PSYC 370 – BEHAVIOURAL NEUROSCIENCE 1

COURSE ESSENTIALS

When: Tuesday & Thursday 9:30 – 10:50am

Where: Buchanan A203

Instructors: Jason Snyder
jasonsnyder@psych.ubc.ca
Koerner F128 (UBC Hospital)
Office hours: at your convenience, by appointment
(also, after class works)
(also, email is bad for course content questions)

TA: Wansu Qiu - qiuw@mail.ubc.ca

Website: See Canvas website - Here I will post lecture outlines, the course schedule and any updates or changes, grades, supplementary links and readings. Check regularly.


The course assumes a biopsychology background. However, if you have a background in science or psychology and are willing to put in the effort you will do well.

Lecture slides will be published online before class, may change at the last minute, and may be updated after class if content was added / fixed / clarified during class (i.e. always check before a test that you have the latest content).

No phones in class (it is distracting for me, for you, for others).

Feel free AT ANY POINT to ask questions, make observations, compliment my wardrobe etc.
GOALS

By the end of this course I hope that you will understand the neurobiology of many of your everyday experiences. Mainly because this will totally impress your friends at parties. More specific goals of PSYC 370 are that:

1) You will appreciate that neurons and circuits are the foundational units of brain function, and you will know about classic and state of the art methods for studying them.
   a. Visualizing neurons as anatomical building blocks
      i. Golgi, dye injection, genetically-encoded fluorescent proteins, immunohistochemistry, electron microscopy, brain clearing
   b. Neurons as physiologically functional building blocks
      i. Action potentials conduct signals within neurons
      ii. Synaptic transmission sends signals between neurons
   c. Neurons cooperate to form circuits
      i. Synaptic convergence/divergence, feedforward and feedback inhibition
      ii. The stretch reflex: a simple circuit that regulates behavior

2) You will be able to identify shared and unique mechanisms by which sensory stimuli are detected, converted to electrical signals and represented in the brain
   a. Basic sensory anatomy and physiology explains many psychophysical phenomena
   b. Visual, auditory/vestibular, somatosensory, chemical sensory systems
      i. Specialized sensory organs convert external stimuli into action potentials (sensory transduction)
      ii. Neurons have receptive fields that relate to their function
      iii. The spectrum of sensory stimuli is organized according to neuroanatomical maps
      iv. Simple sensory neural representations are processed to form complex representations

3) You will appreciate that different memory systems learn about complementary aspects of experience.
   a. Sensory information merges in the hippocampus to form episodic memories of specific experiences
      i. Lateral and medial entorhinal cortex neurons represent object and spatial information, respectively
      ii. Hippocampal neurons represent specific details of experiences and, together, they form memories that can be used flexibly
   b. Synapses undergo plasticity to store memories in circuits
      i. LTP as a synaptic model of memory
      ii. Early LTP, late LTP and linking memories
   c. Hippocampal memories transform and are consolidated into semantic/gist/factual memories in the neocortex
      i. Standard model vs Multiple Trace model of memory consolidation
d. The striatum forms habit-based memories (that can support or compete with hippocampal memories)

4) You will appreciate that memory guides future behaviors and is disrupted in many psychiatric conditions
   a. Memories allow for imagination of future experiences
   b. Memory generalization contributes to anxiety disorders
   c. Alzheimer’s disease impacts specific aspects of episodic memory

In short, my hope is that by the end of the first term you will have a holistic picture of how sensory information enters the brain, is remembered as something meaningful, and used to guide behavior.

EVALUATION

Performance will be evaluated with a midterm exam, an end of term final exam, and 4 assignments given throughout the semester

Exams (2 x 40%)
- each exam will be 80min (i.e. same duration as class, even if during the final exam period)
- exams will be weighted equally (each 40% of final grade)
- exams are based on the material covered in class
- exams will not be explicitly cumulative, though later material will build on material covered earlier in the course.
- exam format will be a combination of multiple choice questions, fill in the blank, and short answer questions
- If you miss an exam you must notify me within 24hrs and provide a doctor’s note that states that you were unable to attend, on the date in question, for medical reasons. We will then schedule a makeup exam.

Assignments (4 x 5%)
- Assignments will be take home questions based on material covered in class and discussed in small groups
- By discussing in groups, and then collectively as a class, you will hopefully have a solid understanding of the concept in question. If not, you should have a good idea of what you need to study from the course materials in order to complete the assignment.
- Each assignment will be worth 5% of your final grade, for a total of 20%

Grades will be available online, may be scaled, and are not official until the appear on your final academic record.

The course TA will grade the exams and assignments, will be available to review them with you, and will resolve the majority of grading issues that may arise.
SCHEDULE

Sept. 6  Lecture 1: Course Intro
Sept. 11 Lecture 2: Neurons – anatomy and methods pt1
Sept. 13 Lecture 3: Neurons – anatomy and methods pt2
Sept. 18 Lecture 4: Membrane potential, action potential
Sept. 20 Lecture 5: Mem. Potential & Synaptic transmission
Sept. 25 Lecture 6: Synaptic transmission
Sept. 27 Lecture 7: Synaptic interactions & circuits
Oct. 2 Lecture 8: Visual System (retina)
Oct. 4 Lecture 9: Visual System (pathways & circuits)
Oct. 9 Lecture 10: Visual System (cortex)
Oct. 11 Lecture 11: Auditory System
Oct. 16 Lecture 12: Somatosensory & Olfactory Systems

Oct. 18 Midterm exam

Oct. 23 Lecture 13: Ventral Stream, Association Cortex
Oct. 25 Lecture 14: Dorsal Stream, Association Cortex
Oct. 30 Lecture 15: Entorhinal cortex, hippocampus & place cells pt1
Nov. 1 Lecture 16: Entorhinal cortex, hippocampus & place cells pt2
Nov. 6 Class cancelled
Nov. 8 Lecture 17: Synaptic plasticity & memory encoding pt1
Nov. 13 Lecture 18: Adult neurogenesis (guest lecture by Dr. Desiree Seib)
Nov. 15 Lecture 19: Synaptic plasticity & memory encoding pt2
Nov. 20 Lecture 20: Memory consolidation
Nov. 22 Lecture 21: Memory and Disorders pt1
Nov. 27 Lecture 22: Memory and Disorders pt2
Nov. 29 Lecture 23: Wrapup & review

Dec. 4-19 December Exam Period
Psychology Department’s Position on Academic Misconduct
Cheating, plagiarism, and other forms of academic misconduct are very serious concerns of the University, and the Department of Psychology has taken steps to alleviate them. In the first place, the Department has implemented software that can reliably detect cheating on multiple-choice exams by analyzing the patterns of students’ responses. In addition, the Department subscribes to TurnItIn – a service designed to detect and deter plagiarism. All materials (term papers, lab reports, etc.) that students submit for grading will be scanned and compared to over 4.5 billion pages of content located on the Internet or in TurnItIn’s own proprietary databases. The results of these comparisons are compiled into customized “Originality Reports” containing several sensitive measures of plagiarism; instructors receive copies of these reports for every student in their class. In all cases of suspected academic misconduct the parties involved will be pursued to the fullest extent dictated by the guidelines of the University. Strong evidence of cheating or plagiarism may result in a zero credit for the work in question. According to the University Act (section 61), the President of UBC has the right to impose harsher penalties including (but not limited to) a failing grade for the course, suspension from the University, cancellation of scholarships, or a notation added to a student’s transcript. All graded work in this course, unless otherwise specified, is to be original work done independently by individuals. If you have any questions as to whether or not what you are doing is even a borderline case of academic misconduct, please consult your instructor. For details on pertinent University policies and procedures, please see Chapter 5 in the UBC Calendar (http://students.ubc.ca/calendar) and read the University’s Policy 69 (available at http://www.universitycounsel.ubc.ca/policies/policy69.html).