

SYLLABUS

Instructors: Dr. Christopher Loretz (Course Coordinator)
Office: 647 Hochstetter Hall
Office Hours: MWF 8:00-8:45 a.m.,
 TR 8:30-9:15 a.m.,
 & by appointment
Physiology Circle: M 4:00-6:00 p.m.; 218 Cooke Hall
Phone: 645-4985
E-mail: loretz@buffalo.edu

Dr. Mary Bisson
Office: 623 Hochstetter Hall
Office Hours: M 10:00-11:00 a.m., T 9:00-10:00 a.m.
Phone: 645-4978
E-mail: bisson@buffalo.edu

Meeting Time and Place: MWF 9:00-9:50 a.m.
 Norton 112, North Campus

Textbook and Other Class and Reference Materials:

- **Sadava et al., *LIFE: The Science of Biology*, 10th edition.** This single required textbook is the same text that was used in BIO 200 and BIO 201 in the 2016-2017 academic year. If you already own the book, that's great, use it again in this fall 2017 semester. If you do not own the book, it is available new or used for your purchase at the University Bookstore on the North Campus, and from on-line booksellers. In the Fall 2017 semester, BIO 200 will begin using the new 11th edition of this textbook. If, for some reason, you are concurrently enrolled in BIO 200, then it is fine for you to purchase and use the 11th edition for both BIO 200 and 203. If you own the 9th edition from an earlier taking of BIO 200, this is fine, too. In the case of using the 9th or 11th editions, please use the chapter conversion table that is posted at UBlerns to make the necessary adjustments in the assigned readings.
- **SimBio Action Potentials experiment simulation package.** There is a modest access cost for the simulation package. Instructions for obtaining access will be given in class. Please do not purchase access in advance. Different components of the simulation package will be used according to student enrollment in BIO 203 and 213. In BIO 203, point value is given for worksheets to be completed and submitted individually by students according to the due date for these assignments.
- **Occasional supplemental readings and/or worksheet materials announced in class and made available through UBlerns.**

Course Description and Objectives: BIO 203 Physiology is a 3-credit hour course designed to follow the first-year major curriculum in Biological Sciences (BIO 200 Evolutionary Biology, and BIO 201 Cell Biology). The course presents basic principles of physiology, with in-class examples and assignments building upon foundational knowledge of the diversity of life and its evolutionary history, including the challenges of life in changing and extreme habitats, and upon solid understanding of cell structure and function, including energetics. An integrative and systems approach will be utilized, with the units of focus being the tissue and organism. The major systems topics for study will include (but not necessarily be completely defined by): barrier membranes, excitable tissues (nervous and sensory systems, and muscle), mechanics and locomotion, energetics and digestion, circulation and respiration, homeostasis (water, salt and nitrogen balance, and thermoregulation), chemical integration (endocrine and immune systems), reproduction, and environmental and conservation physiology. This course also has a substantial quantitative physico-chemical slant to it that reflects the field of physiology. Your background coursework in algebra and calculus will be more than sufficient to arm you with the necessary quantitative analytical skills needed in this course.

Prerequisites: Students should have sophomore-level or higher academic class status, have successfully completed the first-year introductory course sequence for majors (BIO 200 Evolutionary Biology and BIO 201 Cell Biology) or equivalent coursework, and be in good academic standing.

Program Learning Objectives: In the context of departmental program learning objectives, this course will, for the student:

- provide a breadth of knowledge of basic principles and concepts;
- provide depth within specialized areas;
- develop approaches for integration of information;
- encourage critical thinking and hypothesis building;
- provide skills in scientific communication;
- provide contemporary information; and
- encourage an appreciation of scientific values.

Course Learning Objectives: In the specific context of course learning objectives, students successfully completing this course will:

- ¹appreciate the functional organization of complex metazoans and the importance of specialized tissues and physiological systems in large organisms;
- ²understand the principles of organismal homeostasis and acclimation, and regulation by feedback loops and other mechanisms;
- ³recognize the importance of cellular processes underlying physiological acclimation, and of evolutionary adaptation to environment;
- ⁴master basic quantitative skills that are important for analyzing, understanding and presenting physiological data; and
- ⁵be prepared academically for upper-division elective coursework in neurobiology, endocrinology, immunology, and other fields.

Assessment: Student achievement of course learning objectives will be assessed formally or through interactive self-assessment by:

- three in-classroom hourly exams of combined multiple-choice and free-response questions, for testing knowledge acquisition (course learning objectives 1-3) and quantitative skills mastery (course learning objective 4);
- occasional worksheets and homework sets, for developing and self-testing quantitative skills mastery (course learning objective 4);
- on-line review questions on text readings for measuring knowledge acquisition (course learning objectives 1-3); and
- a comprehensive in-classroom final exam of combined multiple-choice and free-response questions, for measuring knowledge acquisition (course learning objectives 1-3), quantitative skills mastery (course learning objective 4), and preparation for advanced-level coursework (course learning objective 5).

Participation: Class participation is encouraged throughout the semester. Active student engagement in discussion and in question-and-answer periods will promote comprehension and learning.

SimBio worksheets will be available for download at UBlerns. These for-credit worksheets should be completed using the SimBio on-line tutorial, and submitted in class according to the assigned due dates. These worksheets cover the topics of osmosis and diffusion and nerve cell function. The SimBio worksheets are timed to correspond to lecture coverage of these topics. Full instructions are included on the worksheets.

Additional, no-credit skill-building worksheets will also be available for download at UBlerns. These no-credit exercises can be completed by interested students, with answers and explanations to be revealed through interactive exchanges in lecture meetings. Worksheet help is available at Physiology Circle.

Course Requirements and Grading: Course grades will be determined by the following scheme:

Exam 1	100 points
Exam 2	100 points
Exam 3	100 points
Final Exam	100 points
SimBio Worksheets	20 points
Total Points	420 points

Exams 1, 2 and 3 will focus on materials from defined blocks of lectures (please refer to the course schedule that is included in this document). The **Final Exam** will emphasize material from the final block of lectures but will additionally and necessarily include questions and components of questions that are comprehensive, cumulative, and/or review in nature. **SimBio worksheets** will be based on the on-line tutorials. Each student will be graded carefully and fairly. All four exams (1, 2, 3, and Final Exam) must be completed in order to pass this course.

Final course grades will be based on total point accumulation by each student, according to the following scheme:

368-420 points	= A-/A
328-367 points	= B-/B/B+
269-327 points	= C-/C/C+
227-268 points	= D/D+
<227 points	= F

Each student's accomplishment, both overall and on the several contributors to total point score, will be evaluated during final course grade assignment.

Attendance: Perfect lecture attendance by each registered student is expected. This expectation of regular attendance is intended to promote both individual student and overall class learning. Documented medical and other legitimate, urgent absences from exams will be excused with proration of exam points. For expected and/or planned absences during an exam (academic program interviews, scheduled medical procedures, university representational activities, *etc.*), please notify the course administrator (Dr. Loretz) in advance to be excused from the exam. Any student absent without notice from an exam and without a physician's written note of excuse or other documentation of urgency will receive a zero for the exam.

Incomplete "I" grades will be assigned only in accordance with University policy. The University has a specific and well-defined policy regarding the Incomplete "I" grade. The I grade is not intended for ordinary cases of non-attendance or unexcused absences from class exams or other activities. The complete University policy for the Incomplete "I" grade is available on-line at:

<http://undergrad-catalog.buffalo.edu/policies/grading/explanation.shtml#incomplete>

Academic honesty is important, and each student is expected to do and to submit her/his own work according to instructions. Some in-class activities and out-of-class homework assignments may include allowances for among-student consultation or collaboration, but, in the end, each student should nevertheless submit her/his own paper. The University has an academic integrity policy that applies to this course. The policy is published in the Undergraduate Catalog and elsewhere, and students are asked to review this policy if they are not already familiar with it. The URL for the official University policy is:

<http://undergrad-catalog.buffalo.edu/policies/course/integrity.shtml>

Academic Policies and Procedures: The on-line version of the Undergraduate Catalog contains a full, detailed presentation of University policies relating to academic policies and procedures. All students should be familiar generally with the University's policies relating to course expectations and to grading, and to other matters. These are available at:

<http://undergrad-catalog.buffalo.edu/policies/>

Accessibility Resources: If you have a disability and require some type of instructional and/or examination accommodation, please inform the instructor early in the semester so that accommodations can be arranged. If you have not already done so, please contact the university's Office of Accessibility

Resources. The office is located at 25 Capen Hall and the telephone number is 645-2608. Classroom instructional and exam accommodations will be made for students individually on the advice and guidance of the Office of Accessibility Resources. The Office of Accessibility Resources will host proctored exams for students with accommodations. It is the responsibility of the student to make the appropriate reservations in that case. For a full description of available services, refer to the Office of Accessibility Resources Web site at:

<http://www.student-affairs.buffalo.edu/ods/>

Religious Accommodation: Any student desiring a reasonable religious accommodation should make the request directly to the course instructor. It is expected that the student will provide sufficient notice of the need for an accommodation to the course instructor in order for the accommodation to be implemented. In the event that a student's request for religious accommodation involves an exam, the student will be excused from the exam (with proration of a score) in order to meet her/his religious needs. If there are concerns about the requested accommodation, the instructor should consult his/her department chair, dean's office and/or the university's Office of Equity, Diversity and Inclusion (EDI). The instructor will not unilaterally deny a request for a reasonable religious accommodation without first consulting EDI. The EDI Web site is:

<http://equity.buffalo.edu/>

Course Management System: All registered students have access via UBlerns (<http://ublearns.buffalo.edu>) to the BIO 203 Physiology course content area. Please monitor regularly for posted announcements and class assignments from the instructor, and for other useful course documents and links.

Daily Class Schedule

Week	Date	Lecture Topic	Reading (in <i>LIFE: The Science of Biology, 10th ed.</i>)
Week 1	08/28 (M) 08/30 (W) 09/01 (F)	Introduction & Course Overview Cellular Physiology Cellular Physiology	Chap. 40 Various Chaps. in Pts. 1-3 (review as needed)
Week 2	09/04 (M) 09/06 (W) 09/08 (F)	No Lecture—Labor Day Neurophysiology (Intro/Overview) Neurophysiology (Membrane Potential)	Chap. 45 "
Week 3	09/11 (M) 09/13 (W) 09/15 (F)	Neurophysiology (Action Potential) Neurophysiology (Synapse) Sensory Systems (Intro/Overview)	" " Chaps. 46, 47
Week 4	09/18 (M) 09/20 (W) 09/22 (F)	Sensory Systems (Audition) Sensory Systems (Vision) Pre-Exam 1 Round-Up	" " (no reading assignment)
Week 5	09/25 (M) 09/27 (W) 09/29 (F)	EXAM 1 (lectures of 8/28-9/22, 11 lectures) Muscle (Contractile Mechanism) Muscle (Control of Contraction)	" Chap. 48 "
Week 6	10/02 (M) 10/04 (W) 10/06 (F)	Circulatory Systems (Intro/Hemodynamics) Circulatory Systems (Heart/Cardiac Cycle) Circulatory Systems (Blood Vessels/Circulation)	Chap. 50 " "
Week 7	10/09 (M) 10/11 (W) 10/13 (F)	Ventilation & Gas Exchange (Ventilatory Organs) Ventilation & Gas Exchange (O ₂ -Binding Proteins) Ventilation & Respiration (O ₂ Transport/Delivery)	Chap. 49 " "
Week 8	10/16 (M) 10/18 (W) 10/20 (F)	Pre-Exam 2 Round-Up EXAM 2 (lectures of 09/27-10/19, 9 lectures) Salt and Water Balance	(no reading assignment) " Chap. 52
Week 9	10/23 (M) 10/25 (W) 10/27 (F)	Salt and Water Balance Salt and Water Balance Digestion and Metabolism	" " Chap. 51
Week 10	10/30 (M) 11/01 (W) 11/03 (F)	Digestion and Metabolism Digestion and Metabolism Biomechanics and Locomotion	" " Chap. 48
Week 11	11/06 (M) 11/08 (W) 11/10 (F)	Biomechanics and Locomotion Pre-Exam 3 Round-Up EXAM 3 (lectures of 10/20-11/08, 9 lectures)	" (no reading assignment)
Week 12	11/13 (M) 11/15 (W) 11/17 (F)	Thermoregulation Thermoregulation Thermoregulation	Chap. 40 " "
Week 13	11/20 (M) 11/22 (W) 11/24 (F)	Chemical Communication No Lecture—Fall Recess No Lecture—Fall Recess	Chap. 41 (no reading assignment) (no reading assignment)
Week 14	11/27 (M) 11/29 (W) 12/01 (F)	Chemical Communication Immune Defense Reproduction	Chap. 41 Chap. 42 Chaps. 43, 53
Week 15	12/04 (M) 12/06 (W) 12/08 (F)	Reproduction Integrative & Environmental Physiology Integrative & Environmental Physiology	" (no reading assignment) "
Final Exam Week	12/13 (W) 8:00-11:00 am 112 Norton	FINAL EXAM (emphasis on lectures of 11/13-12/08, 10 lectures; plus comprehensive/cumulative questions that integrate information drawn from earlier lectures)	

Relationship of BIO 203 Course Objectives and Assessment to BIO Program Objectives

BIO Program Objective	Depth*	Specific Outcome Objectives for BIO 203	Assessment Instrument(s)
1. Provide breadth of knowledge of basic principles and concepts	2	Understand the physico-chemical basis of common physiological processes	Exams 1, 2 and 3, and final exam; review questions; and worksheets
		Understand integrated cell, tissue and organ function in complex multicellular organisms	Exam 1, and final exam; and review questions
2. Provide depth within specialized areas	2	Apply basic physiological principles to understanding individual systems (nerve transmission, sensory reception, muscle contraction, circulation, ventilation and respiration, digestion, osmoregulation and excretion, thermoregulation, chemical signaling and defense, and reproduction)	Exams 2 and 3, and final exam; review questions; and worksheets
3. Provide an understanding of experimental design and methodology	0	N/A	N/A
4. Develop approaches for integration of information	2	Integrate physiological knowledge across scales of size (subcellular/cellular/tissue/organ) to explain organismal performance	Exams 1, 2 and 3, and final exam
		Combine biological and physico-chemical principles to explain organism-environment interactions	Final exam; and worksheets
5. Encourage critical thinking and hypothesis building	1	Analyze and interpret real and simulated data from physiological experiments	Freeform response sections of Exams 2 and 3, and final exam; and worksheets
		Relate natural history of organisms to environmental and physiological constraints on survival	Exams 2 and 3, and final exam; and worksheets
6. Provide skills in scientific communication	1	Express topic understanding in clear prose	Freeform response sections of exams 1, 2 and 3, and final exam
		Relate methods, processes and conclusions of data analysis and interpretation in clear narrative and in technically-correct quantitative graphical/diagrammatic form	Worksheets
7. Provide contemporary information	1	Understand contemporary human and natural influences on organisms in the context of physiological acclimation and adaptation, and survival	Final exam; review questions; and worksheets
8. Encourage appreciation of scientific values	1	Recognize proper and correct interpretation of physiological data collected from the field and from the laboratory	Exams 2 and 3, and final exam; and worksheets
		Identify the importance of physiological knowledge to understanding biosystems generally, and the implications of that knowledge in informing scientific and public policy	Exams 1, 2 and 3, and final exam; and review questions

*Depth: 0 = not covered; 1 = moderately covered; 2 = extensively