

## The Brain: from Dysfunction to Disease. MCDB 3651

The human brain is a highly complex organ with  $10^{14}$  synaptic connections that undergo dynamic chemical and structural changes critical for normal development and function. These dynamic changes give rise to synaptic plasticity which is the basis of learning and memory. Misregulation of synaptic plasticity results in abnormal brain function and behavior that is manifested in numerous neurological and psychiatric diseases. This course will explore the molecular mechanisms responsible for altered synaptic plasticity in neurological diseases such as frontotemporal dementia (FTD), Parkinson's disease, Huntington's disease, Creutzfeldt–Jakob disease, Down syndrome, epilepsy, autism, and Alzheimer's disease.

### FORMAT

This course will follow primarily a discussion format. Group work and class participation will be required. There will be some mini lectures by the instructor to provide background, details and context for the topic under study, but this is not a lecture-based course.

### GRADES

There will be 300 points possible and grades will be determined according to the following:

- In class and group participation: 50 points
- Pre-class assignments and quizzes: 100 points
- Group Presentation: 75 points
- Individual written paper: 75 points

**In class and group participation: 50 points** (2 points per day). Clickers will be used in class each day, and there will be other group activities in class as well.

**Pre-class assignments and quizzes: 100 points.** Due before class on Tuesday and Thursday. These questions are to prepare you for class, and will be based on the assigned reading for that day and must be submitted prior to class. Twenty (20) of these assignments will be counted and a score calculated out of 100 (most pre-class assignments are 5 points; the final total will be proportionally calculated to equal a total out of 100).

**Group Project: 75 points.** Beginning in the latter half of the semester, each class period will be devoted to group project presentations. Once you have formed team you will choose a date for your team's presentation. The website will be updated to show when and on what topic your team will present. You and your group will create something you can share with the public on a topic of your choice. The topic has to be unique—ie, it cannot simply be a repeat of a topic we have covered, but rather should use the tools and information we have learned during the semester to address something we did not discuss in detail. What specifically you create for this assignment is up to you, but it must include the following:

1. high quality scientific explanation of the facts

2. some history on whatever you've chosen and the reason why you chose this topic (ie, why would someone want to learn about it)
3. pictures, figures, or graphics of some sort that help one to understand the material.
4. Data from some of the online tools that you have learned to use during the semester.

Some ideas for this project could be: a public service announcement, a project for kids, a website, a podcast, a video. Whatever you create should be understandable by an intelligent non-scientist, but still have accurate scientific content, and be creative.

Each group will have 1/2 class period (ie, roughly 35 minutes) to present your project. Note 1: the project presentations will happen in the second half of the semester. Please be aware of this as you sign up. Note 2: there will be a peer evaluation component (not of the presentations themselves, but rather internal group evaluation).

**Individual Paper: 75 points.** Each person will write a paper on the same topic as the group project. These are to be individually written, and can cover a subset of the materials for the group project, or a tangent, but cannot be on a totally different topic. The paper should be formatted like a review article. The article must well written, scientifically accurate, following the format of a standard scientific review article, uses original articles as resources (in addition to review articles), and conveys to me your knowledge and appreciation of the topic. Note: The paper is due two weeks after your presentation, or on the last day of class, whichever comes first.