**Final project: current topics in neural engineering**

**Assignment:**

Choose a neural engineering system. Existing neural engineering designs may be on the market already, in clinical or pre-clinical testing, or entirely theoretical. You will delve into the existing systems, and describe the steps needed to take one experimental or theoretical system to clinical use.

I have given some project ideas in the topic listing document.

**Sections**:

* What **treatment need** does the neural engineering solution address?
  + What condition or conditions would the user base have?
  + What non-engineering treatments exist? What do they do?
  + Why are other solutions inadequate?
* What **existing** **designs** meet this need? These may be on the market, or in clinical or pre-clinical testing. You do not need to be comprehensive.
  + What are the basic components of the design? Sensors, decoders, stimulators, actuators, power?
  + If there are multiple designs to meet the same need, how do they differ from each other?
  + If they are already in wide use – how are they used clinically?
  + If they are not already in wide use – why not? What would it take to get there?
* What are the relevant features of the **body** for this system?
  + What parts of the nervous system?
  + What other parts of the body?
  + What are the specific sensory and motor functions?
* Consider a pre-clinical or theoretical design. What **components** does your desired design have?
  + What kind of hardware does it use?
  + What kind of interface does the user use?
  + What kind of software does it need?
  + Where does it get power?
  + How does it record from the body?
  + How are these verified to be safe?
* What is the **current research** on this disease or neural engineering system studying? Or what **research is needed**?
  + What kind of questions are researchers asking?
  + How could they answer those questions? (At a VERY basic level!)
  + What further research is needed to bring the system to clinical practice? Or why is it impractical for broad use?
* What are **ethical concerns?**
  + Is it safe? For users, day-to-day care providers
  + Is it expensive? Will insurance cover it?
  + How can developers ensure equitable access regardless of money or other obstacles?

You will need to consult sources in your research. Ask if you need recommendations. Textbooks, the abstracts of journal articles (you probably do not need more detail than that for this), the CSNE website, and other university websites are useful sources. Do not cite popular press such as Wired, Scientific American, Wikipedia, or Popular Science – while they are very useful for getting oriented in a new topic (and you can absolutely consult them), they are not primary research reports or technical references. You will probably list 5-10 citations.

Should break your written report and presentation into these sections (treatment need, types of design, interaction with body, components, current or needed research, ethics), with a brief introduction and conclusion.

**Products**:

* Written report
  + 8-10 double-spaced pages not including references
  + Up to 4 figures
* Presentation
  + 7 minutes + 2 minutes for questions
  + Same material as report