ANIMAL PHYSIOLOGY I

Calendar Description: Fundamental concepts in sensory, neural and behavioural physiology. The biochemical mechanisms whereby nerve cells detect and transmit information and the processes whereby information is integrated in the nervous system and gives rise to the outputs of behaviour. Three lecture hours, three laboratory hours. One term. Four credits.

Prerequisites: SC/BIOL 2030 4.0; SC/BIOL 2020 4.0; SC/BIOL 2021 4.0 (Students lacking prerequisites may be de-enrolled).

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Lectures: Monday 1:30 - 2:30 p.m. ACW-006 (may change) Wednesday 1:30 - 2:30 p.m. CLH-M Friday 1:30 - 2:30 p.m. CLH-M

Laboratories: 3 hrs/week on any one of the following days:

Monday 2:30 - 5:30 p.m. Rm. 206 Farquharson Tuesday 2:30 - 5:30 p.m. " Wednesday 2:30 - 5:30 p.m. " Thursday 2:30 - 5:30 p.m. " Friday 2:30 - 5:30 p.m. "

Labs start Monday, September 21st, 2009


Laboratory protocols will be available for downloading weekly.

Grading: Term Test (October 23rd, 2009) = 20%
Laboratory work:
  Laboratory reports = 17%
  One laboratory test = 18%
Final examination = 45%
  Total = 100%

Other Information: The following topics will be discussed: cell permeability and exchange; nerve cells, impulses and neural transmission; coding of environmental stimuli by sense organs and physiology of the senses; integration in the nervous system; mechanisms and nervous pathways by which a particular stimulus leads to a particular behavioural response; plasticity in the nervous system, including learning; muscles and movement; hormones and other chemical messengers. Examples will be drawn from both vertebrate and invertebrate nervous systems.
LECTURE SCHEDULE

Cell Permeability and Exchange Mechanisms
Membrane structure and models
Mechanisms of exchange across membranes
Intercellular communication

The Nervous System, Ions and Excitation
Design of nervous systems; types of neuron;
Origin and maintenance of the resting potential; action potential; cable properties
Ion channels; types, structure

Information Transmission
Electrotonic spread and regenerative propagation; non-spiking interneurons
Synaptic transmission - electrical and chemical
Neurotransmitters and neuromodulators

Muscle and Movement
Neural control of contraction; vertebrates and invertebrates
Muscle fibre types and their innervation
Muscle types and behaviours: flight, swimming

MID-TERM TEST FRIDAY OCTOBER 23rd, 2009

Sensory Mechanisms
Coding of environmental stimuli by sense organs
Chemoreceptors, stimulus transduction
Mechanoreceptors; physiology of the ear
Photoreceptors; visual pigments, colour vision

From Nerve Cells to Animal Behaviour
Neural circuits and behaviour: integration; Pattern generators
Circuitry of behavioural pathways in simple animals

Hormones and Other Chemical Messengers
Receptors
Hormone action
The spectrum of neurochemical communication; multiple messengers from single cells

FINAL EXAMINATION: TO BE HELD IN PERIOD 10th – 23rd DECEMBER
LABORATORY SCHEDULE

<table>
<thead>
<tr>
<th>Week of:</th>
<th>Lab #</th>
<th>Title</th>
<th>Written Report ?</th>
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<tbody>
<tr>
<td>Sept. 21 - 25</td>
<td>1</td>
<td>Properties of Membranes</td>
<td>Required</td>
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<tr>
<td>Sept. 28 – Oct 2</td>
<td>2</td>
<td>Introduction to Powerlab and Labchart</td>
<td>No</td>
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<tr>
<td>Oct. 5 – 9</td>
<td>3</td>
<td>Compound Action Potentials</td>
<td>Yes</td>
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<tr>
<td>Oct. 12 – 16</td>
<td>-</td>
<td>Reading Week</td>
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<td>Oct. 19 – 23</td>
<td>4</td>
<td>Sensory Perception</td>
<td>Yes</td>
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<td>Oct. 26 – 30</td>
<td>5</td>
<td>Skeletal Muscle</td>
<td>Yes</td>
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<tr>
<td>Nov. 2- 6</td>
<td>6</td>
<td>Physiology of Frog Heart (Cardiac Muscle)</td>
<td>Yes</td>
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<tr>
<td>Nov. 9 – 13</td>
<td>7</td>
<td>Blood Sugar Regulation</td>
<td>Yes</td>
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<tr>
<td>Nov. 16 - 20</td>
<td>8</td>
<td>Smooth Muscle</td>
<td>Yes</td>
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<td>Nov. 23 - 27</td>
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<td>Return Marked lab reports</td>
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<td>Lab exam review in lab period</td>
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<tr>
<td>Nov. 30 – Dec 4</td>
<td>-</td>
<td>LABORATORY EXAM , 18% final grade</td>
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Each section on its customary day of the week. Marks will be posted during the week of Dec 14\textsuperscript{th}.

Note: Written reports are required for FOUR laboratories. You are required to write a report on Lab #1, worth 2\% of the final grade. This exercise will introduce you to detailed laboratory report writing and you will be given extensive feedback by your TA that should help you with the other laboratory reports. The three other reports are worth 5\% each and you can choose ANY THREE exercises to write up from Lab #3 – Lab #8 ie. any three of the six exercises marked “YES” above.

T\As will set due dates and late penalties for report submissions.

NO reports will be accepted after December 8\textsuperscript{th} (the last day to submit term work).

You are reminded that the Senate Policy on Academic dishonesty is in force and applies to all written work handed in. Copying or close paraphrasing from your lab partner, from the computer software used in labs, or from the internet are all considered plagiarism and any suspected cases will be reported. See Biology Department Handbook for further information.

YOU ARE EXPECTED TO TAKE GOOD CARE OF THE APPARATUS YOU USE.