

Biology of Cells

BIO 1210-02

Spring 2012

Instructor Name: Dr. Aaron Howard
Contact Information: ahoward@aurora.edu
Office Hours: TR 9:20-11:00 A.M. (immediately after class), or by appointment, in Stephens Hall 112
Meeting Times: Lecture: TR 8:00-9:15 A.M., 111 STPH
Lab: R 1:15-3:05 P.M., 221 STPH
Moodle Information: <http://moodle.aurora.edu/moodle/>

COURSE DESCRIPTION: This course studies the cell as the basic unit of biology. Topics include classification of living organisms; acellular and cellular organisms; structure and roles of biologically important molecules; prokaryote and eukaryote cell structure; concepts of metabolism and energy flow; enzymes; photosynthesis; ATP production; cellular reproduction; molecular genetics; and the principles of Mendelian genetics. Laboratory exercises are coordinated with lecture topics. No Prerequisites. Meets General Education "Observation of the Natural World." 4 semester hours.

COURSE GOALS AND OBJECTIVES: This course plays many roles, including an entry-level course for individuals majoring in biology or health science, a supportive course for other majors such as nursing, and as a general education course in the "Ways of Knowing Through Observation of Our Natural World" category. Because of these different roles, this course must meet many diverse, but complementary, outcomes. In the text below is an outline the objectives of the course, and then how this course applies to the goals of the general education program, and of the biology programs (goals listed are for the Biology B.S. Degree); other program goals (Biology B.A., Health Sciences B.S.) are listed on the Aurora University Website. After each objective, the methods of assessment are listed.

Course Objectives:

1. Recognize, define, and properly use the terms common to cell biology. (*exams, quizzes, writing projects, labs*)
2. State, give examples of, and apply the concepts of cell biology. (*exams, quizzes, labs, writing projects*)
3. Be able to recognize, discuss, and practice scientific processes, including experimental design. (*writing projects, labs*)
4. Recognize and discuss the major events of and contributors to cell biology and society. (*exams, quizzes*)
5. Analyze and orally discuss an ethical problem related to cell biology and society. (*writing projects, presentations*)
6. Find, read and analyze primary sources about an ethical problem resulting from the development of new technology in a field of cell biology and write a paper including a statement of your position on the topic and reasons (backed by science) why you believe as you do. (*writing projects, presentations*)
7. Develop or apply pre-existing study techniques appropriate to the study of science and practice critical thinking skills necessary to solve biological problems. You will be given suggestions and resources to help you meet this goal. (*exams, quizzes, labs, writing projects*)
8. Successfully complete, and learn from, laboratory exercises including the effective use of the microscope. (*lab, writing projects, quizzes, exams*)

General Education Goals: General Education at Aurora University is explicitly connected to the University Mission: "AU, an inclusive community dedicated to the transformative power of learning." The General Education program provides an interdisciplinary introduction to the content areas, builds critical thinking and communication skills, and fosters intellectual and ethical development through the undergraduate program. As members of an inclusive community, each student will experience AU's Core Values – Integrity, Citizenship, Excellence, and Continuous Learning – through General Education. Courses in the "Knowing through Observation of Our Natural World" category meet the following two objectives:

1. Ability to demonstrate critical thinking skills as evidenced by reading, speaking, and writing about the natural world.
2. Ability to gather/organize empirical information and propose realistic solutions to problems in the natural world.

These goals will be met throughout this course via a number of projects that allow students to grow and develop their scientific writing skills. The projects will require critical thinking and reading skills specified by the General Education Committee: identification of a question or problem, clarification of the issues encompassing a problem,

statement of a position based on valid evidence and reasoning, consideration of alternative positions, and valid conclusion or evaluation. You will be required to engage in primary sources, and the quality of writing, speaking, and the ability to think on your feet will be important components of the assignments.

Program Goals: This course meets the Biology B.S. Degree goals listed below. After each program goal the number(s) of the BIO 1210 course objectives that are evidence of meeting the degree goals are listed.

1. Understand and apply knowledge of the concepts of cell biology, heredity, biological evolution and diversity, ecology, and matter, energy and organization in living systems. (1,2)
2. Understand and apply knowledge of the interactions among science, technology, and society. (5,6)
3. Understand and apply knowledge of biological science as inquiry. (3,7,8)
4. Understand and apply knowledge of the accepted research practices, tools, and technologies of biologists.(6,8)
5. Interpret and communicate scientific information in oral and written form. (5,6)
6. Understand knowledge of the concepts of chemistry, physics, and math as they apply to biology. (There is not a specific objective that will demonstrate attainment of this goal, but to understand the concepts of cell biology we will have to understand the underlying chemistry and physics. We will also practice data analysis and evaluation using the objective tools of statistics, a branch of mathematics.)

University Goals: This course partially satisfies the “knowing through observation of our natural world” general education requirements.

TEXT AND SUPPLIES:

Required:

- Reece et. al. 2011. *Campbell’s Biology with Mastering Biology*, 9th ed, Pearson/Benjamin Cummings, San Francisco.
- Osgood & Ocorr. 2009. *The CELL MAP FOR the Absolute, Ultimate Guide to Lehninger Principles in Biochemistry*, 5th edition, W.H. Freeman, New York.
- Vodopich & Moore. 2009. *Biology: Laboratory Manual*, 9th edition, McGraw Hill Higher Ed, New York.

Recommended:

- Pechenik, Jan A. 2007. *A Short Guide to Writing about Biology*, 6th edition. Pearson/Longman, New York (reference for researching and writing in biology).
- Van de Graaff & Crawley. 2009. *A photographic atlas for the biology laboratory*, 6th edition. Morton Publishing Co., Englewood (a photographic atlas such as this may aid you in the laboratory for this course and future courses – highly recommended for biology majors).

GRADING: There are a total of 800 points from the following assessments:

QUIZZES AND EXAMS	Number	Points per	Total points
Quizzes (daily)	30	5	150
Unit Exams	4	50	200
Final Exam (Cumulative)	1	125	125
Total:			475
LABORATORY			
Lab Exercises	16	variable	75
Lab Practical (Cumulative)	1	50	50
Lab Reports	5	variable	75
Total:			200
OTHER			
Cell Map	1	25	25
Ethical Issue Summary and Bibliography	1	25	25
Ethical Issue Paper	1	50	50
Oral Presentation of Ethical Issue	1	25	25
Total:			125
TOTAL POINTS FOR COURSE:			800 PTS

Final Grades: Final grades are based on the following percentage ranges:

Percentage	Points Needed	Final Grade
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90-100%	720-800	A
80-89%	640-719	B
70-79%	560-639	C
60-69%	480-559	D
<60%	≤479	F

Grading Policies:

1. Individuals that are taking the class as CR/NCR must earn a C or above to receive a grade of CR.
2. **Academic Warnings:** First year students earning a D or F at the end of the 4 week mark are likely to receive an Early Student Intervention notice. Any student earning a D or F at mid-term are likely to receive an Academic Warning Notice. Academic warning/intervention notices may be earned by various factors and actions, including low exam grades, significant absences, low assessment grade(s), or any behavior that qualifies the student as requiring aid in achieving success in the course.
3. The total number of points and distribution of points is subject to change. Exam dates will be announced in advance. Assignments are due on the day announced, and late assignments WILL NOT BE ACCEPTED without prior instructor approval. There will be no make-ups for quizzes and exams. Special accommodations will NOT be given to accommodate travel or vacation plans. If you must miss class for an approved (by the instructor) reason, you must let the instructor know BEFORE that class period in order to be able to make up any work.

WRITING ASSIGNMENTS: There are several writing assignments in this course, including the lab reports and an ethical issue paper. All writing projects must utilize Standard English. The quality of the writing, including correct spelling, syntax, and grammar, will be reflected in the grade. Additional guidelines will be given for writing assignments, but in general all writing projects in BIO 1210 must comply with the following regulations and failure to meet these criteria will result in your manuscript being rejected and returned ungraded:

- All writing projects must be submitted in the assigned format in hard copy on white, unlined paper or electronically ONLY when permission from the instructor is given.
- The following page set-up and formatting must be followed for all papers:
 - 12 point Arial or Times New Roman font
 - 1.0" top, bottom, left, and right margins
 - Portrait orientation, paragraphs with left alignment
 - Double-spaced
 - Staple your paper in the upper left corner

OTHER COURSE POLICIES AND INFORMATION:

Academic Conduct: Aurora University's Code of Academic Integrity prohibits the following dishonest and unethical behaviors: cheating, fabrication, plagiarism, obtaining unfair advantage, unauthorized access to computerized records or systems, and facilitating academic dishonesty regardless of intent. Therefore the university expects students to do their own academic work. In addition, it expects active participation and equitable contributions of students involved in group assignments. Cheating will result in automatic failure. You are not to represent someone else's work as your own in any class assignments. You will not receive credit for any plagiarized assignment nor will you be allowed to make it up. The definition of each of these terms and the full text of the code is available in Aurora University catalog and on AU website: <http://www.aurora.edu/academics/resources/code.html>.

Attendance: You are expected to be at all class and laboratory sessions. If you miss a lecture it is your responsibility to get lecture notes from other students. Attendance records will be kept for the Aurora University Registrar. Academic warnings will be issued for unexcused absences. If you must be absent for approved functions, it is YOUR responsibility to let the instructor know in advance so we can make other arrangements. Unapproved absences will result in zero points for missed assignments, including quizzes and tests.

Class Preparation: You should read textbook assignments, laboratory exercises, other assigned readings and review your notes from previous classes before coming to class and lab. Daily preparation will aid in retention of material and will ease the task of studying for tests. In addition, there will be a quiz every class so daily review will directly improve your grade. All of the material in this class builds on the prior material and, therefore, all assignments, quizzes and test are cumulative throughout the semester.

Classroom and Laboratory Conduct:

1. **Guests and Children in the Classroom:** Please ask permission of the instructor before bringing any guests or children to class with you. We must be considerate of other students who are paying tuition and have a right to an appropriate learning atmosphere. Children and guests are not allowed in the laboratory.
2. **Talking and Disturbances in Class:** I expect you to comply with the following classroom rules any time class is in session: 1) Always respect the rights of others, 2) Come to class on time and refrain from visiting during the class time, 3) Cell phones will be placed on SILENT MODE during class and laboratory periods. You will not send or receive text messages during class and laboratory periods. If you must use a cell phone, please leave the classroom, 4) Individuals will be asked to leave the room or laboratory if their actions are interfering with the learning experiences, rights, and/or safety of others.

Classroom Conduct Policy, adopted by the AU Faculty Senate, 4 November 2005: Students enrolled in AU courses have the right to learn in an environment where all individuals are treated equitably and with respect. Behaviors in class that interfere with the learning experience are not permitted. Disruptive or disrespectful behaviors may result in dismissal from the class for that day by the instructor. Continued problems will be reported to the College Dean and/or the Dean of Student Life for further action. Course instructors may also impose class related sanctions on the offending student.

STUDENT RESOURCES:

Resources for All Students: Even the best of us need help sometimes. The backgrounds of the students in this course will likely vary widely, so some of you may require special assistance at some point during the semester so that you stay on top of the material and succeed in this course. First, feel free to come see the instructor or another instructor for help at any time during the semester. This course builds on previous material, so if you have problems, make sure to come to the instructor as early as possible so we can attend to any issues you are having.

In addition, tutors are available at the Center for Teaching & Learning. These tutors are provided free of charge for students by the University, and if you use them, they can help you obtain a greater benefit and perhaps a higher grade in this course. Please sign up at the Center for Teaching & Learning if you are in need of these tutor services. The Center for Teaching & Learning is located at the Southeast corner of the Charles B. Phillips Library and the phone number is 630-844-5520.

Resources for Students with Disabilities: Aurora University values diversity and inclusion and recognizes disability as an aspect of diversity. Our shared goal is to create learning environments that are accessible, equitable, and inclusive. If you anticipate barriers related to the format, requirements, or assessment of this course, you are encouraged first to contact the disability office (630-844-5520) in the Center for Teaching & Learning, then to meet with the instructor to discuss options or adaptations. The Learning Center is responsible for authorizing and facilitating accommodations for students with disabilities, consistent with Section 504 of the Federal Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. Aurora University will provide reasonable accommodations for students with a diagnosed and verified learning disability, physical disability, or psychological disability. Once they have met with a student and established that the student has appropriate documentation of a disability, they will work with that student to provide him or her with access to the services offered by Aurora University. Depending on the disability, this may include providing classroom accommodations, testing accommodations, assistive technology, access to readings on tape, or other appropriate services.

University Emergency Procedures: Students are encouraged to be aware of measures that Aurora University has taken to create a safe learning environment. All classrooms and labs have a deadbolt lock installed in entry doors. The university also has installed location maps in each room on campus. These maps include the floor plan of the floor on which the room is located; the name and address of the building; emergency exits for the building; and safety zones in the case of severe weather. As the university puts in place other safety procedures or plans, the campus community will be notified. Please remember that it is important for everyone to report suspicious or threatening objects, people, or conditions to Campus Safety. In emergency situations call **630-844-5450 or 911 or x555** (if calling from on campus); in non-emergency situations call 630-844-6140 or x6140 (if calling from on campus).

TENTATIVE TIMELINE AND SCHEDULE OF EVENTS:

All aspects of the schedule are subject to change at the instructors discretion. All changes will be posted on moodle. Additional readings will be given as handouts in class and uploaded onto moodle.

Week	Lecture or Laboratory Topics	Readings*	Other Activities or Due Dates
1 – Jan. 9	Lecture: Introduction Chemistry Laboratory: Welcome to Lab, Lab Safety – MANDATORY! Ex. 1 – The Process of Science	1 2 V (1-10)	1/12 – Lab exercise 1 pre-lab due in lab
2 – Jan. 16	Lecture: Water Organic Chemistry (Begin) Laboratory: How to read and write scientific papers.	3 4 Handouts	1/17 – Lab exercise 1 due
3 – Jan. 23	Lecture: Organic Chemistry (Finish) Biomolecules (Begin) Laboratory: Ex. 2 – Measurements in Biology Ex. 5 – Solutions, Acids, and Bases Select Groups for Ethical Issues Project and Discuss	4 5 V(11-20) V(49-56)	1/26 – Lab exercise 2, 5 pre-lab due in lab
4 – Jan. 30	Lecture: Biomolecules (Finish) Cells (begin) Laboratory: Ex. 6 – Biologically Important Molecules	5 6 V(57-70)	1/31 – Lab Exercises 2, 5 due 1/31 – Writing Assignment 1 due 2/2 – EXAM 1 (introduction through biomolecules) 2/2 – Lab exercise 6 pre-lab due in lab
5 – Feb. 6	Lecture: Cells (finish) Membranes and Transport (begin) Laboratory: Ex. 3 – The Microscope Ex. 4 – The Cell: Structure and Function	6 7 V(21-32) V(33-48)	2/7 – Lab Exercise 6 due 2/9 – Topic for Ethical Issues Project due 2/9 – Lab exercise 3, 4 pre-lab due in lab

Week	Lecture or Laboratory Topics	Readings*	Other Activities or Due Dates
6 – Feb. 13	Lecture: Membranes and Transport (finish) Laboratory: Ex. 9 – Diffusion and Osmosis	7 V(93-104)	2/14 – Lab Exercises 3, 4 due 2/14 – Writing Assignment 2 due 2/16 – Lab exercise 9 pre-lab due in lab
7 – Feb. 20	Lecture: Metabolism Laboratory: Ex. 8 - Spectrophotometry	8 V(81-92)	2/21 – Lab Exercise 9 due 2/23 – EXAM 2 (Cells, Membranes and Transport) 2/23 – Lab exercise 8 pre-lab due in lab
8 – Feb. 27	Lecture: Cellular Respiration Laboratory: Ex. 10- Cellular Membranes	9 V(105-112)	2/28 – Lab Exercise 8 due 2/28 – Summary/Annotated Bibliography due 3/1 – Writing Assignment 3 due 3/1 – Lab exercise 10 pre-lab due in lab
SPRING BREAK (3/4-3/11) – NO CLASSES			
9 – Mar. 12	Lecture: Photosynthesis Laboratory: Ex. 11 – Enzymes	10 V (113-124)	3/13 – Lab Exercise 10 due 3/15 – Writing Assignment 4 due 3/15 – Lab exercise 11 pre-lab due in lab
10 – Mar. 19	Lecture: Mitosis and Meiosis (begin) Laboratory: Ex. 7 – Separating Organic Compounds Ex. 13.1 – Photos. Pigments/Paper Chromatography	12 V (71-80) V (137-148)	3/20 – EXAM 3 (Metabolism, Cellular Respiration and Photosynthesis) 3/20 – Lab Exercise 11 due 3/22 – Lab exercise 7, 13.1 pre-lab due in lab
11 – Mar. 26	Lecture: Mitosis and Meiosis (cont.) Laboratory: Ex. 16 – Transformation (set up)	12,13 V(171-178) Handout	3/27– Lab Exercises 7, 13.1 due 3/29 – Ethical Issues Paper due 3/29 – Lab exercise 16 pre-lab due in lab
12 – Apr. 2	Lecture: Molecular Biology (begin) Laboratory: Ex. 14 – Mitosis Ex. 15 – Meiosis Ex. 16 – Transformation (results)	16, 17, 18 V(149-158) V(159-170) V(171-178)	4/5 – Cell Map Due 4/5 – Lab exercise 14,15,16 pre-lab due in lab

Week	Lecture or Laboratory Topics	Readings*	Other Activities or Due Dates
13 – Apr. 9	Lecture: Molecular Biology (finish) Inheritance (begin) Laboratory: Inheritance Lab	16,17,18 14,15	4/10 – Lab Exercises 14, 15, 16 due 4/12 – Inheritance pre-lab due in lab
14 – Apr. 16	Lecture: Inheritance (cont.) Laboratory: <i>Group Presentations</i>	14,15	4/17 – EXAM 4 (Mitosis and Meiosis, Molecular Biology) 4/17 – Inheritance Lab due
15 – Apr. 23	Lecture: Inheritance (cont.) Laboratory: <i>Group Presentations</i>	14,15	4/26 – FINAL LAB REPORT DUE
16 – Apr. 30	FINAL EXAM (Cumulative), Tuesday 5/1 (8:00 – 10:45 A.M.) The final is split into a written exam and lab practical: 1) Final Lab Practical (8:00 – 8:45 A.M.) – 221 STPH 2) Final Written Exam (8:45 – 10:45 A.M.) – 112 STPH		

* Readings without a letter prefix refer to chapters within the Campbell et al. textbook, while readings preceded by “V” refer to pages within the Vodopich and Moore laboratory manual.