



## COURSE SYLLABUS

COURSE TITLE:	BIOL 317 Fundamentals of Animal Physiology		
COURSE CODE:	86812	TERM:	Fall 2014
COURSE CREDITS:	3.0	DELIVERY:	Lecture & Practicum (Lab)
CLASS SECTION:	01	START DATE:	3 Sep 2014
LECTURE LOCATION:	rm 125 Biology Bldg	LAB LOCATION:	G74 Thorvaldson Bldg
LECTURE TIME:	9:30 to 10:20 am MWF	LAB TIME:	1:30-5:20 pm on Th or F
WEBSITE:	via PAWS/Blackboard		

### Course Description

Considers physical, chemical and functional aspects of animal cells and tissues. Specifically examines membrane transport mechanisms, bioelectricity and fundamental principles of muscle and nervous system physiology, evolution and plasticity. Cellular mechanisms underlying learning and memory are introduced.

Prerequisite(s): BIOL 224 or BMSC 224 (or HSC 208); CHEM 112; CHEM 115 or CHEM 250 (CHEM 115 recommended).

Note: PHYS 115 and 117 are recommended. Students with credit for BIOL 217 will not receive credit for this course.

### Learning Outcomes

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

1. have an in depth understanding of physiological principles and processes associated with cell membrane function
2. develop their skills in quantitative analysis of biological data
3. develop their scientific writing skills
4. be able to find and read scientific literature at an introductory level
5. develop their oral presentation skills
6. develop group working skills
7. conduct physiological experiments and collect and analyze data
8. develop an appreciation for the scientific method and actively engage in understanding new information

Note: The University of Saskatchewan Learning Charter is intended to define aspirations about the learning experience that the University aims to provide, and the roles to be played in realizing these aspirations by students, instructors and the institution. A copy of the Learning

Charter can be found at: [http://www.usask.ca/university\\_secretary/LearningCharter.pdf](http://www.usask.ca/university_secretary/LearningCharter.pdf) More information on University policies on course delivery, examinations and assessment of student learning can be found at: <http://policies.usask.ca/policies/academic-affairs/academic-courses.php>

## Course Overview

The course consists of 50 minutes of lecture on the MWF schedule, starting on Sept 4, 2014 and ending on Dec 5, 2014. This will result in 37 days of lectures during the term (approximately 30 hours of face-to-face instruction in the lectures). Six afternoons of hands-on lab exercises plus three afternoons for student presentations are also included in this course. In these exercises, you will work in small groups to perform physiological experiments and analyze your data. The experiments are used to provide a practical illustration of some of the major lecture concepts and are coordinated with lecture material as shown in the schedule below. Completion of the labs is a required course component. You will hone your scientific writing and oral communication skills through the preparation of labs reports and class presentations based on your experimental results. Each student will be responsible for completing six lab reports and giving one 15 minute oral presentation to the class. Note that the lab periods are scheduled for 3 hrs 50 minutes per afternoon; students need to make themselves available for this entire time period. At the end of each lab exercise, each group is required to turn in a summary (called a Group Data Sheet) of the experimental data they collected. The Group Data Sheet must be given to the lab demonstrators before any student in the group leaves the lab. There are no exceptions to this; failure to provide a Group Data Sheet will result in a deduction of 25% from the lab report prepared by each member of the group.

## Class Schedule

Week/ Dates	Instructor Major Lecture Topics Laboratory Activity	Readings*	Student Work Due/Other Types of Assessment
Wk 1 Sept 3 Sept 5	Dr. Marchant: Nature and purpose of class; Water as the Biological Solvent  <i>No lab scheduled this week</i>	<u>Textbook</u> : Chapter 1	Nothing due
Wk 2 Sept 8 Sept 10 Sept 12	Dr. Marchant Water as the Biological Solvent (important features of biological solutions & molecular exchange in solution; osmosis)  <i>Lab Period: Lab Orientation</i>	<u>Textbook</u> : Chapters 2, 5 & 27 (part)  <u>Lab Manual</u> : Introduction	Nothing due
Wk 3 Sept 15 Sept 17 Sept 19	Dr. Marchant: Exchange of Materials Across Biomembranes (osmosis, ion channels, carrier mediated transport; bulk transport)  <i>Lab Period: Exercise #1 Molecular Exchange</i>	<u>Textbook</u> : Chapters 2 & 5  <u>Lab Manual</u> : Exercise 1	Group Data Sheet for Lab 1

Wk 4 Sept 22 Sept 24 Sept 26	<u>Dr. Marchant:</u> Transmembrane Potentials (Gibbs-Donnan equilibrium; diffusion potentials; ionic basis of membrane charge; steady state & equilibrium potentials)  <i>Lab Period: Exercise #2 Diffusion Potentials</i>	<u>Textbook:</u> Chapter 12  <u>Lab Manual:</u> Exercise 2	Lab 1 Reports due  Group Data Sheet for Lab 2
Wk 5 Sept 29 Oct 1 Oct 3	<u>Dr. Marchant:</u> Bioelectricity (passive vs active electrical properties; action potentials; Hodgkin-Huxley cycle; action potential conduction)  <i>Lab Period: Exercise 1 &amp; 2 Student Presentations</i>	<u>Textbook:</u> Chapter 12	Lab 2 Reports due  Student Presentations
Wk 6 Oct 6 Oct 8 Oct 10	<u>Dr. Marchant:</u> Bioelectricity (continued)  <i>Lab Period: Introduction to Neurophysiology Equipment</i>	<u>Textbook:</u> Chapter 12  <u>Lab Manual:</u> Equipment Intro	Group Data Sheet for Intro Lab
Oct 13	<u>No Lecture – Thanksgiving</u>		
Wk 7 Oct 15 Oct 17	<u>Dr. Marchant:</u> Bioelectricity (conclusion)  <u>Dr. Gray:</u> Intercellular Communication  <i>No lab scheduled this week</i>	<u>Textbook:</u> Chapter 12	Nothing due - <i>Study for the midterm</i>
Wk 8 Oct 20 Oct 22 Oct 24	<u>Dr. Gray:</u> Intercellular Communication (neurotransmitter release; synaptic & neuromuscular transmission; chemically-sensitive ion channels)  <b>Midterm Exam on Oct 22</b>  <i>Lab Period: Exercise #3 Compound Action Potentials</i>	<u>Textbook:</u> Chapter 13  <u>Lab Manual:</u> Exercise 3	Midterm exam on material to end of Bioelectricity  Group Data Sheet for Lab 3
Wk 9 Oct 27 Oct 29 Oct 31	<u>Dr. Gray:</u> Muscle Physiology (muscle types; contractile units; sliding filament theory; excitation-contraction coupling smooth vs. striated muscle)  <i>Lab Period: Exercise #4 Skeletal Muscle Contraction</i>	<u>Textbook:</u> Chapter 20  <u>Lab Manual:</u> Exercise 4	Lab 3 Reports due  Group Data Sheet for Lab 4
Wk 10 Nov 3 Nov 5 Nov 7	<u>Dr. Gray:</u> Muscle Physiology (conclusions)  Signal Transduction Across Membranes (general mechanisms;	<u>Textbook:</u> Chapter 2 & 14	

	mechanoreceptors;photoreceptors; visual and infrared spectra; phonoreceptors; middle ear receptors; lateral line receptors)  <i>Lab Period: Exercise 3 &amp; 4 Student Presentations</i>		Lab 4 Reports due  Student Presentations
Wk 11 Nov 10 Nov 12 Nov 14	<u>No Lectures or Labs</u> Break Week		
Wk 12 Nov 17 Nov 19 Nov 21	<u>Dr. Gray:</u> Signal Transduction (continued)  <i>Lab Period: Exercise #5 Electromyography</i>	<u>Textbook:</u> Chapter 14  <u>Lab Manual:</u> Exercise 5	Group Data Sheet for Lab 5
Wk 13 Nov 24 Nov 26 Nov 28	<u>Dr. Gray:</u> Signal Transduction (conclusions)  Nervous Integration (basic concepts; animal models of memory & learning; evolution of the nervous system; vertebrate brain structure & function; autonomic nervous system)  <i>Lab Period: Exercise #6 Sensory Receptors</i>	<u>Textbook:</u> Chapters 13 & 15  <u>Lab Manual:</u> Exercise 6	Lab 5 Reports due  Group Data Sheet for Lab 6
Wk 14 Dec 1 Dec 3 Dec 5	<u>Dr. Gray:</u> Nervous Integration & Regulation (continued) Course wrap-up  <i>Lab Period: Exercise 5 &amp; 6 Student Presentations</i>	<u>Textbook:</u> Chapter 15	Lab 6 Reports due  Student Presentations
	Final Exam during regular exam period (Dec 6 to 21)		

\* Additional readings may be assigned as the course proceeds. These will be noted during the lectures or in the lab manual as appropriate.

## Instructors:

### Contact Information:

Dr Tracy Marchant	room 322 Biology bldg tracy.marchant@usask.ca	966-4420
Dr Jack Gray	room 151 Biology jack.gray@usask.ca	966-4400
Ms Sheri Fisher (lab coordinator/instructor)	room G77.3 Thorvaldson sheri.fisher@usask.ca	966-4431

**Office Hours:** Generally-speaking, the instructors above will be available in their offices on a drop-in basis. However, please note that all instructors have other commitments that may take them away from their office. Specific appointments can be set by email or through a phone call. Email responses to specific questions about course material are at the discretion of each instructor; information about individual policies will be provided in the lecture or laboratory by each instructor.

**Instructor Profiles & Other Information:** Drs Marchant and Gray are regular faculty members/professors in the Department of Biology. They hold advanced degrees (MSc, PhD) and teach and conduct research in the general area of animal physiology. Dr Gray is also the Head of the Department of Biology. Ms Fisher also holds an advanced degree (MSc) and is responsible for coordinating all aspects of the laboratories for BIOL 317. Note that your lab group will also be assigned a laboratory demonstrator who will assist you during the lab periods and be responsible for grading your lab reports and presentation. The lab demonstrators work under Ms Fisher's supervision and are senior undergraduate or graduate students at the University.

## **Required Resources**

### **Textbooks**

Hill, Wyse & Anderson. 2012. Animal Physiology 3 ed, Sinauer.

This is available from the University of Saskatchewan Bookstore:

<http://www.usask.ca/bookstore/>

Laboratory Manual for BIOL 317 (will be available as a download from the course Blackboard)

### **Electronic Resources**

The laboratory portion of this course will require a working knowledge of computers and various computer programs, including MS Excel, Word and Powerpoint. Computers will be used extensively to collect and analyze data and prepare reports in the laboratory. You will need to access your University computer account during the laboratory; make sure you know your university nsid and password and how to log on to your account. Further details are in the lab manual.

### **Downloads**

These will be available as appropriate through the course Blackboard. The only document that you are required to download and read is the course syllabus. Please note that instructor's Powerpoint slides may be provided to you as a courtesy. You are not required to download or print these slides. While we will endeavour to have the lecture Powerpoint slides posted sometime in advance of the lectures, we will not guarantee this. Each instructor will provide you with additional information about their downloads.

### **Supplementary Resources**

From time to time, your instructors may make supplementary material available to you through the course Blackboard. This material will not replace the lecture or lab experience and you are encouraged to attend all lectures and take your own notes. A number of paper-based resources for the laboratory may be placed on reserve for you in the Natural Sciences Library; information about these is provided in the lab manual as appropriate.

## Grading Scheme

Midterm Exam	25
Final Exam	40
Lab Reports (six X 5% each)	30
Oral Presentation (one)	5
Total	100%

## Evaluation of Student Performance

### Midterm Exam

**Value:** 25% of final course grade

**Date:** Oct 22 (to be written in the lecture period)

**Length:** 50 minutes

**Format:** a mix of multiple choice questions and those requiring a written answer.

**Description:** Will include all of Dr Marchant's lecture material (ie to the end of the Bioelectricity lectures). Calculators allowed. No phones, laptops, tablets or other materials allowed.

### Final Exam

**Value:** 40% of final grade

**Date:** Consult the Final Exam Schedule when it is released.

**Length:** 3 hours

**Format:** a mix of multiple choice questions and those requiring a written answer.

**Description:** The exam is comprehensive in that it will cover all lecture material. However, material delivered since the midterm exam will be emphasized. Calculators allowed. No phones, laptops, tablets or other material allowed. **Students must plan to be in Saskatoon during the final exam period (Dec 6 to 23) as the BIOL 317 final exam could be scheduled on any day during this period.**

### Laboratory Reports:

**Value:** 30% of final grade

**Due Date:** See Course Schedule for exact dates

**Format:** Each student must independently write a report for each of the six lab exercises. A hardcopy (paper) of the report must be submitted the following week at the start of your lab period

**Description:** Comprehensive information about the format and style to be used for these reports is contained in the lab manual and will be explained in detail during the orientation lab in week two of the course. Generally, each report will consist of 4 to 5 pages of writing plus a number of Figures and/or Tables depicting the results obtained in the lab exercise. Students are required to know and understand what constitutes plagiarism and the University's Regulations on Academic Student Misconduct (see below). Each report will be worth 5% of the final grade. Note that failure to turn-in a Group Data Sheet will result in a 25% deduction from that lab report mark for each student in the group (see above).

### Lab Presentation :

**Value:** 5% of final grade

**Date:** See Course Schedule; exact dates are assigned randomly.

**Format:** 15 minute Powerpoint presentation

**Description:** Each student will be required to give one presentation detailing and explaining the results obtained during one of the lab exercises. Presentation topics are assigned randomly in the lab orientation period during week two.

## **Submitting Assignments/Feedback to Students**

Each student must independently write a report for each of the six lab exercises. A hardcopy (paper) of the report must be submitted the following week at the start of the next lab period (no exceptions to this). The lab reports will be graded by lab demonstrators 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. 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 manual; students must read this carefully. The oral presentation will be evaluated by Ms Fisher, two lab demonstrators and other students in the lab section. 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, well in advance of the last day to withdraw deadline (November 15).

## **Late Assignments/Missed Lab Deadlines**

Lab reports 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 coordinator (an email or phone call to Ms Fisher is adequate) on the day the assignment is due and discuss the reasons why the deadline is being missed. 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. Ms Fisher may consult with Dr Marchant and/or Gray during this verification process. There are no exceptions to this policy; students who fail to proactively advise the lab coordinator that they will miss the deadline will be subject to the 10% per day penalty. Late assignments will not be accepted after one week. Similar procedures must be followed by a student if they are going to miss giving their scheduled lab presentation. Note that failure to turn-in a Group Data Sheet will result in a 25% deduction from that lab report mark for each student in the group (see above).

## **Attendance Expectations**

Students are expected to attend all scheduled lab periods. It is impossible to schedule make-up labs for this course. 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. Individuals who leave the lab before their Group Data Sheet is turned in will receive a 10% deduction on their lab report for that exercise.

## **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).

## **Midterm and Final Examination Scheduling**

Midterm and final examinations must be written on the date scheduled. Final course examinations may be scheduled at any time during the examination period (Dec 6 to 23); students should therefore avoid making prior travel, employment, or other commitments for this period. If a student is unable to write the midterm exam through no fault of his or her own for medical, compassionate or other valid reasons, documentation must be provided. Students

should consult the laboratory manual for information specific to missed laboratories. Those who miss the final exam must contact the College of Arts & Science and apply for a deferred final exam. Deferred exams may utilize a different format than the regular exam, at the sole discretion of the course instructors. Students are encouraged to review all University examination policies and procedures: <http://policies.usask.ca/policies/academic-affairs/academic-courses.php>

## University of Saskatchewan Grading System

Students in BIOL 317 are reminded that the University has established a grading system to be used in all of its courses. Information on literal descriptors for grading at the University of Saskatchewan (reproduced below) can be found at:

<http://students.usask.ca/current/academics/grades/grading-system.php>

**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.

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/secretariat/index.php>

All students should read and be familiar with the Regulations on Academic Student Misconduct as well as the Standard of Student Conduct in Non-Academic Matters and Procedures for Resolution of Complaints and Appeals available on the University Secretary Website.

***Important Note:*** Additional information about student misconduct specific to BIOL 317 is found in the laboratory manual. BIOL 317 students are required to read and understand the information about misconduct that is presented in the laboratory manual and the links above.

## **Examinations through Disability Services for Students (DSS)**

Students who have a disability (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 a disability 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://students.usask.ca/current/disability/> or contact DSS at 966-7273 or [dss@usask.ca](mailto: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. Students who are in need of accommodation for other aspects of BIOL 317 must present the appropriate letter from DSS to the course instructors and we will work with the student to arrange an appropriate accommodation.