

COURSE SYLLABUS

WINTER, 2016

INSTRUCTOR: DR PHILIP HICKS

OFFICE:	Centennial Building, Room 4058
OFFICE HOURS:	2:30-3:30 Mon & 1:00-2:00 Thursday (by email pre-arrangement)
OFFICE PHONE:	343-8106 (leave a message if there's no answer; please speak loudly, slowly and clearly enough for your message to be understood)
E-MAIL ADDRESS:	phicks@lakeheadu.ca (school e-mail address)
WEB PAGE:	https://www.lakeheadu.ca/academics/departments/biology/directory/faculty
CLASS HOURS:	11:30-2:30, Monday

A. DESCRIPTION

This course provides an overview & analysis of mechanisms underlying neural processing at cellular & systems levels, in mammalian central nervous system. Topics will span a broad range from ion flow at membranes to functional subsystem-level analysis (examples of topics will likely include parallel processing of sensory information, reflex response organisation of motor systems, movement, role of synaptic plasticity in memory and neural recovery).

Offering: 0-0; 3-0

Note: Students may take BIOL 4630 only if they have completed either of BIOL 3250 or 3251 successfully previously, or if they have had equivalent preparation from psychology courses.

B. ORGANIZATION

This is a lecture course that expands on selected issues covered in the Purves et al. text, with a predominant theme of investigating mechanisms of how neurons acting in concert, shape responses and create patterns of activity that result in volition, thought, consciousness, motivation, physiological systems control, sensory analysis, etc. The plan is to use the text and library reserve readings as “spring-board” resources to orient but not necessarily completely account for, all requirements for any given course topic. It will serve as a rough guide, supplementing lectures. Students will need to look up one or more papers, and have it/them read before next class for use as topics supporting in-class discussion. The course will be focused upon the classroom lecture material, but students may be required to participate using some type of seminar format wherever possible. Accordingly, a neuroscience background is necessary and hence the prerequisite for a prior neuroscience or physiology course.

C. COURSE OBJECTIVES

To introduce students to neural systems from neurophysiological, neuropharmacological and neuroanatomical concepts at a relatively more advanced level than is offered at more introductory (2nd-yr or 3rd-year) levels. The class will encompass (time and holiday schedules permitting). issues around synaptic transmission such as co-transmission, neuromodulation by trace amines, presynaptic sites of

agonist/antagonist action, selective transport inhibition and facilitation, etc., including various concepts involving synaptic plasticity, such as: GABA-induced receptive field shaping in selective portions of the somatosensory as well as visual pathways of cortex and subcortical levels, LTP and LTD in hippocampal and extra-hippocampal sites, experimental techniques used in modern-day research-oriented laboratories; and a detailed examination of selected brain regions (ventral horn, thalamic nuclei, olfactory bulb, cerebellum, hippocampus, limbic system interconnections, cerebral cortex) with attention focused on the characteristic circuitries of neuronal interactions for each.

D. COURSE TOPICS

The course covers all, or some combination of, the following topics, time and weather permitting:

- . reviews of neurobiological fundamentals,
- . spinal ventral horn structure and reflex functions
- . first two synaptic levels of somatic afferent systems including receptive field properties
- . retina and thalamic levels of visual processing including receptive field properties
- . structure and organization of modality-specific and associational cerebral cortex
- . hippocampal circuitry and roles in memory and place-finding
- . LTP & LTD in hippocampal & extra-hippocampal sites
- . nigro-striatal system in health and disease
- . cerebellar circuitry and role in motor systems
- . circuitry of the limbic system: interconnections and functions
- . olfactory bulb and its internal circuitry as well as functions
- . trace amines and neuromodulation; possible role in disease
- . experimental techniques used in modern-day research-oriented laboratories.

E. TEXT AND REQUIRED SUPPLIES

1. Required text: *Neuroscience*, 5th Ed., by Dale Purves et al., Sinauer, Sunderland MD, ISBN: 078-0-87893-695-3
2. Various readings held on reserve at Main Library

F. GRADING PLAN: Lecture Portion

There will be six (6) mini-essays and one (1) midterm exam for course assessment: each mini-essay will be worth 8.3 points (6 x 8.3% of the final grade = 50% of the total grade for the course). Mini-essays will focus on the theme of and/or some aspect of particular interest within that theme, of the lecture. The essay is due at my office within 2 weeks of the lecture the theme relates to. The mid-term exam will be given after five (5) weeks into the course and shall be valued at 25% of the final grade. The remaining 25% of the course grade will come from a cumulative final exam, not necessarily written during exam week, and which will not be structured to contain any “long-answer-type” questions.

The date of the mid-term exam will be announced at least three weeks prior, allowing you sufficient time for preparation.