

BMS 320 – Virtual Laboratory in Physiology

Course Coordinator / Instructor

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Overview

Each week's coursework involves:

- Pre-lab tutorials using Draw It to Know It and selected on-line Tutorials*
- Concepts Tests (open book) on Canvas
- Laboratory Exercise using PhysioEx 10.0-Laboratory Simulations in Physiology*
- Optional: Completion of Data Charts to use for Data Analysis
- Completion of Lab Report on Canvas
- Upload PDF Activity Files from PhysioEx program

- Three (Closed Book) Unit Exams each covering four experiments.

*see page 3 for information on purchasing online content for course.

All tests, lab reports, and exams are done through: BMS 320 Virtual Laboratory in Physiology Canvas Course site. Access to this Course is automatic following your registration for the course.

To Log on, go to: canvas.colostate.edu

Pre-/Co-requisite

- Colorado State University Courses BMS 300 (Principles of Human Physiology), which is also available at Colorado State University Online Plus [<http://www.online.colostate.edu/courses/BMS/BMS300.dot>] OR
- College level Physiology course at another institution (send unofficial transcript to Dr. Vader for approval)

Course Description and Goals

This course uses virtual laboratory exercises to study classic physiology experiments and is meant to meet the physiology lab pre-requisite for off-campus students applying for admission to post-graduate biomedical programs.

The course has been designed to fit the needs of students preparing for careers in health related fields such as Fitness and Athletics; Pre-Medicine; Pre-Physical and Occupational Therapy; Pre-Physician Assistant; Nursing; Bio-Education (Teachers), as well as students simply interested in how their body functions.

Be sure to check with post-graduate institutions of interest to insure this course meets their requirements. The laboratory exercises are simulations of experiments done in traditional "wet-lab" courses. The method of data collection differs, but the recording and analysis of data is similar and rigorous. Students will gain an increased understanding and appreciation for the functions (physiology) of the human body.

Course Learning Objectives

1. Evaluate different types of cell membrane transport mechanisms with respect to type of transport, rate of transport, conditions that affect the transport (membrane pore size, molecular weight, size, concentration of solutes), and role of carrier molecules and ATP.
2. Evaluate the physiology of neurons including ion concentration, channels, resting membrane potentials, stimuli strength, refractory periods, conduction velocity, and synaptic function.
3. Observe and explain the effect of increasing stimulus voltages (multiple motor unit summation); the effect of increasing stimulus frequencies (wave summation); and the effect of fatigue on skeletal muscle contraction.
4. Evaluate the interaction between thyroid hormones and metabolism, insulin and plasma glucose levels and their role in diabetes mellitus, benefits of hormone replacement therapy, and the role of ACTH on cortisol levels.
5. Explain the effect of blood vessel radius, blood viscosity, blood vessel length, and blood pressure on blood flow rate; and the effect of blood vessel radius and stroke volume on pump activity in the heart.
6. Explain the factors affecting the refractory period of cardiac muscle and the role of vagal nerve stimulation, the effect of temperature, chemical modifiers, and ionic changes on cardiac function.
7. Measure respiratory volumes and calculate capacities and explain the role of surfactant and intra-pleural pressure on respiration.
8. Explain the enzymatic processes involved in digestion of starches, proteins, and fats.
9. Describe the effect of arteriole radius and pressure on glomerular filtration; the renal response to altered blood pressure; the role of solute gradients and their impact on urine concentration; the role of carrier proteins in glucose reabsorption; and the effect of hormones on urine formation.
10. Explain the role of hyperventilation, rebreathing and renal responses in respiratory acidosis and alkalosis; and the respiratory responses to metabolic acidosis and alkalosis.
11. Explain how to measure and the importance of hematocrit, erythrocyte sedimentation rates, hemoglobin and blood cholesterol values; describe blood typing procedures and the importance of the blood type determination.
12. Describe the procedures used in and the importance of direct fluorescent antibody, Ouchterlony double diffusion, indirect enzyme-linked immune-sorbent assay, and western blotting techniques.

Course Materials for BMS 320

- **Required (needed by the first day of class):**

- (1) Purchase on-line access to the PhysioEX (10.0) program at <http://www.physioex.com/>. The price is \$30.00 and:
- (2) Draw It to Know It (Anatomy & Physiology) at <https://drawittoknowit.com/course/anatomy-physiology> A six months subscription is \$49.99 after a one week free trial. A coupon code (if available) for a discount will be provided at the beginning of the course.

- **Highly Recommended:**

Vander's Human Physiology is the text used for the pre-/co-requisite course (BMS 300) for BMS 320 and is *highly recommended* (but not required) as additional reading for this course. Chapters are referenced in the Lab Report assignment. The referenced edition is the 13th, but anything from the 10th to the 15th would be acceptable. It can be found on-line. If you have another college level Physiology text, it can be used instead. You can use the index to find the topics covered in each experiment. Some questions in the Lab Reports assume you are reading the assigned sections of the textbook. If you are going to be in the Biomedical field professionally, a good physiology text book is always a good resource.

10th: 978-0073122861

11th: 978-0077216092

12th: 978-0077350017

13th: 978-0073378305

14th: 978-1259294099

15th: 978-1259903885

If you do not have the current version, used texts and older editions can be purchased from Amazon.com at reduced prices.

Special needs statement: Students with disabilities are encouraged to contact the Resources for Disabled students at 491-6385 to arrange for accommodation and support services. Experiment assignments are not timed and double time is already allowed for the three exams. Please submit your SDC Accommodations Letter to Dr. Vander the first week of class.

Academic Integrity

We take academic integrity seriously. At minimum, academic integrity means that no one will use another's work as their own. The Student Conduct Code defines infractions to academic integrity as:

- Cheating; includes using unauthorized sources of information and providing or receiving unauthorized assistance on any form of academic work or engaging in any behavior specifically prohibited by the faculty member.
- Plagiarism; includes the copying of language, structure, ideas, or thoughts of another, and representing them as one's own without proper acknowledgment. (*This includes copying answers found on internet sites such as Quizlet, Chegg, and Anki.*)
- Unauthorized Possession or Disposition of Academic Materials; includes the unauthorized selling or purchasing of examinations or other academic work; stealing another student's work; unauthorized entry to or use of material in a computer file; and using information from or possessing exams that an instructor did not authorize for release to students.
- Falsification; any untruth, either verbal or written, in one's academic work.
- Facilitation; knowingly assisting another to commit an act of academic misconduct.

Source: Student Conduct Code (pages 3-4) <https://resolutioncenter.colostate.edu/wp-content/uploads/sites/32/2018/08/Student-Conduct-Code-v2018.pdf>

If you plagiarize in your work you could lose credit for the plagiarized work, fail the assignment, or fail the course. At a minimum, violations will result in a grading penalty in this course and potentially a report to the Office of Student Resolution Center.

Of course, academic integrity means more than just avoiding plagiarism. It also involves doing your own reading and studying. It includes accessing the Canvas site regularly, careful consideration of all class materials, and engagement with the class and your fellow students. Academic integrity lies at the core of our common goal: to create an intellectually honest and rigorous community. Because academic integrity, and the personal and social integrity of which academic integrity is an integral part, is so central to our mission as students, teachers, scholars, and citizens, we will ask to you check off on the CSU Honor Pledge as part of completing all Exams.

"I have not given, received, or used any unauthorized assistance."

Exams

There will be three written (closed book) unit exams all administered via Canvas. Each unit exam will emphasize the material in that unit (four experiments each). Each of the three exams will consist of 100 points (~80 questions evenly distributed over the tutorial information and laboratory information/exercises). Questions on these written exams will be taken from tutorials, lab exercises, Lab Reports, Concept Tests, and Pre- and Post-Lab quizzes found in PDF files.

Exam Proctoring:

This course will utilize HonorLock to proctor your online exams.

What is HonorLock?

Honorlock is an online proctoring service that allows you to take your exam from the comfort of your home. You DO NOT need to create an account, download software or schedule an appointment in advance. Honorlock is available 24/7 and all that is needed is a computer, a working webcam, and a **stable** Internet connection.

- To get started, you will need Google Chrome and to download the Honorlock Chrome Extension. You can download the extension at www.honorlock.com/extension/install.
- When you are ready to test, log into Canvas, go to your course, and click on your exam.
- Clicking Launch Proctoring will begin the Honorlock authentication process, where you will take a picture of yourself, show your ID, and complete a scan of your room.
- Honorlock will be recording your exam session by webcam as well as recording your screen. Honorlock also has an integrity algorithm that can detect search-engine use, so please do not attempt to search for answers, even if it's on a secondary device.
- Good luck! Honorlock support is available 24/7/365. If you encounter any issues, you may contact help by live chat, phone (844-243-2500), and/or email (support@honorlock.com,)

Assignment Policies for BMS 320

- **Weekly:**
 - Summer: Materials for the week's experiment are released at 8 pm on Monday or at 8 am on Friday and are due at 8 am the following Friday or 8 pm the following Monday. See schedule for specific assignments on each date.
 - Fall & Spring: Materials for the week's experiment are released at 8 am MDT/MST on Wednesday morning and are due at 8:00 am, the following Wednesday. See schedule for specific assignments on each date.
- Please plan ahead to allow for technical problems or extenuating circumstances.

Late Submissions: Assignments not submitted by the due date will be accepted with a 25% deduction for late submissions of up to 12 hours and a 50% deduction for late submissions of up to 24 hours. The assignment will be given a zero after 24 hours.

Early Submissions: In order to encourage students to submit assignments early (and spread out the grading process for the instructor), extra credit points will be added to the Lab Report grade for Experiments submitted 24 hours or more before the deadline. All exercises for the experiment including the Concept Test, uploaded PDF Activity Files and the Lab Report must be completed for the extra credit points to be awarded. Grades in this course are NOT curved, so the grades of students who chose to submit assignments according to the assigned due date will not be affected negatively by this policy.

Grading Policies for BMS 320

1. Assignment available dates and times and due dates and times are listed in the schedule. Anything not submitted by the deadline will receive a deduction/zero. Contact me concerning extenuating circumstances, but since you have 3.5 days (Summer Session) or 7 days (Fall and Spring Semesters) to do the exercise associated with each experiment, it is expected that you will schedule your time to accommodate last minute problems or illnesses that might arise. This course moves quickly and it will be hard to catch up if you get behind.
2. You can define your own schedule within the week as long as the assignment deadlines are met, however, you must complete all the assigned activities. The next set of assignments are released when the previous due date occurs.
3. The instructor will be available to answer questions from about 8 am to 5 pm Monday through Friday MDT/MST and will monitor emails during the evening and on week-ends but unless the problem is urgent, may not respond until the next morning or on Monday morning if contacted over the week-end.
4. Lab Reports will be graded and returned within 24 hours of the due date/time.
5. Concept Tests (on Canvas) are based on 50 points and have between 10-30 questions.
6. Lab Reports (on Canvas) are graded on a 100 point scale.
7. Uploaded PDF Activity files are worth 40 points and are based on completion of the experiment and the post-lab tests found in the PhysioEx program that are completed at the end of each activity in the experiment.
8. Unit Exams will each be 100 points distributed over about ~80 questions (20 from each topic in the Unit) and are closed book. The highest exam grade will be counted twice at the end of the semester.
 - The Course Average will be calculated based on the following percentages:

Communication Assignments	5.0%
12 Concept Tests (Open Book)	12.5%
12 Lab Reports	20.0%
12 PDF Activity File Uploads	12.5%
3 (+1) Unit Exams	50.0%
 - Communication Assignments help to develop a sense of community in the course and give the instructor insight into how the course is going for the students. Assignment Details will be given on Canvas at the beginning of the course.
 - The lowest score for the Concept Tests, Lab Reports, and PDF Activity Files will be dropped at the end of the semester. Use this policy to address extenuating circumstances such as illnesses.
 - The exam average will include 3 unit exams plus the score for the highest unit exam grade.
 - Final Grades will be defined by the following breakdown. Note: scores are not rounded up.

90.00-100% = A;	70.00-79.99% = C;	< 60% = F.
80.00-89.99% = B;	60.00-69.99% = D;	