic stimulation
* Optogenetics
* Ethics of neuromodulation
* Brain-to-brain interface
* And more!

**Course Expectations & Grading**

This course is graded Pass/Fail (S/U). Attendance is mandatory. Please let the instructor know if you will miss a class. Your grade will be determined based on attendance and class participation. We will have many discussions, so there will be plenty of opportunities for participation. There will be assigned readings/videos each week. Come to class prepared to discuss that week’s topic.

**Key Dates**

No class on October 16th. No class on November 6th. Makeup class December 4th.

Tentative Schedule

October 9th: Intro to BCI

October 23rd: p300 and SSVEP based BCIs

October 30th: Demo of Emotiv EEG BCI

November 13th: Deep brain stimulation and transcranial magnetic stimulation

November 20th: Optogenetics

December 4th: Brain-to-Brain interfaces

**Assignments & Readings**

These will be posted on the Blackboard site for this course.