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BIOB 160N.00: Principles of Living Systems

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PRINCIPLES OF LIVING SYSTEMS (BIOB 160N)

MWF 1 – 1:50 pm by zoom

Fall Semester 2020

Instructors

Art Woods

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Office hours (by zoom): Mon 4:30 – 5:30 ([zoom link](#)), Thu 1:30 – 2:30 ([zoom link](#)) and Fri 2-3 ([zoom link](#)), or by appt.

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Office hours (by zoom): Tue 2:30 – 3:30 and Fri 2-3, or by appt.

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Office hours (by zoom): Tue 2:30 – 3:30 and Fri 1-2, or by appt.

Overview and Objectives

Biology encompasses a diverse set of disciplines that includes biochemistry, molecular and cell biology, genetics, evolutionary biology, ecology, behavior, ecosystem biology, conservation biology, human and veterinary medicine, agronomy and more. Knowledge of biology is also increasingly important in other disciplines, such as economics, politics, social policy, ethics, business, technology, engineering and design, and architecture. In fact, it is difficult to find any human activity for which an understanding of biology has not become relevant and important.

BIOB160N, *Principles of Living Systems*, is a broad survey course that is a pre-requisite for all options in the Biology and Wildlife majors, and is generally required for all pre-professional programs in the health sciences. In BIOB160N we will work to develop a strong foundation for your future studies in Cell and Molecular Biology, Genetics and Evolution, Developmental Biology, Anatomy and Physiology, Ecology, and related options.

Learning Outcomes

Upon completion of BIOB 160, students will have gained a deeper understanding of the general principles of biology as a whole and a broad but solid foundation of knowledge of the form and function of living systems. By the end, students will have a general understanding of each broad area of biology, which will prepare students for more

detailed investigation and advanced study as they progress through the biological curriculum. This course is the first exposure to the rigors of scientific thinking, experimentation, and exploration and, as such, students will be exposed to the various important principles that guide scientific discovery in the biological world. Furthermore, students will learn the basics of hypothesis development and testing and will be well suited to apply that knowledge in their future science-based courses and fields of study.

In particular, students will:

1. Grasp how science works (What is science? What is not science?);
2. Learn how to construct *testable* questions, design experiments that test such questions, then interpret observational data that answer those questions;
3. Learn how to communicate your ideas about the structure, function and evolution of living systems;
4. Understand the basic physical and chemical properties that characterize living systems;
5. Know the main types of molecules common to all living systems;
6. Understand how energy is captured, stored, used, and passed through living systems;
7. Understand how biological information is preserved, inherited and modified;
8. Understand how stored biological information is unpacked to make biological machines;
9. Understand how the processes of natural selection and evolution work;
10. Understand some of the ways that humans affect biological processes on Earth.

Principles of Living Systems is a cumulative course, so that your success in grasping the material presented one week will depend on having mastered material presented in previous weeks. It is essential for you to keep up with the readings and homework assignments. If you fall behind, it will be difficult to catch up. If you find yourself in trouble, please advise your professors or Graduate Teaching Assistants or Learning Assistants as EARLY as possible. We will be better able to help you if you talk with us as problems arise; we will be less sympathetic ten minutes before an exam. If you cannot meet at any of the designated office hours, please work to schedule an appointment at another time.

Learning is not a passive activity; in BIOB160 (and in all your coursework!) you need to take an active role. We are here to facilitate your learning, but we ask that you:

- Come prepared and actively participate in the class meetings
- Be prepared and willing to work cooperatively in zoom breakout groups during class meetings
- Reflect objectively on your own progress and understanding

Lectures

Because the class is so large, there is no suitable space on campus for meeting in person while also social distancing. Lectures will therefore be delivered by zoom, with links provided via Moodle and email. As a way of providing structure for the course, the

lectures will be delivered synchronously – meaning that we’ll meet in zoom MWF 1 – 1:50. We also will record most lectures and make them available afterward. However, we strongly encourage everyone to attend the synchronous zoom lectures, during which time we’ll do some Q&A, some breakout groups, and some audience response polling.

Textbook & LaunchPad Online Homework

This course uses Hillis et al. *Principles of Life* (Sinauer/Macmillan), 3rd edition and an associated homework service called LaunchPad. These two resources are being delivered to you electronically and a “digital book fee” has been assessed to your tuition bill. This is a new distribution model called “all-inclusive” in which the faculty member, the publisher, and the bookstore have negotiated a low price and immediate access on the first day of class. To access your content, log in to the BIOB160 Moodle site, then follow [these instructions](#), which we’ve also put on the opening course Moodle page. There are technical support numbers at the end of the instructions document.

LaunchPad will give you practice with the material that we cover in class and in your readings. Launchpad assignments are designed primarily to complement upcoming lectures—so you often will be covering readings and topics that we haven’t yet discussed in class. Launchpad assignments typically will be due Tuesdays at midnight, although we encourage you to work on them earlier and at your own pace. In addition, some of the questions on your in-class exams and final exam will be derived from (but not necessarily identical to!) the LaunchPad assignments. Your score in LaunchPad will make up 20% of your grade in class.

If you do not want to participate in the all-inclusive model, you can opt out via the textbook link, which will be available until the last day to [drop classes](#), September 9th. If you opt out, your access will be revoked and you will have to purchase the materials elsewhere. Note that a standalone code for LaunchPad may cost more than the all-inclusive package from the bookstore. If you have any questions concerning Inclusive Access, please reach out to Amanda Peterson at The Bookstore at UM, apeterson@montanabookstore.com. We will keep several print copies of the book on reserve at the Mansfield Library. In addition, if you want a hard copy of your own (and you’re signed up for the all-inclusive package), you can go to the UM Bookstore to request a print-out of the entire thing for an additional \$40.

Course Schedule

In addition to material we cover in lectures, you will be responsible for readings indicated below. A more detailed schedule of subchapter readings and assignments will be provided on Moodle.

Week of	Prof.	Topic	Reading from Text	Lab Activity (if you are taking the lab portion of the class)
Wed Aug 19	AW	Introduction and overview Key concepts for life What is science?	Chaps. 1, 13	No labs

Aug 24	AW	Processes of evolution (forces of evolutionary change, evolution of populations)	Chap. 13	What is science?
Aug 31	AW	Processes of Evolution Phylogenies History of life on earth Bonus lecture: evolution of dogs	Chaps. 13 and 14	How to read scientific papers and interpret scientific controversies
Sept 7	BC	<i>No class Monday (Labor Day)</i> Wednesday, Sept 9 – Test 1 Speciation 1	Chap. 16	Term project instructions
Sept 14	BC AW	Speciation 2/3 Ecological systems in time and space		The Tasmanian Wolf
Sept 21	AW	Ecological systems in time and space Bonus lecture: From climate to microclimate	Chap. 38	Simbio: Climate change
Sept 28	AW	Populations	Chap. 39	Simbio: Population ecology
Oct 5	SM	Biological macromolecules Friday, Oct 9 – Test 2	Chap. 3	Work on term projects
Oct 12	SM	Biological macromolecules Cell structure and membranes	Chaps. 3 and 4	Enzyme function
Oct 19	SM	Cell structure and membranes	Chap. 4	Work on term projects
Oct 26	SM	Energy and cell metabolism Cellular respiration and photosynthesis	Chap. 2.3, 2.4; Chap. 5	Photosynthesis
Nov 2	SM	Photosynthesis (W) Friday, Nov 6 - Test 3	Chap. 5	DNA extraction
Nov 9	SM BC	Cell cycle and cell division <i>No class Wednesday (Veterans Day)</i> DNA + From DNA to protein	Chap. 7	Term project symposium (W labs will go next week)
Nov 16 (Nov 18 last day or reg classes)	BC	Molecular evolution Bonus lecture: host-microbe interactions <i>No class Friday</i>	Chap. 9, Chap. 10	
Nov 19		FINAL EXAM: 1:10 – 3:10		

Grading

Grades in the lecture part of the course will be assigned in the +/- system, according to the following scheme:

Grade	Percent of Total Points
A	93-100%
A-	90-92.99%
B+	87-89.99%
B	83-86.99%
B-	80-82.99%
C+	77-79.99%
C	73-76.99%
C-	70-72.99%
D+	67-69.99%
D	63-66.99%
D-	60-62.99%
F	Below 60%

Your grade will be based on the following weighting of course components:

Component	Weighting
Exams (best 3 out of 4)	75% (25% per exam)
LaunchPad	20%
iClicker	5%
Total	100%

Exams

You will take three 50-minute exams and one 2-hour comprehensive final, all of equal value. Exams will be administered via Moodle and will consist of approximately 2/3 multiple-choice questions and 1/3 short answer/essay questions. For calculating final grades, we will take the best 3 out of your four exam scores – each worth 25% of your grade.

Make-up exams will be administered one week *after* the scheduled exam. Make-up exams will consist of a mix of multiple choice and short-answer questions, and may include additional lecture material covered after the regularly scheduled exam. Students generally find make-ups to be more difficult than the regularly scheduled exam. Only students presenting verifiable medical or university excuses directly to Drs. Woods or Miller at least 24 hours before the regularly scheduled exam will be eligible for a make-up exam.

iClickers

We will use the iClicker response system during lectures this semester. This technology will provide you (and us!) with feedback about what you know (and don't) and will help promote better understanding of the concepts presented in lecture. We will run clicker polls in most class periods. Starting the second week of classes, you will be graded on your *participation* in the system, not on whether you get answers right. Because we are running the course remotely, hardware clickers are not an option – you must use the [iClicker Reef Application](#) on your own smart device, and access to the app is provided via your course fee for BIOB160 (bundled with the textbook and Launchpad). **You must register via the Moodle platform for BIOB160.** Click the link called 'Registering your REEF account' from the main course page to get instructions.

Participation using iClickers will make up 5% of your grade in class. Note that you may not bring a friend's iClicker to class and answer questions for him/her. We will consider this cheating, and if we see you do this you will not get any participation points for the entire semester.

Cost breakdown for course materials. All students in BIOB160N are charged \$60.00 for online access to the textbook (Hillis et al., 3rd Edition), the online homework service (LaunchPad), and iClicker REEF polling app. If you are taking BIOB161 (the lab course associated with BIOB160), you'll also need to buy a hardcopy of the lab manual from the bookstore (\$35.35). The lab manual includes an account with SimBio, the maker of a piece of simulation software that we'll use during the semester. Note that these prices are significantly lower than they were even a few years ago.

Course Teaching Assistants (TAs) & Labs

There are eight TAs for BIOB 160 this semester:

Jackson Birrell Jackson.birrell@umontana.edu
Romain Boisseau Romain.boisseau@umontana.edu
Tim Forrester timothy.forrester@umconnect.umt.edu
James Frakes jameson.frakes@umconnect.umt.edu
Diandra Lewis diandra.lewis@umontana.edu
Adam Mitchell Adam.mitchell@umontana.edu
John Statz john.statz@umontana.edu
Jen Wall Jennifer.wall@umconnect.umt.edu

If you are taking the laboratory portion of the class, you will meet your TA at the first lab meeting, which will start the first full week of classes (week of August 24th). If you are not taking the lab portion, you still are welcome (encouraged) to contact one or more of the TAs with questions about lecture material. Your TA will be an essential resource for this class, and he or she should be your first point of contact when you have questions, either about the course structure or about particular ideas and concepts with which you may be having trouble. TAs will also regularly attend zoom lectures to monitor the chat room and help get questions to the instructor.

Course Material

You will be able to access most of the resources for this class on the course [Moodle site](#). We will post copies of the PowerPoint lectures as well as other information. You will need your NetID and password to access the Moodle site, which you can look up [here](#).

Extra credit. None offered.

Students with disabilities

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and [Disability Services for Students \(DSS\)](#). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with DSS, please contact DSS in Lommasson 154. We are happy to work with you and DSS to provide appropriate accommodations for your learning and testing.

Zoom Room Behavior

Please conduct yourself as a responsible, courteous adult. **Good zoom etiquette is to mute your audio most of the time (except when responding to questions asked directly to you). You can mute your video or not – although as instructors, we prefer to see faces, not static zoom tiles!** We realize that getting video to work depends in part on bandwidth, and it may be necessary to turn off your video in order to get decent audio coming through.

We'll also encourage everyone to use the chat room during lectures to ask questions and discuss class topics. In every lecture, a TA will be present to monitor the chat discussions and to direct questions to the instructor. Note that although you can electronically 'raise your hand' in zoom, the instructor won't be able to lecture and keep an eye on several hundred participants at once – so better to direct your question to the TA.

Email.

Please also be courteous when sending emails. For example, use a salutation and sign-off, and write in good English (not text-ese).

A Note on Email and Spam Filters

All email communication for the course will be sent to your official university email and not to other email providers. If you don't normally check your university email, you will miss important emails. You can have your university email forward messages to other email addresses (e.g., gmail, yahoo, etc). When we email the whole class, the message will go to lots of email addresses, and some email providers will block this as spam. You should check the settings of your spam filters so that they allow such messages.

Plagiarism and Cheating

Although you will be encouraged to work collaboratively with others in this class and the lab, ***the work you hand in must be your own***. A good rule of thumb is that you can work together up to the point of committing words to paper (or computer). After that, the words you put down should be your own. We remind you of the official University policy on plagiarism: "Plagiarism is the representing of another's work as one's own. It is a particularly intolerable offense in the academic community and is strictly forbidden. Students who plagiarize may fail the course and may be remanded to Academic Court for possible suspension or expulsion (See Student Conduct Code section of this catalog). Students must always be very careful to acknowledge any kind of borrowing that is included in their work. This means not only borrowed wording but also ideas. Acknowledgment of whatever is not one's own original work is the proper and honest use of sources. Failure to acknowledge whatever is not one's own original work is plagiarism." (Quotation from The University of Montana Catalog).

If you have any questions about the line between collaboration and plagiarism, see your professors or your TA before you hand in material. Assignments from two or more students that have significant overlap will be regarded as reflecting a violation of the expectation that students turn in independent work. All the students involved will be given no points for that material, and the violation will be dealt with according to the Student Conduct Code. Penalties for plagiarism and cheating can be as severe as suspension or expulsion from The University. For more information on UM policies on plagiarism, see the [Student Conduct Code](#).

Adds, drops, and changes of grading

University policies on drops, adds, changes of grade option, or change to audit status will be strictly enforced in BIOB160N. These policies are described in the [course catalog](#). The last day for making many changes is September 9th.

For more information, see UM's [dates and deadlines](#) document.