

COURSE SYLLABUS

COURSE TITLE:	BIOL 317 Fundamentals of Animal Physiology		
COURSE CODE:	82533	TERM:	Fall 2019
COURSE CREDITS:	3.0	DELIVERY:	Lecture & Practicum (Lab)
CLASS SECTION:	01	START DATE:	4 Sep 2019
LECTURE LOCATION:	rm 123 Biology Bldg	LAB LOCATION:	G74 Thorvaldson Bldg
LECTURE TIME:	10:30 to 11:20 am MWF	LAB TIME:	1:30-5:20 pm on Th
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. demonstrate an in-depth understanding of physiological principles and processes associated with cell membrane function
2. apply their skills in quantitative analysis of biological data
3. improve 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. apply 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 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 and ending on Dec 5 2019. This will result in 36 days of lectures during the term (approximately 30 hours of face-to-face instruction in the lectures). Seven afternoons of hands-on lab exercises, plus an orientation and two 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 five 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 of five experimental lab exercises, 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 teaching assistants before students leave 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
Week 1 Sept 4 Sept 6	Dr. Marchant: Nature and purpose of class; Water as the Biological Solvent (important features of biological solutions & molecular exchange in solution) <i>No lab scheduled this week</i>	<u>Textbook:</u> Chapters 1 2 & 5	Nothing due
Week 2 Sept 9 Sept 11 Sept 13	Dr. Benson Water as the Biological Solvent <i>Lab Period: Orientation</i>	<u>Textbook:</u> Chapters 2, 5 & 27 (part) <u>Lab Manual:</u> Introduction	Nothing due
Week 3 Sept 16 Sept 18 Sept 20	Dr. Benson: 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 #1
Week 4 Sept 23 Sept 25 Sept 27	Dr. Benson: Exchange of Materials continued <i>Lab Period: Exercise #2 Diffusion Potentials</i>	<u>Textbook:</u> Chapters 2 & 5 <u>Lab Manual:</u> Exercise #2	Lab #1 Reports due Group Data Sheet #2

Week 5 Sept 30 Oct 2 Oct 4	<p><u>Dr. Benson:</u> Transmembrane Potentials (Gibbs-Donnan equilibrium; diffusion potentials; ionic basis of membrane charge; steady state & equilibrium potentials)</p> <p><i>Lab Period: Introduction to Neurophysiology Equipment</i></p>	<p><u>Textbook:</u> Chapter 12</p> <p><u>Lab Manual:</u> Intro to Neurophysiology Equipment</p>	<p>Lab #2 Reports due</p> <p>Conduction Velocity & Rate of Decay Calculations</p>
Week 6 Oct 7 Oct 9 Oct 11	<p><u>Dr. Benson:</u> Bioelectricity (passive vs active electrical properties; action potentials; Hodgkin-Huxley cycle; action potential conduction)</p> <p><i>Lab Period: Exercise #3 Compound Action Potential</i></p>	<p><u>Textbook:</u> Chapter 12</p> <p><u>Lab Manual:</u> Exercise #3</p>	<p>Group Data Sheet #3</p>
Week 7 Oct 14	No Lecture – Thanksgiving Day		
Week 7 Oct 16 Oct 18	<p><u>Dr. Benson:</u> Bioelectricity (conclusions)</p> <p><u>Dr. Marchant:</u> Intercellular Communication (neurotransmitter release; synaptic & neuromuscular transmission; chemically-sensitive ion channels)</p> <p><i>Lab Period: Lab Period: Exercise #4 Skeletal Muscle Contraction</i></p>	<p><u>Textbook:</u> Chapter 12</p> <p><u>Lab Manual:</u> Exercise #5</p>	<p>Lab #3 Reports due</p> <p>Group Data Sheet #4</p>
Week 8 Oct 21 Oct 23 Oct 25	<p><u>Dr. Marchant:</u> Intercellular Communication (continued)</p> <p>Muscle Physiology (muscle types; contractile units; sliding filament theory; excitation-contraction coupling smooth vs. striated muscle)</p> <p><i>Lab Period: no lab exercise/activity</i></p>	<p><u>Textbook:</u> Chapter 13</p>	<p>Oct 23: Midterm Examination (during lab period; to end of Bioelectricity)</p>
Week 9 Oct 28 Oct 30 Nov 1	<p><u>Dr. Marchant:</u> Muscle Physiology (continued)</p> <p><i>Lab Period: Exercise #4 Analyses & Tutorial</i></p>	<p><u>Textbook:</u> Chapter 20</p>	<p>Lab #4 Reports due on Nov 1</p>
Week 10 Nov 4 Nov 6 Nov 8	<p><u>Dr. Marchant:</u> Signal Transduction Across Membranes (general mechanisms; mechanoreceptors; photoreceptors; visual and infrared spectra; phonoreceptors; middle ear receptors; lateral line receptors)</p> <p><i>Lab Period: Exercise #5 Sensory Receptors</i></p>	<p><u>Textbook:</u> Chapter 2 & 14</p> <p><u>Lab Manual:</u> Exercise #5</p>	<p>Group Data Sheet #5</p>

Week 11 Nov 11-15	No Lectures or Labs Break Week		
Week 12 Nov 18 Nov 20 Nov 23	<u>Dr. Marchant:</u> Signal Transduction Across Membranes (continued). <i>Lab Period: Student Presentations</i>	<u>Textbook:</u> Chapter 14	Lab #5 Reports due Student Presentations (on exercises 1 to 3))
Week 13 Nov 25 Nov 27 Nov 29	<u>Dr. Marchant:</u> Nervous Integration & Regulation (basic concepts; animal models of memory & learning; evolution of the nervous system; vertebrate brain structure & function; autonomic nervous system) <i>Lab Period: Student Presentations</i>	<u>Textbook:</u> Chapters 13 & 15	Student Presentations (on exercises 3 to 5)
Week 14 Dec 2 Dec 4	<u>Dr. Marchant:</u> Nervous Integration & Regulation (continued) Course wrap-up	<u>Textbook:</u> Chapter 15	Nothing Due Study for the final exam!
	Final Exam during regular exam period (Dec 7 to 23)		

* 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 120.3 Biology CSRB tracy.marchant@usask.ca	966-4420
Dr James Benson	room 320.2 Biology CSRB james.benson@usask.ca	966-4404
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 Benson are regular faculty members/professors in the Department of Biology. They both hold advanced degrees (PhD) and teach and conduct research in the general area of animal physiology, with Benson further specializing in cryobiology and biological mathematics and Marchant specializing in animal endocrinology and ecophysiology. Ms Fisher 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 teaching assistant who will help you during the lab periods and be responsible for grading your lab reports and presentation. The teaching assistants work under Ms Fisher's supervision and are senior undergraduate or graduate students at the University.

Required Resources

Textbooks

Hill, Wyse & Anderson. 2016. Animal Physiology 4 ed, Sinauer/Oxford.

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 (in addition to the lab manual). 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 (five)	30
Oral Presentation (one)	5
Total	100%

Evaluation of Student Performance

Midterm Exam

Value: 25% of final course grade

Date: Oct 23 (to be written in the lab period)

Length: 90 minutes
Format: a mix of multiple choice questions and those requiring a written answer.
Description: Will include all lecture material 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 should plan to be in Saskatoon during the final exam period (Dec 7 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 five lab exercises. A hardcopy (paper) of the report must be submitted according to the schedule shown above.
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. Generally, each report will consist of several 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). Reports 1 & 2 will be worth 5% of the final grade; Report 3 worth 6%, Report 4 worth 8% each and Report 5 worth 6%. 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.

Lab Presentation :

Value: 5% of final grade
Date: See Course Schedule for exact dates.
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. Students who fail to attend both days of student presentations will receive a 2.5 mark deduction from their final course grade.

Submitting Assignments/Feedback to Students

Each student must independently write a report for each of the lab exercises. A hardcopy (paper) of the report must be submitted as shown in the Course Schedule (no exceptions to this). The lab reports will be graded by lab teaching assistants who will also watch for plagiarism. Reports will be graded and returned on a schedule such that students will have feedback about their work after they have submitted the first report. 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 teaching assistants 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.

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. 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. 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 Benson during this verification process. 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 any assignment associated that activity. Students who fail to attend both days of student presentations and who do not have a valid excuse based on illness or extenuating personal circumstances will receive a 2.5 mark deduction from their final course grade.

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 7 to 23); 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, compassionate or other valid reasons, documentation must be provided and an opportunity to write the missed exam may be given. Note: students should consult the laboratory manual for information specific to missed laboratories. Students 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>

Recording of the Course

Students are not allowed to record any aspect of this course, except with the permission of the instructors or as provided for by arrangements with Disability Services for Students. Any recording made under these provisions are to only be used for the personal learning of the student who made the recording.

Copyright

All previously-published material is used this course under the fair-use provisions of Canadian copyright legislation. The instructors retain copyright of their own work. Students shall refrain from redistributing any material provided to them, except with the permission of the instructors.

Student Feedback

The Department of Biology or the instructors may survey students regarding the course. This is generally done through an in-class assessment near the end of term.

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/academics/grading/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.

Student Supports

Student Learning Services

Student Learning Services (SLS) offers assistance to U of S undergrad and graduate students. For information on specific services, please see the SLS web site

<https://library.usask.ca/studentlearning/>.

Student and Enrolment Services Division

The Student and Enrolment Services Division (SESD) focuses on providing developmental and support services and programs to students and the university community. For more information, see the SESD web [site http://teaching.usask.ca/](http://teaching.usask.ca/).

College Supports

Students in Arts & Science are encouraged to contact the Undergraduate Student Office and/or the Trish Monture Centre for Success with any questions on how to choose a major; understand program requirements; choose courses; develop strategies to improve grades; understand university policies and procedures; overcome personal barriers; initiate pre-career inquiries; and identify career planning resources. Contact information is available at:

<http://artsandscience.usask.ca/undergraduate/advising/>

Examinations through Access and Equity Services (AES)

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

Students who are in need of accommodation for the course must present the appropriate letter from AES to the course coordinator. Students registered with AES may require alternative arrangements for examinations. Students must arrange such accommodations through AES by their stated deadlines.