

BIO 203 Physiology
Fall 2012, Class #18408

SYLLABUS

Instructors: Dr. Christopher Loretz (Administrator)
Office: 647 Hochstetter Hall
Office Hours: MWF 9:00-9:50 a.m.,
TR 8:30-9:20 a.m.,
& by appointment
Circle: M 4:00-4:50 p.m.; 218 Cooke Hall
Phone: 645-4985
E-mail: loretz@buffalo.edu

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

Meeting Time and Place: MWF 10:00-10:50 a.m.
Norton 112 (Woldman Theater), North Campus

Textbook and Other Reference Materials:

- *Nature Education Principles of Biology* (ISBN-13: 978-1937415990)
The textbook is an on-line digital text. Students must purchase access to the text. Purchase can be made on-line directly from the publisher (\$49.00 for lifetime access), or made in-person from the campus bookstore for an access code to be redeemed on-line.
- occasional supplemental readings and/or materials announced in class and as provided through UBlearns

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.

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:

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

Assessment: Student achievement of course learning objectives will be assessed by:

- three hourly exams and a comprehensive final exam 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 testing quantitative skills mastery (course learning objective 4); and
- a comprehensive final exam, 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.

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

Exam 1	20%
Exam 2	20%
Exam 3	20%
Worksheets/HW	10%
Final Exam	30%

Exams 1, 2 and 3 are not cumulative in coverage. They will test on materials from defined blocks of lectures (please refer to the course schedule that is included in this document). The final exam will test on material from the final block of lectures and will additionally include questions that are comprehensive, cumulative, and/or review in nature. Each student will be graded carefully and fairly.

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. For expected and/or planned absences during an exam (academic program interviews, scheduled medical procedures, *etc.*), please notify the course administrator (Dr. Loretz) in advance. 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.

All four exams (1, 2, 3, and final) must be completed in order to pass this course. Incomplete "I" grades will be assigned only in accordance with University policy.

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.

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 may 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. The office website is at <http://www.ub-disability.buffalo.edu>. Classroom instructional and exam accommodations will be made for students individually on the advice and guidance of the Office of Accessibility Resources.

Religious Accommodation: A student who requires 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 alternative examination time or date, any make-up examinations given for purposes of test security must be comparable, in terms of format and difficulty, to the examinations given to the remainder of the class. 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.

Course Management System: All registered students have access via Ublearns (<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.

Class Schedule

Week	Date	Topic	Module Reading <i>Nature Education PoB</i>	Lecturer
Week 1	8/27 (M)	Introduction & Course Overview	Mods 126-127	CAL
	8/29 (W)	Cellular Physiology	Mod 18	CAL
	8/31 (F)	Cellular Physiology	Mod 19	CAL
Week 2	9/03 (M)	No Lecture—Labor Day		
	9/05 (W)	Neurophysiology (Intro/Overview)	Mod 129	CAL
	9/07 (F)	Neurophysiology (Membrane Potential)	Mod 130	CAL
Week 3	9/10 (M)	Neurophysiology (Action Potential)	Mod 131	CAL
	9/12 (W)	Neurophysiology (Synapse)	Mod 132	CAL
	9/14 (F)	Sensory Systems (Intro/Overview)	Mod 134	CAL
Week 4	9/17 (M)	No Lecture—Rosh Hashanah		
	9/19 (W)	Sensory Systems (Audition)	Mod 135	CAL
	9/21 (F)	Sensory Systems (Vision)	Mod 136	CAL
Week 5	9/24 (M)	EXAM 1 (lectures of 8/27-9/21, 10 lectures)		
	9/26 (W)	No Lecture—Yom Kippur		
	9/28 (F)	Muscle (Contractile Mechanism)	Mod 138	CAL
Week 6	10/01 (M)	Muscle (Control of Contraction)	Mod 138	CAL
	10/03 (W)	Circulatory Systems (Intro/Hemodynamics)	Mod 151	CAL
	10/05 (F)	Circulatory Systems (Heart/Cardiac Cycle)	Mod 152	CAL
Week 7	10/08 (M)	Circulatory Systems (Blood Vessels/Circulation)	Mod 153	CAL
	10/10 (W)	Ventilation & Gas Exchange (Ventilatory Organs)	Mod 154	CAL
	10/12 (F)	Ventilation & Gas Exchange (O ₂ -Binding Proteins)	Mod 155	CAL
Week 8	10/15 (M)	Ventilation & Respiration (O ₂ Transport/Delivery)	Mod 156	CAL
	10/17 (W)	Salt and Water Balance	Mod 157	MAB
	10/19 (F)	EXAM 2 (lectures of 9/28-10/15, 8 lectures)		
Week 9	10/22 (M)	Salt and Water Balance	Mod 158	MAB
	10/24 (W)	Salt and Water Balance	Mod 159	MAB
	10/26 (F)	Salt and Water Balance	Mod 160	MAB
Week 10	10/29 (M)	Digestion and Metabolism	Mods 144-149	MAB
	10/31 (W)	Digestion and Metabolism	Mods 144-149	MAB
	11/02 (F)	Digestion and Metabolism	Mods 144-149	MAB
Week 11	11/05 (M)	Biomechanics and Locomotion	Mod 139	MAB
	11/07 (W)	Biomechanics and Locomotion	Mod 139	MAB
	11/08 (F)	Thermoregulation	Mod 128	CAL
Week 12	11/12 (M)	EXAM 3 (lectures of 10/17-11/07, 9 lectures)		
	11/14 (W)	Thermoregulation	Mod 128	CAL
	11/16 (F)	Thermoregulation	Mod 12	CAL
Week 13	11/19 (M)	Chemical Communication	Mods 21-22, 140-141	CAL
	11/21 (W)	No Lecture—Fall Recess		CAL
	11/23 (F)	No Lecture—Fall Recess		CAL
Week 14	11/26 (M)	Chemical Communication	Mods 142-143	CAL
	11/28 (W)	Immune Defense	Mods 168-170	CAL
	11/30 (F)	Reproduction	Mods 161-163	CAL
Week 15	12/03 (M)	Reproduction	Mod 164	CAL
	12/05 (W)	Integrative & Environmental Physiology		CAL
	12/07 (F)	Integrative & Environmental Physiology		CAL
Final Exam Week	12/14 (F) 08:00-11:00 Norton 112	FINAL EXAM (lectures of 11/08-12/07, 10 lectures; plus comprehensive/cumulative component covering entire course)		

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; and worksheets
		Understand integrated cell, tissue and organ function in complex multicellular organisms	Exam 1, and final exam
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; 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; 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

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