

PSYCHOLOGY 451/2 - 01 (Winter 2017)
Neurobiology of Learning and Memory
Mondays and Wednesdays 11:45 – 1:00

Instructor: Dr. Dave Mumby
Phone: 848-2424 (ext. 2233)

Office: SP-257.05
Office hours: Mondays 10:30-11:30, Wednesdays 2:45-3:45

Course Description: All animals, including humans, have the capacity to change their behaviour in response to events they experience. These changes in behaviour reflect changes within the nervous system. This course deals with some of the major questions about the neural bases of learning and memory. Students will learn about the kinds of learning-related changes that occur within the nervous system, and about the techniques that behavioural neuroscientists use to study them.

There are several different levels of analysis for examining the neural bases of learning and memory. We will examine three of them: First, there are questions about the **molecular bases of learning and memory**. These are concerned with the basic elements of learning-related changes within neural circuitry. For example, we will review and evaluate theories, hypotheses, and experiments concerned with a) the role of protein synthesis in learning and memory, b) specific neurotransmitter substances that might have a special role in learning and memory, and c) the roles of hormones in the modulation of memory-related changes in brain and behaviour.

There are questions about the **cellular bases of learning and memory**. Memory-related changes in the nervous system are manifest as changes in the signalling-properties of neurons within circuits that are made up of interconnected populations of neurons. We will review and evaluate theories, hypotheses, and experiments concerned with a) morphological changes that neurons undergo in response to experience, b) physiological phenomena that underlie long-term change in synaptic efficacy, and c) learning related changes in the relatively simple nervous systems of invertebrates.

There are also questions about the **functional neuroanatomy of memory systems**. These are concerned with brain anatomy and the memory-related functions of the brain's various components. For example, we will review and evaluate theories, hypotheses, and experiments concerned with: a) *how* information we learn and retain is represented in the brain, b) *where* in the brain certain kinds of information is stored, c) *how* various brain structures are interconnected to form circuits that serve unique memory functions, and d) the neuropathology underlying certain memory disorders in humans.

Readings and lectures: There is no textbook for this course. There will be a few required readings, however -- journal articles, which you can download from the Concordia library website. The course is divided into three main sections, as outlined below. Students should note that certain topics to be covered in class are not covered in the readings, and *vice versa*. Accordingly, in order to get all of the course material, it will be necessary to study all the assigned readings **and** attend the lectures. Students should be prepared to take their own notes during lectures. An ability to think *critically* about the topics and issues we cover is required for success on the exams.

Exams: There will be 3 exams. The first will be worth 25% of your final grade, the second will be worth 30% of your final grade, and the final exam will be worth 45% of your final grade. All exams will include short-answer and short-essay questions. Exams will be cumulative with respect to the material covered, but the second exam will emphasize material covered after the first exam, and the final exam will emphasize material covered after the second exam. The standard university grading system will be used to convert numerical (percentage) marks into letter grades.

Grading

The following grading system will be used to convert numerical (percentage) marks into letter grades.

- A (80-100%)**
Within this range, 80 to 85% is A-, 85.1 to 95% is A, above 95% is A+.
- B (70-79%)**
70 to 72.5% is B-, 72.6 to 77.5% is B, and 77.6 to 79.9% is B+.
- C (60-69%)**
60 to 62.5% is C-, 62.6 to 67.5% is C, and 67.6 to 69.9% is C+.
- D (50-59%)**
50 to 52.5% is D-, 52.6 to 57.5% is D, and 57.6 to 59.9% is D+.
- F (below 50%)**

General Policies: There will be **no make-up exams** and **no supplementals** in the course. Exceptions may be considered in the event of a valid medical excuse, accompanied by a doctor's note. The student must contact me at least 24 hours prior to the exam.