



COURSE SYLLABUS

COURSE TITLE:	BIOL 430 Neurobiology of Behaviour		
COURSE CODE:	21379	TERM:	T2 2017/18
COURSE CREDITS:	3.0	DELIVERY:	Lecture and Practicum (Lab)
CLASS SECTION:	02	START DATE:	January 3 ^{ed} , 2018
CLASS LOCATION:	room 123 Biology	LAB LOCATION:	room G74AThorvaldson
CLASS TIME:	10:30 – 11:20 (M,W,F)	LAB TIME:	1:30 - 5:20 (F)
WEBSITE:	via Blackboard		

Course Description

Neuroethology is the study of how activity in an animal's nervous system produces and modifies natural behaviour. Topics in the course include the detection and coding of information from the environment, integration of information for decision-making, generation of motor patterns that underlie behaviour and general constraints on form and function of neural circuits. Initial course material may be somewhat similar to material covered in Biol 472 (Animal Behaviour) but will quickly deviate as we explore the physiological mechanisms that underlie behaviour.

Lectures will cover specific themes as outlined below, with the intent of maintaining continuity within the overall field of neuroethology. The laboratory component will emphasize practical aspects of the lecture material and will deviate slightly from laboratories in other courses in that the students will provide much of the initiative for the formulation of hypotheses and designing the appropriate experiments. Students will also gain experience with assimilating information from primary literature sources as they pertain to the analysis and interpretation of experimental data. Primary sources will also be used for the preparation of a report and seminar describing a particular model neuroethological system.

Prerequisites

BIOL 317 or HSC 350 or permission of the instructor.

Learning Outcomes

By the completion of this course, students will be expected to:

1. Develop an understanding of the cellular mechanisms that underlie the adaptive behavior Seen in animals.
2. Through an examination of the original literature and experiments that constitute our current understanding of neuroethology, to develop an appreciation of the experimental and quantitative basis of modern neuroscience.

3. Through collection and analysis of experimental data, to develop and improve skills in critical thinking, analysis, and synthesis.
4. Through lab exercises, develop skills in dissemination of experimental data through drafting of a manuscript according to guidelines of a scientific journal.
5. Develop skills in developing a research proposal through completion of a mock NSERC Discovery Grant application.

Course Overview

The course is designed to explore advanced concepts of the neural control of natural animal behavior, building on information obtained from prerequisite courses or equivalent experience. The focus will be on how neural circuits are configured within environmental constraints to produce and control behavior that is adaptive within the lifespan of the animal.

Detailed Course Schedule

Week Dates Instructor	Major Lecture Topics	Laboratory Activity
Week 1 Jan 3 & 5	Introduction; History <u>Readings:</u> Textbook Chapter 1; Blackboard material	No formal lab activity scheduled.
Week 2 Jan 8, 10 & 12	History; Review of neuronal structure and function <u>Readings:</u> Textbook Chapter 1 & 2; Blackboard material	No formal lab activity scheduled.
Week 3 Jan 15, 17 & 19	Review of neural structure and function; Environmental constraints <u>Readings:</u> Textbook Chapter 1, 2; Blackboard material	Experimental Design (Assignment 1)

Week 4 Jan 22, 24 & 26	Environmental constraints; Ecological evolutionary considerations Neuroethological techniques <u>Readings:</u> Textbook Chapters 3; Blackboard material	Introduction to Electrophysiological Analysis (Assignment 2) (Assignment 1 due)
Week 5 Jan 29, 31 & Feb 2	Neuroethological techniques; Model systems <u>Readings:</u> Textbook Chapters 7 and 8; Blackboard material	No formal lab activity scheduled. (Assignment 2 due)
Week 6 Feb 5, 7 & 9	Sensory processing <u>Readings:</u> Textbook Chapter 7; Blackboard material	Locust Lab (1): Observation and Analysis
Week 7 Feb 12, 14 & 16	Motor control; Model systems for neurons circuits controlling motor patterns <u>Readings:</u> Textbook Chapter 6; Blackboard material	Locust Lab (2): Experiment Design and Analysis (Manuscript)
Week 8 Feb 19, 21 & 23	Midterm Break – no Lectures	Midterm Break – no Lab
Week 9 Feb 26, 28 & Mar 2	Motor control Cont; Spatial orientation; and sensory guidance <u>Readings:</u> Textbook Chapter 5 & 6; Blackboard material <u>Learning Assessment (15%)</u> Mid-Term Examination up to Model systems Friday 2nd of March at lecture time and room	No formal lab activity scheduled.

Week 10 Mar 5, 7 & 9	Neuromodulation of behavior; Sensorimotor integration; Jamming avoidance response <u>Readings:</u> Textbook Chapters 8 & 9; Blackboard material	Motor Patterning (Assignment 3) (Manuscript due)
Week 11 Mar 12, 14 & 15	Initiation; Selection and modulation of behavior <u>Readings:</u> Textbook Chapters 10 and 13; Blackboard material	Students presentation – part # 1 (Assignment 3 due)
Week 12 Mar 19, 21 & 23	Neurobiology of learning and memory; Neuronal development and maturational plasticity; The biological clocks <u>Readings:</u> Textbook Chapters 10 and 13; Blackboard material	Students presentation – part # 2
Week 13 Mar 26, 28 & 30	Neurobiology of migration and homing; <u>Readings:</u> Textbook Chapter 11; Blackboard material	No formal lab activity scheduled.
Week 14 Apr 2,4 & 5	Communication; Course review <u>Readings:</u> Textbook Chapter 12; Blackboard material	No formal lab activity scheduled.
	<u>Learning Assessment (35%)</u> Final Examination during regular exam period.	

Instructor Information

Contact Information

Dr. Manar Angrini
Location: room 324 Biology Bldg
E-mail: manar.angrini@usask.ca
Phone: 966-4437

Ms. Rachel Parkinson (Lab demonstrator)
E-mail: rachel.parkinson@usask.ca

Phone: 966-4448

Mr. Cody Manchester (Lab demonstrator)

E-mail: cody.manchester@usask.ca

Phone: 966-4448

Office Hours

Dr. Angrini: By appointment via e-mail

Ms. Parkinson: By appointment via e-mail

Mr. Manchester: By appointment via e-mail

Required Resources

Lecture notes: The instructor will provide lecture notes on Blackboard in PDF format that contain images presented in the lectures. These notes will NOT contain the text covered in lecture. It will be the student's responsibility to attend lectures and acquire the information needed to complete the notes provided on Blackboard. The instructor will not supply complete lecture notes to the students.

Lab manual: provided on Blackboard

Plan for a standard paper: provided on Blackboard

Guide to grant writing: provided on Blackboard

The laboratory portion of the course will require a working knowledge of computers which will be used to collect and analyze data and prepare reports. You will need access to a computer, printer, the Internet, email, the software program Excel and a word processing program. This can be achieved from your home computer or your membership in the Arts & Science Computer Lab. If you have not already set up a University computer account you should contact the Arts and Science Computer Lab. Other, more specific, software for data analysis will be available only on the computers in Thorvaldson rm G74B.

Recommended Resources

Zupanc, G. K. H. (2010). Behavioural Neurobiology: An integrative approach (2nd Ed) pp. 1-342. New York: Oxford University Press. ISBN- 978-0-19-920830-2. Available in the bookstore

Grading Scheme

Midterm exam	15%
Final exam	35%
Lab reports (5% each x 3)	15%
Manuscript assignment	15%
Research proposal	15%
Research presentation	5%
Total	100%

Evaluation of Student Performance

Midterm Exam

- Value:** 15% of final grade
Date: See Course Schedule
Length: 50 minutes
Type: Comprehensive. Invigilated by instructor. Closed book. In class.
Description: The exam will cover material up to the end of sensory guidance. and will be a combination of multiple choice and short answer questions. Calculators or other electronic devices not required nor allowed.

Final Exam

- Value:** 35% of final grade
Date: See Course Schedule
Length: 3 hours
Type: Comprehensive. Invigilated by instructor. Closed book. In assigned exam room.
Description: The exam will cover all material in the course, possibly including lab material. Emphasis will be placed on material covered after the midterm exam. The exam will be a combination of multiple choice, short answer and long answer (essay) type questions. Calculators or other electronic devices not required nor allowed.

Lab reports (x3):

- Value:** 5% each of final grade
Due Date: See Lab Schedule
Type: Brief lab reports (1-2 pages)
Description: Each report should include a short introduction that addresses the main topic of the lab and answers to specific questions presented in the manual. These answers may take the form of well-written, thorough explanations and may require appropriate presentation of figures. Details of the requirements for each report will be included in the relevant handout material.

Manuscript assignment:

- Value:** 15% of final grade
Due Date: See Lab Schedule
Type: Full manuscript related to experiments in weeks 6 and 7.
Description: The manuscript will be a formal presentation of data collected in weeks 6 and 7 (Feb. 5 and 12). The tutorial and manuscript preparation scheduled for weeks 8 and 9, respectively, are designed to give you time to complete analysis of the collected data and create relevant figures. The manuscript should be prepared as if for submission to the **Journal of Comparative Physiology A: Sensory, Neural, and Behavioral Physiology**, which publishes many articles in neuroethology. All scientific journals have very strict instructions for preparing a manuscript. Authors that do not adhere to these instructions risk having their manuscripts rejected without having been reviewed. Therefore, it is critical that you follow the "instructions to authors" as laid out by the journal. These can be found in a copy of the journal in the library or online at the journal's website (<http://www.springer.com/life+sciences/animal+sciences/journal/359>). On the course Blackboard page, I have also included a guide entitled "PLAN FOR A STANDARD PAPER" which will provide you with ideas of how to compose a

formal scientific report. Normally, a manuscript is reviewed by 2 or more referees who are experts in a particular field. The referees provide comments to the author(s) on how to improve a manuscript and comments to the editor of the journal on whether the manuscript should be published. The decision is made by the editor based on the referees' comments. For your assignment, I will serve as the referee and editor.

Research proposal:

Value: 15% of final grade

Due Date: See Lab Schedule

Type: Grant proposal

Description: This part of the course will introduce you to one of the most important aspects of a scientific profession: grant writing. Scientists do not live on bread alone. They need funding to provide them with the resources needed to conduct research. These resources include costs for equipment, personnel (graduate students, technicians etc.), supplies, and other things that require "money". Research is a very expensive endeavor and so most researchers turn to government or private agencies for the needed funds. The onus, therefore, is on the researcher to convince the funding body that the research is important, generally interesting, and practical (i.e. the researcher is capable of carrying out the proposed experiments.).

For this assignment, you will select a topic of interest that relates to the field of neuroethology and come up with ideas to advance our understanding of neuroethological principles. Most work in this field in Canada is funded through Discovery Grants program of the Natural Sciences and Engineering Research Council of Canada (NSERC). Therefore, this assignment will be to create a Discovery Grant-style proposal using a model system of your choice. You should consult with me early in the term to help decide on the system you wish to use and general ideas for the proposed research.

The following is copied from the NSERC website on how to present a proposal. In the real world, if these guidelines are not followed, the proposal will be automatically rejected (which can end a scientific career). So follow these instructions to the letter!

There are two main components to a Discovery Grant: Form 100 (personal data form) and Form 101 (Application for a grant). Your assignment will only involve Form 101 and, specifically, the Summary of the Proposal and the Proposal itself. No need not worry about budgets or budget justification (assume that you will have all the resources you need). I will have copies of NSERC grants for you to look at as a template. The proposal is due at 4:00 pm on April 8, 2015. (NO EXCEPTIONS!).

Research presentation:

Value: 5% of final grade

Due Date: See Lab Schedule

Type: Brief lab reports (1-2 pages)

Description: In addition to the written grant proposal, you will be required to present your ideas in a 15 - 20 minute PowerPoint presentation. This is not normally done with an NSERC grant proposal but will give you experience in presenting your work to a scientific audience. Each presentation will have a 20 minute time slot (15

minutes for the presentation and 5 minutes for questions). Additional people may be brought in as the “audience”.

Submitting Assignments/Feedback to Students

Each student must independently write a report for each lab exercises. An electronic copy of the assignment must be submitted to the hand in folder on Blackboard. The manuscript assignment and grant proposal will be graded by Dr. Angrini. The lab reports will be graded by the lab demonstrator who will also watch for plagiarism. Reports will be graded and returned on a schedule such that students will have regular feedback about their work after they have submitted the first two reports. All assignment grades will be assigned based on the quality of the data presentation, grammar, spelling, scientific writing and other aspects of the report. Additional information about the format of the reports is contained in the lab handouts. For the manuscript assignment and grant proposal, grades will also be assigned based on adherence to relevant instructions and formatting; students must read these carefully. The oral presentation will be evaluated by Mr. Manchester, Ms. Parkinson and Dr. Angrini and other students in the course. A rubric and weighting scheme for assessing the presentation will be posted on Blackboard. Presenters will be provided with written feedback about their performance. Marks from the midterm exam will be available 7 to 10 days after the exam.

Late Assignments/Missed Lab Deadlines

Assignments submitted after the deadline will be penalized by a 10% reduction in the mark assigned to the report for each day that the report is late. Students who miss a deadline due to a protracted illness or extenuating personal circumstances are required to contact the lab demonstrator (an email or phone call to Mr. Manchester is adequate) on the day the assignment is due and discuss the reasons why the deadline is being missed. There are no exceptions to this policy; students who fail to proactively advise the lab demonstrator that they will miss the deadline will be subject to the 10% per day penalty. Depending on the situation, additional documentation may be requested from the student. Deadline extensions will only be provided when the protracted illness or extenuating personal circumstance is verifiable. Similar procedures must be followed by a student if they are going to miss giving their scheduled research presentation

Attendance Expectations

Students are expected to attend all scheduled lectures and lab periods. Nevertheless, unexpected, valid absences do occur. Students who are unable to attend lectures should coordinate with fellow students to obtain copies of lecture notes. Students who are unable to attend labs should coordinate with their lab group to determine how best to contribute to the assignment associated with that lab. A student who does not attend a laboratory activity and does not have a valid excuse, will receive a grade of zero for that activity.

Criteria That Must Be Met to Pass

Students must write the final exam in order to pass the course. Students who do not write the final exam will be assigned a final course grade of 49%, or lower depending on their performance in other aspects of the course, along with a grade comment of INF (Incomplete Failure). The final grade will be adjusted if a deferred final exam is written (see below).

Participation

All students are expected to participate in all course-related activities. Participation within specific lab exercises will be determined by the group as required.

Midterm and Final Examination Scheduling

Midterm and final examinations must be written on the date scheduled.

Final examinations may be scheduled at any time during the examination period; students should therefore avoid making prior travel, employment, or other commitments for this period. If a student is unable to write an exam through no fault of his or her own for medical or other valid reasons, documentation must be provided and an opportunity to write the missed exam may be given. Students are encouraged to review all examination policies and procedures:

<http://www.usask.ca/calendar/exams&grades/examregs/>

University of Saskatchewan Grading System (for undergraduate courses)

Exceptional (90-100) A superior performance with consistent evidence of

- a comprehensive, incisive grasp of the subject matter;
- an ability to make insightful critical evaluation of the material given;
- an exceptional capacity for original, creative and/or logical thinking;
- an excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently.

Excellent (80-90) An excellent performance with strong evidence of

- a comprehensive grasp of the subject matter;
- an ability to make sound critical evaluation of the material given;
- a very good capacity for original, creative and/or logical thinking;
- an excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently.

Good (70-79) A good performance with evidence of

- a substantial knowledge of the subject matter;
- a good understanding of the relevant issues and a good familiarity with the relevant literature and techniques;
- some capacity for original, creative and/or logical thinking;
- a good ability to organize, to analyze and to examine the subject material in a critical and constructive manner.

Satisfactory (60-69) A generally satisfactory and intellectually adequate performance with evidence of

- an acceptable basic grasp of the subject material;
- a fair understanding of the relevant issues;
- a general familiarity with the relevant literature and techniques;
- an ability to develop solutions to moderately difficult problems related to the subject material;
- a moderate ability to examine the material in a critical and analytical manner.

Minimal Pass (50-59) A barely acceptable performance with evidence of

- a familiarity with the subject material;

- some evidence that analytical skills have been developed;
- some understanding of relevant issues;
- some familiarity with the relevant literature and techniques;
- attempts to solve moderately difficult problems related to the subject material and to examine the material in a critical and analytical manner which are only partially successful.

Failure <50 An unacceptable performance

Integrity Defined (from the Office of the University Secretary)

The University of Saskatchewan is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Student Conduct & Appeals section of the University Secretary Website and avoid any behavior that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

All students should read and be familiar with the Regulations on Academic Student Misconduct (http://www.usask.ca/university_secretary/honesty/StudentAcademicMisconduct.pdf) as well as the Standard of Student Conduct in Non-Academic Matters and Procedures for Resolution of Complaints and Appeals (http://www.usask.ca/university_secretary/honesty/StudentNon-AcademicMisconduct2012.pdf)

For more information on what academic integrity means for students see the Student Conduct & Appeals section of the University Secretary Website at:
http://www.usask.ca/university_secretary/pdf/dishonesty_info_sheet.pdf

Examinations with Disability Services for Students (DSS)

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with Disability Services for Students (DSS) if they have not already done so. Students who suspect they may have disabilities should contact DSS for advice and referrals. In order to access DSS programs and supports, students must follow DSS policy and procedures. For more information, check <http://www.students.usask.ca/disability/>, or contact DSS at 966-7273 or dss@usask.ca.

Students registered with DSS may request alternative arrangements for mid-term and final examinations. Students must arrange such accommodations through DSS by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by DSS.