
Foundations of Biology

Bio 201



Fall, 2008

This course provides an introduction to the foundational concepts of biology for students who have chosen the life sciences as a major or minor, or who need it to fulfill the scientific discovery intellectual perspective. A combination of lectures, laboratory exercises, and assignments will introduce you to ways of observing and thinking about fundamental concepts and processes common to many living organisms, including basic biochemistry, cells, energy acquisition, and genetics, concepts that will be further developed in upper level courses in biology. Various resources in lecture and laboratory will be utilized to reinforce biological concepts, enhance the learning experience and development of scientific skills, and to improve critical thinking skills.

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Office hours: 10:30-11:30 Monday, Friday
12:40-1:50 Thursday
or by appointment

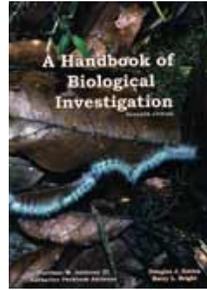
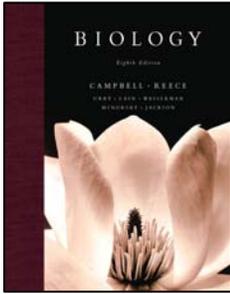
LECTURE 12:50-1:50, Monday/Wednesday/Friday 166 Hoyt Science Center

Attendance in lecture is expected. You will not be graded on attendance except indirectly through your grades on exams, assignments, and labs. Because your success in this course is strongly dependent on your presence in class and your participation, you should make an effort to be present at all class sessions. If you know ahead of time that you will miss class, let me know so we can make arrangements for you to attend another lecture section. Absence may be excused for personal emergencies or health-related problems. If you miss class, it is your responsibility to contact me and to obtain lecture notes and assignments that were given during your absence.

LABORATORY 2:00 - 5:00 Wednesday 342 Hoyt Science Center

Attendance in laboratory is required. You must notify me ahead of time if you know that you cannot be in lab so we can make arrangements for you to attend another lab section. Any missed group work must be made up independently and will be graded on an individual basis.

REQUIRED MATERIALS



Textbooks: *Biology, 8/e*, by N. Campbell and J. Reece, © 2008, Benjamin Cummings Publisher

A Handbook of Biological Investigation, 7/e, by H. W. Ambrose III, *et al.*, © 2007, Hunter Textbooks, Inc.

Lab book: You will need a blank, dual-copy lab book. Handouts for each lab will be posted on the r-drive; you will be responsible for printing a copy before lab each week.

PURPOSE OF THIS COURSE

Our world is increasingly influenced by discoveries and technological applications that require logic and reason. Many of these new discoveries and applications have occurred within the life sciences. With this in mind, students who successfully complete this course shall:

- cultivate an interest in, and appreciation for, the ways in which biology is relevant to our daily lives;
- develop a college level understanding of biological concepts that are fundamental to most living organisms: the biochemical basis of life, cell structure and function, cell metabolism, energy acquisition and use, cell division, principles of heredity, DNA structure and function, and molecular evolution;
- become familiar with the process of scientific inquiry, demonstrate proficiency with the scientific method of inquiry as it pertains to fieldwork and the laboratory, and demonstrate proficiency with quantitative skills as they apply to data collection and analysis;
- understand the potential for using multiple biological disciplines, skills, and tools for solving problems;
- demonstrate proficiency with reading scientific literature, critical evaluation of information, integration of scientific information with the scientific process, the “art” of scientific notation, and scientific writing;
- demonstrate a sense of scientific integrity and responsibility for your own learning;
- become proficient with time-management, taking initiative, and self-motivation; and
- demonstrate proficiency with basic computer, Internet and technology skills.

The ultimate goal of all these objectives, along with the rest of your education at Westminster College, is to make you a better citizen, someone who is capable of making well-informed decisions about current and future scientific discoveries and how they relate to human culture and other living things.

METHODS OF INSTRUCTION

1. **Lectures and discussion:** These will follow the schedule printed below. I expect you to attend class, pay attention, and participate actively in discussions by answering questions, asking questions, and making comments. Always bring your textbook to lecture.
 2. **Reading:** The textbook that we have chosen provides a good general introduction to the field of biology. Most of the topics that we will approach in the class are covered by the book. Thus, it will serve to augment lecture and to provide material for discussion. Being prepared is a key to success in this course. Assigned reading should be completed before coming to class or lab. Take notes on your reading and keep track of any questions that arise for later clarification in class or during office hours.
 3. **Laboratories:** This is a very important part of the course. In many cases, the laboratory exercises will parallel what we are discussing in lecture, to increase your understanding of certain topics and to give you a different perspective on them. Lab exercises will also teach you new concepts and important skills. You will be required to keep a laboratory notebook which will be graded periodically throughout the semester. Keeping a laboratory notebook will help you develop organizational and problem solving skills and to practice analytical thinking; it will also help you synthesize what you have learned in lab and solidify the knowledge. You will write one formal lab report, an in-depth presentation of one lab exercise in the form of a scientific manuscript.
 4. **Exams:** Periodic lecture exams will allow you to assess your progress in learning the information presented in the class. There will be five exams in this course. The first four will be over material contained in four or five chapters. The final exam will be comprehensive. You should expect multiple choice, short answer, and essay questions on the exams.
 5. **Assignments:** In most cases, the assignments will relate to the material that we will be discussing the next week. Their purpose is to prepare you for the discussion or to give you more information or a different viewpoint on the material that is covered in the reading. Information literacy assignments will give you experience in locating, reading, and critiquing different types of biological literature.
 6. **Biology seminars:** There will be a number of biology seminars this semester – you are required to attend two of them. Immediately after each seminar, you will submit a short summary and analysis of the presentation.
 7. **Additional resources:** Take advantage of your resources. I am here for your benefit and will do whatever reasonable to help you in the course. Feel free to drop by my office or e-mail me any time you have questions or concerns. We will have weekly study sessions to answer questions and go over lecture and lab material. Your fellow students are another potential resource. Some students find study groups to be an effective learning strategy. You may also take advantage of a free tutoring service provided by upper-class biology majors in Beta Beta Beta, Westminster's biology honorary society.
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GRADING

Grades will be based on exams, lab notebooks, a formal lab report, assignments, and participation in biology seminars, weighted as follows:

Exams (four)	= 40% of final grade
Final comprehensive exam	= 10% of final grade
Lab notebooks	= 25% of final grade
Formal lab report	= 8% of final grade
Problem sets	= 6% of final grade
Participation	= 5% of final grade
Information literacy assignments	= 3% of final grade
Seminars	= 2% of final grade
Biology capstone presentation	= 1% of final grade

Your final grade in the course will be based on the following scale:

Above 93%: A	87% - 90%: B+	77% - 80%: C+	67% - 70%: D+	below 60%: F
90% - 93%: A-	83% - 87%: B	73% - 77%: C	63% - 67%: D	
	80% - 83%: B-	70% - 73%: C-	60% - 63%: D-	

POLICY ON EXAMS AND ASSIGNMENTS

All assignments must be turned in by 5:00 p.m. on the day that they are due unless you are absent the day that the assignment was due and had a valid excuse. Valid excuses include such things as serious illness or injury and personal or family emergencies. Points will be subtracted from assignments turned in late. Occasionally, assignments may be due in class but we will let you know ahead of time if this happens.

You may turn in assignments in three ways:

1. **hard copy:** the least desirable method. Hand the paper to me, slide it under my office door, or give it to someone to deliver. *Do not use campus mail.*
 2. **in the Assignments folder on the course r-drive:** if you save a file to the r-drive, the name of the file must contain your name and some indication of what it contains (e.g., the name of the file could be "Smith, Assignment 5"). You must save the file to another drive, then save it to the r-drive. If you try to save directly to the r-drive, the network will only write a blank temporary file and you will lose all of your work. Once you have saved something to the Assignments folder you will be unable to retrieve it, open it, or delete it.
 3. **as an e-mail attachment:** Again, the name of the file must contain your name and some indication of what it contains. You can find out if I have received your messages by looking in the Sent Items folder in your mailbox.
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ACADEMIC INTEGRITY

Academic integrity is central to the purpose and pursuit of any academic community. In this class, I expect you to adhere to the principles of academic integrity stated in the Westminster College handbook and to maintain the highest standards of academic honesty and integrity, in keeping with the philosophy and purposes of the College.

“Academic dishonesty is a profound violation of this expected code of behavior. It can take several forms, including, but not limited to, plagiarism, cheating, purposely altering the work of another (without that person’s permission), misrepresentation of attendance in class or at a College event, misrepresentation of work, facts or experimental results, unauthorized use of or intentional intrusion into another's computer files and/or programs, intentional damage to a computer system, unauthorized use of library materials and privileges, or engaging in any activity which attempts to alter or harm another’s academic standing.”

You must always guard against potential plagiarism. Plagiarism includes extensive quoting, paraphrasing, or copying from any other source (books, articles, websites, other students’ work, or class material), incorrect or inadequate citation of quotes, data, ideas, or images, and directly copying experiments or research projects that have been developed by another student or published by another researcher. I encourage you to work together and discuss your assignments with other students, but all material that you turn in must be your own work. Quotes, data, graphs, photographs, or ideas taken from another source must be cited correctly. If you have any doubts about whether you need to cite a source – YOU MUST ASK. If there is plagiarism in one of your assignments, you will receive a score of zero for that assignment and a written report will be sent to the Dean of Academic Affairs. More than one incident of plagiarism may result in your being awarded an F for the course.

TENTATIVE SCHEDULE OF LECTURE TOPICS AND READINGS

DATE	Topic and Reading (Campbell and Reece, 2008)	LAB AND ASSIGNMENTS
August 27	Introduction to the course Chapter 1, <i>Themes in the study of life</i> , pp. 1-3, 6-11	No scheduled lab this week
August 29	Chapter 1, <i>Themes</i> , pp. 12-17	
September 1	Chapter 1, <i>Themes</i> , pp. 4-5	<i>Observation and hypothesis testing in biology (at the Field Station)</i>
September 3	Chapter 2, <i>The chemical context of life</i> , pp. 30-37	
September 5	Chapter 2, <i>The chemical context of life</i> , pp. 38-45	
September 8	Chapter 3, <i>Water and the fitness of the environment</i> , pp. 46-57	<i>Observation and hypothesis testing (continued)</i>
September 10	Chapter 4, <i>Carbon and the molecular diversity of life</i> , pp. 58-67	
September 12	Chapter 5, <i>Large biological molecules</i> , pp. 68-74	
September 15	Chapter 5, <i>Large biological molecules</i> , pp. 74-86	<i>Biological instrumentation and skills</i>
September 17	Chapter 5, <i>Large biological molecules</i> , pp. 86-91	
September 19	Problem set	
September 22	Chapter 6, <i>A tour of the cell</i> , pp. 94-108	<i>Microscopy</i>
7:00-8:00 p.m.	Exam #1 (chapters 1, 2, 3, 4, 5)	
September 24	Chapter 6, <i>A tour of the cell</i> , pp. 109-124	
September 26	Chapter 7, <i>Membrane structure and function</i> , pp. 125-130	<i>Information literacy assignment #1 assigned</i>
September 29	Chapter 7, <i>Membrane structure and function</i> , pp. 131-141	<i>Information literacy assignment #1 due, IL assignment #2 assigned</i>
October 1	Chapter 11, <i>Cell communication</i> , pp. 206- 210	
October 3	Chapter 8, <i>Introduction to Metabolism</i> , pp. 142-156	

DATE	Topic and Reading (Campbell and Reece, 2008)	LAB AND ASSIGNMENTS
October 6	Chapter 9, <i>Cellular respiration</i> , pp. 162-169	<i>Cell permeability and osmosis</i>
October 8	Chapter 9, <i>Cellular respiration</i> , pp. 170-184	
October 10	Problem Set	
October 11 - 14	Mid-semester break	
October 15 7:00-8:00 p.m.	Chapter 12, <i>The cell cycle</i> , pp. 228-236 Exam #2 (chapters 6, 7, 8, 9, 11)	No scheduled lab this week
October 17	Chapter 12, <i>The cell cycle</i> , pp. 236-245	Information literacy assignment #3 due
October 20	Chapter 13, <i>Meiosis</i> , pp. 248-253	<i>Genetics and ethics case study</i>
October 22	Chapter 13, <i>Meiosis</i> , pp. 253-261	
October 24	Chapter 14, <i>Mendel and genetics</i> , pp. 262-275	
October 27	Chapter 14, <i>Mendel and genetics</i> , pp. 276-285	<i>Patterns of inheritance</i>
October 29	Chapter 15, <i>The chromosomal basis of inheritance</i> , pp. 286-296	
October 31	Chapter 15, <i>The chromosomal basis of inheritance</i> , pp. 296-304	
November 3	Chapter 16, <i>The molecular basis of inheritance</i> , pp. 305-310	<i>Human DNA isolation and PCR amplification</i>
November 5	Chapter 16, <i>The molecular basis of inheritance</i> , pp. 311-316	
November 7	Chapter 16, <i>The molecular basis of inheritance</i> , pp. 316-324	
November 10	Problem set	<i>Gel electrophoresis and DNA analysis</i>
November 12	Chapter 17, <i>From gene to protein</i> , pp. 325-331	
November 13, 7:00-8:00 p.m.	Exam #3 (chapters 12, 13, 14, 15, 16)	
November 14	Chapter 17, <i>From gene to protein</i> , pp. 331-344	

DATE	Topic and Reading (Campbell and Reece, 2008)	LAB AND ASSIGNMENTS
November 17	Chapter 17, <i>From gene to protein</i> , pp. 344-350	<i>Gene expression and bacterial pigmentation</i>
November 19	Chapter 18, <i>Regulation of gene expression</i> , pp. 351-356	
November 21	Chapter 18, <i>Regulation of gene expression</i> , pp. 356-366	
November 24	Chapter 18, <i>Regulation of gene expression</i> , pp. 366-380	No scheduled lab this week Formal lab report due
November 26 – 30	Thanksgiving break	
December 1	Chapter 21, <i>Genomes and their evolution</i> , pp. 426-434	<i>Gene expression (continued)</i>
December 3	Chapter 21, <i>Genomes and their evolution</i> , pp. 438-449	<i>Bioinformatics and molecular evolution</i>
December 5	Exam #4 (chapters 17, 18, 21)	
December 8	Review for final exam	
December 9	Reading Day	
December 12 11:30 - 2:00	Comprehensive final exam	