BIO 450 – Animal Physiology Lab - Course Syllabus

Instructor

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Course Description

This course is designed to illustrate the fundamental physiological processes occurring in animals by providing hands-on experience using a diversity of laboratory exercises. Each week we will complete a set of experiments that use current physiological techniques to examine a particular aspect of animal physiology. We use a variety of animal models, including frogs, earthworms, cockroaches, and humans, to conduct these experiments. Please be aware that some animals (but not humans) will be sacrificed during the semester to provide living tissue for experiments, though we may not have access to all listed species in all semesters. This laboratory course is intended to supplement material presented in BIO 449.

General Course Information

Lab times: T 9:30-12:15; T; 2:00-4:45, Th 9:30-12:15; Th 2:00-4:45

Location: Rigge 307

Textbook: *Human Physiology: An Integrated Approach 8th Edition* by Dee U. Silverthorn is highly recommended (same textbook used in BIO 449). Lab manual will be available for purchase during the first lab of the semester (price = $10, cash).

Webpage: All official class materials, grades, and notifications (including cancellations) will be through the course website on Blueline.

Co/prereqs: BIO 449 (Animal Physiology Lecture)

Fulfills: This course fulfills a laboratory requirement for the Biology major/minor, as well as the Technology Designation under the Magis Core Curriculum.

Curriculum Goals

Course Objectives

Upon successful completion of this course, students will:

- develop an improved understanding of the fundamental concepts of animal physiology, including: membrane permeability, action potential propagation of nerves, mechanisms of sensory physiology, skeletal muscle activity and kinetics, regulation of heart beat and contraction force, ion and water regulation, measures of immunity, and female reproductive hormone cycles
- demonstrate proficiency in experimental design, data collection, statistical analysis, and interpretation of scientific results
- gain a deeper understanding the of the relationship between structure and function at the molecular, cellular, system, and organismal levels
- improve both oral and written scientific communication skills
- cultivate the ability to work as a productive member of a team
- understand the importance of technology in the field of physiology and become proficient in understanding the use of various technologies, including: transducers, amplifiers, PowerLabs, EMGs, ECGs, spectrophotometers, and LabChart8 software in addition to Excel and Google Sheets and Docs.

Magis Core Designated Technology Course

The importance of preparing students to engage the world as insightful, creative, and ethical citizens has been a long-standing foundation of a Jesuit education. In this ever-advancing world, technology is playing a larger and larger role in every-day life, and therefore encouraging students to become proficient in various aspects of technology is not only required to become a successful member of the scientific community, but is imperative to interacting with the whole of society. This course aims meet the technology designation of the Magis Core by encouraging the joint exploration of natural and technological wonders in a hands-on, laboratory setting. This course covers basic techniques used in physiological research and introduces standard medical technologies that students will no doubt encounter during their lives. Importantly, students will learn to appreciate both the strengths and limitations of the various technological methodologies covered in this course, which will form the focal point for reflection on the broader benefits and concerns of technology and its use in the modern world. Finally, students will collaboratively work to collect, interpret, and present data in scientifically meaningful ways, and become proficient in using technology to enhance the written/oral discussion of physiological research.

Objective 1: Students will use technology effectively for research, analysis, communication, and collaborative work.

Objective 2: Students will recognize that technology and the digitization of knowledge are powerful tools and will identify potential dangers concerning the reliability, privacy, security, and equity.

Course Structure

Lab Exercises

The attached schedule provides the general topic covered in each week's lab. The background, laboratory protocols, and worksheets for each lab are provided in the lab manual. Prior to each lab, you are expected to have: 1) watched the pre-lab BlueCast lecture, 2) read the background and reviewed the laboratory procedures, and 3) taken your online pre-lab quiz via BlueLine. For each lab, you will complete a worksheet to be turned in digitally as a PDF on the course Blueline site by the beginning of the next lab (unless otherwise instructed). There are 9 lab worksheets (one for each lab). This is when worksheets are due! I am instating a one-week grace period in which you may still turn in your worksheet for a reduced grade (max grade of 4 out of 5), but do not abuse the privilege – you truly will benefit best by keeping up with the material. Late assignments will not be accepted beyond this grace period– no exceptions. There may be some exceptions to worksheet due dates near the end of the semester for students seeking feedback on the last few assignments before the written and practical exams.

Written Assignments

There will be two writing assignments in this course as listed below. All writing assignments are to be written individually even though the data used will have been collected with your group members. General information on each assignment can be found below, but the extended assignment descriptions and grading rubrics can be found at the back of the lab manual.

1. **Technology Reflection**: A 2-page (single-spaced) reflection on the use of technology in the field of Physiology is required. This should include a discussion on the technology used so far in the course, its effectiveness for studying various aspects of animal physiology, and a brief discussion of its limitations in terms of its reliability, security, and equity. This assignment is **due by 6pm October 21th**; late papers will be subject to a 10% reduction in grade per day – no late papers accepted more than one full week after the deadline (at which point the max grade you could earn would be a 30%).

2. ***Lab Report:*** This report will include the synthesis of all required sections presented in a peer-reviewed publication, including the introduction, materials and methods, data analysis, results, and discussion. This assignment is due by **6pm November 4th**; late papers will be subject to a 10% reduction in grade per day – no late papers accepted more than one full week after the deadline (at which point the max grade you could earn would be a 30%). See the extended assignment description and grading rubric at the back of the lab manual for more information.

Pre-lab Lectures
Students are expected to come to each lab prepared to engage in the experiments and activities planned for that week. Preparedness will require reading the lab in advance and watching the pre-lab BlueCast lecture before coming to class for the week. Pre-lab lectures will cover the pertinent background material and provide you with a primer on the upcoming lab activities. These recorded lectures will become available on the course Blueline site following the conclusion of labs for the week (~5pm on Thursday). In addition, each week there will be quiz questions that assess your readiness for the coming lab (described more below).

Blueline Quizzes
There will be a total of 10 quizzes on Blueline for this course. These quizzes are due for ALL students before the start of labs for the week. In other words, pre-lab quizzes for all lab sections are due by 9:30am every Tuesday! The quizzes will contain pre-lab questions that assess your readiness for the coming lab (so read the lab manual and watch the pre-lab lecture *before* taking the quiz), and post-lab questions to assess your understanding of the material covered in the previous lab. Generally, you should expect post-lab questions to be more challenging than the pre-lab questions. Quizzes are meant to ensure that students have learned the important material covered in the labs. The quizzes will be a combination of multiple choice, True/False, and short answer. Ten quizzes will be administered, however only the scores of the top nine will be applied toward your grade (i.e. the lowest quiz score is dropped). You will have one hour to complete each quiz. They will become available at the end of labs for the week (Thursday ~5pm). There are no make-up or late quizzes allowed – no exceptions (this is why we allow you to drop your lowest grade).

Exams
The final exams will consist of two components, written exam to test content knowledge, and an in-lab practicum that that tests your ability to conduct/problem-solve randomly selected lab exercises and techniques. We will talk about this exam in more detail as it approaches.

Grading Policy

A total of 300 points will be awarded as follows:

Assignment	Points
Quizzes (10 @ 10)*	90
Worksheets (10 @ 5)	50
Technology Reflection	10
Lab Report	50
Written exam	50
Practicum	50
Total	300

Grade	Percentage
A	93 – 100
A-	90 – 92.9
B+	87 – 89.9
B	83 – 86.9
B-	80 – 82.9
C+	77 – 79.9
C	73 – 76.9
C-	70 – 72.9
D	60 – 69.9
F	59.9 and below

* The lowest quiz grade will be dropped. NOTE: there are no make-ups for these assignments and late quizzes/worksheets will not be accepted.

Any *written* assignments (i.e. the Technology Reflection or Lab Report) turned in late will incur a 10% reduction in points per day. Occasionally, due dates for assignments may change – but you will be notified in lab and on BlueLine of such changes. Some labs require data entry during or after lab – these tasks must be completed according to the deadlines announced in lab. All assignments and quizzes will be graded as expediently as possible and returned to you.

Policy on Attendance

You are expected to attend every lab on time and actively participate in all the lab exercises. *Students that arrive late to lab will not be allowed to participate in that week's lab*. If you must miss a lab period, contact your lab instructor as soon as you learn of your conflict. Space is limited in each lab section, so you are not allowed to attend a lab section for which you are not registered without prior consent from both your instructor and the instructor of the section you wish to attend. If you fail to attend a lab, you will not receive any points for that week's lab report since you did not conduct the procedures or collect the data needed to inform your answers. Further, no extensions or late work will be accepted for the previous week's lab report.

Miscellaneous Policies and Expectations

Laboratory Safety

You are expected to have and use your own lab goggles as needed. The Biology Department will supply disposable gloves and dissecting kits.

The Occupational Safety and Health Administration (OSHA) stipulates the following requirements for personnel working in a laboratory environment:

- Confine long hair and loose clothing
- Wear closed-toe shoes - no sandals, perforated shoes, ballet flats, or canvas sneakers

- Wear full length pants or skirt (*tight stretchy pants and pants with holes are not allowed*)
- Avoid skin contact with harmful substances by using gloves and wearing long sleeves
- Wear safety goggles when working with potentially dangerous chemicals

Class Cancellation
Class will never meet if the University is closed. If class is cancelled for other reasons, your instructor will send out an announcement via BlueLine. If a University closure occurs during a scheduled quiz, exam, or practicum, your instructor will post information on alternative dates.

Academic Honesty
In this class, cheating on a quiz or exam, plagiarizing a written assignment, falsifying data, or otherwise turning in any work that is not your own may result in sanctions (ranging from a score of zero for the affected work, to a failing grade in the course). In addition, students caught cheating will have a letter placed in their college file so that future offenses in other courses will carry more severe consequences. Please consult the Academic Honesty section in the Creighton University Student Handbook for more information on this topic (link below).
https://ccas.creighton.edu/sites/ccas.creighton.edu/files/media/Academic%20Honesty%20Policy.pdf

Americans with Disabilities Act
If you believe that you need accommodations for a disability, please contact Disability Services if you have not already done so (Old Gym 437, 402-280-2195) For information about disability support services, visit http://www.creighton.edu/disabilitysupportservices/. They will provide me with specific instructions regarding the accommodations you require. Students are expected to schedule their exams in a timely fashion and to provide me with the appropriate paperwork within the first two weeks of class.

Please Note: In the event of disruption of normal classroom activities due to emergencies such as a disease outbreak or other emergency, the format for this course may be modified to enable completion of the course. In that event, you will be provided an addendum to this syllabus that will supersede this version.

Special Statement from Creighton on Academic Honesty in a Digital Environment
Learning takes place in the face to face and virtual classrooms through a variety of means, including lectures, discussions, activities, etc. For learning to take place, these environments need to be a safe space. As part of that safe space, we should speak respectfully to and with each other. That is not to suggest that any of us will never misspeak. To learn from these conversations, we need to ensure that what happens in our face to face and virtual classrooms stays in the classroom. For this reason *all*

course materials, including handouts, problem sets (and solutions), and lecture and discussion materials (powerpoint slides,videos, lecture and discussion recordings, etc.) that are posted on the course BlueLine site are considered to be copyrighted and are intended to be used only by students enrolled in that class (during that semester), for the purposes of fulfilling the course objectives. Only the instructor may record common class sessions. Only the instructor may distribute any and all recorded materials, including individual student discussion posts. Sharing any of these materials with others outside of the course **will** be considered "misuse of academic resources," as defined in the *Creighton University Student Handbook* as an act of academic misconduct, and students can be penalized, up to and including failure of the course. In the case of recorded live lecture and discussion material, students should be aware that recording may continue during class breaks. Therefore, private conversations should be held elsewhere in order to avoid inadvertent recording. There are additional consequences for cyberbullying or otherwise using a recording in violation of our code of conduct or Title IX policies.

Be respectful about the health of those around you!

While we are all vaccinated here at Creighton University, please be respectful of those around you that may still have concerns about COVID or that regularly engage with people in high-risk groups. As someone with an unvaccinated young child at home, I join my fellow Creighton faculty and staff colleagues in asking you to follow these simple rules in regard to my class:

1. Do not come to class if you have a close COVID exposure or are experiencing any severe symptoms of illness. These include fever, fatigue, body aches, or frequent coughing and sneezing.

2. If you have symptoms of a mild cold or allergies, please wear a mask to class to protect those around you and put others' minds at ease. It is hard to focus on learning if adjacent students sound ill.

    a. This is especially important in lab, which often requires us to work in close proximity. Likewise, there are some labs that will require closer proximity than others – students may be asked to wear masks during these class meetings.

3. If you visit me in my office, I will require that we both wear masks. My office is a small space with poor ventilation and this simple measure will prevent me from accidentally transmitting illnesses to my family. If you prefer to meet without a mask, I am happy to meet with you one-on-one via Zoom.

4. Understand that this pandemic is still a major health concern, and as such, as our understanding of COVID evolves and as transmission and vaccination rates change in the area and in the country, our handling of the situation may also change.

Should you need to miss lab due to illness or exposure, I will *ALWAYS* find a way to accommodate you and ensure that you do not lose points for your absence.

Animal Physiology Laboratory Course Schedule

Dates	Lab Activity	Quiz & Written Assignment Dates
8/18-8/20	*No labs the first week of class (Wednesday – Friday)*	*Labs start the first full week of class*
8/24-8/26	**Lab 1** – Membrane Physiology	**Quiz 1**
8/31-9/2	**Lab 2** – Propagation of action potentials in the neuron	**Quiz 2** **Lab 1 worksheet due**
9/7-9/9	**Lab 3** – Sensory Physiology	**Quiz 3** **Lab 2 worksheet due**
9/14-9/16	**Lab 4** – Measuring muscle activity patterns *in vivo* (humans)	**Quiz 4** **Lab 3 worksheet due**
9/21-9/23	**Lab 5** – Muscle contractile kinetics (frog model data)	**Quiz 5** **Lab 4 worksheet due**
9/28-9/30	**Lab 6** –Cardiovascular & Respiratory Physiology	**Quiz 6** **Lab 5 worksheet due**
10/5-10/7	**Lab 7** – Immunology	**Quiz 7** **Lab 6 worksheet due**
10/12-10/14	*Fall Break - No labs*	
10/19-10/21	**Lab 8** – Renal responses to fluid and ion intake	**Quiz 8** **Lab 7 worksheet due** **Technology Reflection due**
10/26-10/28	**Work on Lab Reports**	**Lab 8 worksheet due**
11/2-11/4	**Lab 9** – Human Reproductive Physiology	**Quiz 9** **Lab 8 worksheet due** **Lab worksheet 9 due (for feedback)** **Lab Report due** (on Renal lab)
11/9-11/11	**Written exam / Review for practicum**	**Quiz 10** **Lab 9 worksheet due**
11/16-11/18	**Practicum**	
11/23-11/25	*Thanksgiving week - No labs*	