ECE 421 – Neural Interface Engineering

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UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Grades

	4 credit hours
Homework	15%
Exam 1	20%
Exam 2	20%
Final Exam	30%
Graduate Project	**15%**

4 credit course = 6hrs per week

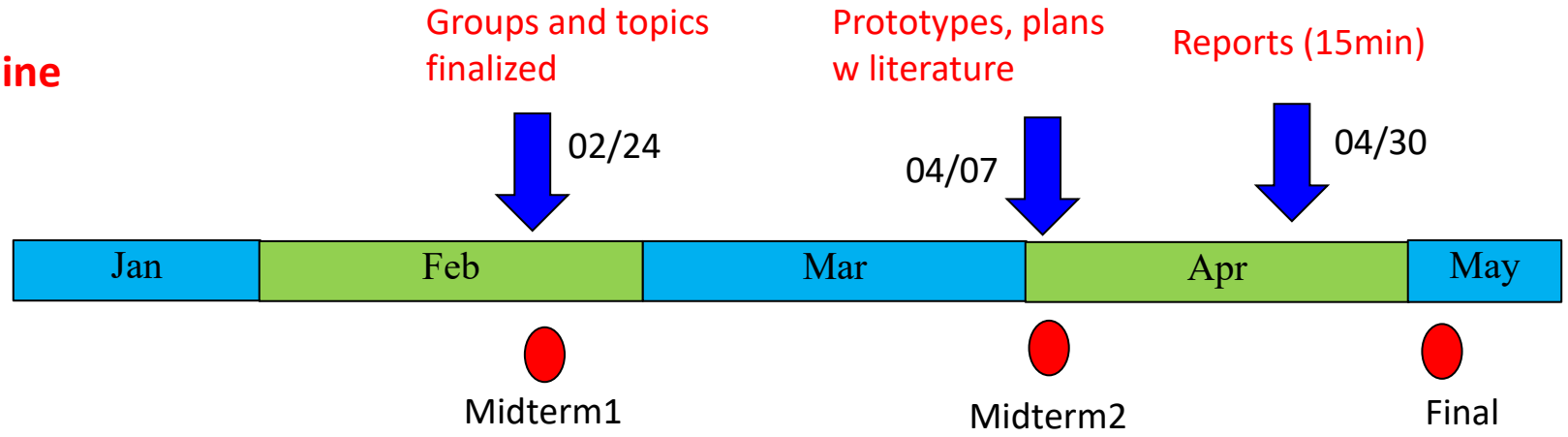
Graduate students project

4 credit points total

Taking this option, you will:

- Research topic
- Compile information
- Discuss at midterms
- Report during last 2 lectures

Timeline



Deadline 1 : Feb 24 - by email

By **Feb 24** EOD please send me an email with the following information

a. title
b. your team (if any)
c. brief description of your proposal

You can choose from any areas we touched upon in the lecture course including those not yet discussed in the class.
Project can be of different type including

- literature review on progress – pros and cons
- business assessment for specific BMI
- coding effort for decoding of brain activity from existing datasets
- anything else of interest to the lecture course or a combination of the above

Most importantly it should be focused on Brain Machine Interface engineering problems: record neural activity → decode →compute control action → generate control signals → encode into spikes →stimulate brain activity

Examples of previous topics

- EEG-Based Emotion Recognition for Brain-Machine Interface Application
- Retinal Prosthesis: Business Case
- Robust EEG-based hand movement classification algorithm with electrodes being sparsely placed and roughly aligned
- Cochlear Prosthetics: An Analysis of its Developments and Potential Advancements
- Spike sorting and its role in brain-computer interfaces
- Brain EEG signal decoding using Machine Learning
- The present and future of large-scale cortical implant
- Cochlear implants' design with a focus on signal processing and their efficacy in different demographics.

Deadline 2 : April 7- by email

By April 7 EOD please send me email with the following information:

Extended description of your material for the proposal.
Can be in the form of a text with paragraph titles and subtitles or power point slides deck or a snapshot of your code

Most importantly: From this description I should be able to understand the current status of your project, where you are heading, what is left to do, and how I can help

Deadline 3 : April 28 – final report

By **April 28** EOD please email me your final paper report as a pdf attachment

In preparing the report for your graduate project please use the template.
The total length of the report is 5 pages not counting references. The report is divided into sections and subsections - two examples (not necessarily to follow exactly) are here:

literature review example
coding example

Use figures and tables as you see fit to describe your findings. Do not cut and paste large figures form publications. Instead use only critical parts of the figures or, even better, your own drawings and sketches.

If you are doing a coding project- preferably in Python and ideally in the Jupyter notebook format that later generations of students can perhaps use it in the class.

Final deadline 4 : April 30 PPT presentation

Your Powerpoint presentation is due by Thursday, April 30 **before** the start of the class. You have to send the ppt file to me before the start of the class to be able to present from my computer.

Prepare a Powerpoint presentation describing your report findings using the same sections/subsections and figures/tables as in your written report. In your preparation for in-class oral presentation target 10 minutes concise presentation. Presentations will be assessed for clarity and logic to be included in the overall grade.

All graduate students **should be present** in the class for both Friday, April 30 and Wednesday, May 5 presentations. You will be asked to rate the presentations of each group during the class following a google doc questionnaire – so please bring your laptops in the class with you.