

Biology Update One
BIOC 623C
Online Summer 2009

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Learning Objectives

In participating in this class you will

- Name the four classes of biological molecules and describe the chemical basis of their structure and function
- Relate the three-dimensional structure and chemical nature of a biologically-important molecule to its biological function
- Speak fluently about the molecular basis of biological process including protein folding, enzyme catalysis, DNA replication, gene expression, transport across the cell membrane, cell communication, cell respiration, and photosynthesis.
- Exchange information with other teachers on how to best communicate the principles of cell and molecular biology to students at a variety of different grade-levels.
- Read and interrupt accounts of recent research in cell and molecular biology, and consider ways to incorporate it into the classroom.

Course Resources

- The course web site will contain files with most course readings or links to required web sites, as well as supplemental materials and Powerpoint files for course presentations.
- You will receive a nine-DVD set of lectures for this course in the mail. These same lectures will be available as window media files on the course website. Please contact Lisa Rezende if you do not have access to **either** a DVD play or a high speed Internet connection. The lecture portion of the course begins in Unit 2, so do not worry if they have not arrived by the start of the course.
- You will need a copy of the book *Biology, 7th edition* by Neil Campbell and Jane Reece (2005) (ISBN: 0-8053-7146-X). You can purchase it new or used at the bookstore or website of your choice.
- You will receive the tubers and push pins you will need in Unit Four by mail.

Navigating the Course:

We have organized this course into 8 This is what is known as a "guided" online course, and it provides structure so you will not get too far behind. **You will not be working at your own pace.** Instead, each teacher enrolled in the course will be in the same unit at the same time. Discussion of the course material is a critical component of this online course, so we need to go through this together.

Each unit will consist of the following sections:

Lesson- taped lectures by Jim Ware covering this week's material
 Reading assignments from both the textbook and outside sources
 Lecture review
 Update discussion, where you will discuss a current topic in biology that relates to the unit
 Activity and activity discussion
 Assignment, which is turned in for a grade
 Diagnostic learning log
 Self-assessment quiz

Weekly Syllabus

Unit	Topic/Activities
Unit One:	<p>Introduction to Online Learning</p> <ul style="list-style-type: none"> ❑ eCollege student orientation tutorial ❑ Discussion: Introduce yourself ❑ Assignment 1: Using the online course tools ❑ Quiz: Self Assessment Quiz #1
Unit Two:	<p>Introduction and Chemistry Review</p> <ul style="list-style-type: none"> ❑ Reading: <i>Biology 7th edition</i> (2005) by Neil A. Campbell and Jane B. Reece, Chapters 1-4 ❑ “Robot helps show that water striders row on H₂O” by James Owens (<i>National Geographic News</i>, August 6, 2003) ❑ Lecture: Introduction ❑ Lecture: Chemistry Review ❑ Lecture: Carbon Chemistry Review ❑ Discussion: Walking on water ❑ Activity: Brush up on your chemistry ❑ Assignment: Mantras ❑ Diagnostic Learning Log ❑ Quiz: Self Assessment Quiz #2
Unit Three:	<p>Carbohydrates and Lipids</p> <ul style="list-style-type: none"> ❑ Reading: <i>Biology 7th edition</i> (2005) by Neil A. Campbell and Jane B. Reece, Chapter 5, section 5.1 - 5.3. ❑ Maeder, Thomas, "Sweet Medicines" <i>Scientific American</i> pp. 40 - 47 (July 2002). ❑ Lecture: Carbohydrates

	<ul style="list-style-type: none"> ❑ Lecture: Lipids ❑ Discussion: Sugars: They aren't just for dessert. ❑ Activity: Kitchen Chemistry: Read the label ❑ Assignment: The lipid and the whale ❑ Diagnostic Learning Log ❑ Quiz: Self Assessment Quiz #3
Unit Four:	Proteins
	<ul style="list-style-type: none"> ❑ Reading: <i>Biology 7th edition</i> (2005) by Neil A. Campbell and Jane B. Reece, Chapters 5 Section 5.4 <p>Cunningham, Aimee, "Taken for a Spin: Scientists look to spiders for the goods on silk," <i>Science News</i>, 171 (2007).</p> <p>Goldberg, Alfred L., Elledge, Stephen J., and Harper J. Wade, "The cellular chamber of doom," <i>Scientific American</i>, pp. 68 – 73 (January 2001).</p> <p>Nature Publishing: "The importance of protein folding," "Protein folding technology," "Protein folding and disease," "Protein folding diseases," and "Treating protein folding diseases, available at:</p> <ul style="list-style-type: none"> ❑ http://www.nature.com/horizon/proteinfolding/background.html ❑ Lecture: Proteins I ❑ Lecture: Proteins II ❑ Lecture: Proteins III ❑ Discussion: Protein folding and disease ❑ Activity: Amino acids: Molecular flashcards ❑ Assignment 1: The many roles of proteins ❑ Assignment 2: Making it all gel ❑ Diagnostic Learning Log ❑ Quiz: Self Assessment Quiz #4
**Unit Five:	Enzymes
	<ul style="list-style-type: none"> ❑ Reading: <i>Biology 7th edition</i> (2005) by Neil A. Campbell and Jane B. Reece, Chapters 8. ❑ Breithaupt, Holger, "The Hunt for Living Gold: The search for organisms in extreme environments yields useful enzymes for industry." <i>EMBO Reports</i> 2: 968-971 (2001) ❑ Lecture: Enzymes I ❑ Lecture: Enzymes II ❑ Discussion: Extreme Enzymes ❑ Activity: Everyday encounters with enzyme inhibitors

	<ul style="list-style-type: none"> <input type="checkbox"/> Assignment: <input type="checkbox"/> Diagnostic Learning Log <input type="checkbox"/> Quiz: Self Assessment Quiz #5
	** Note: The week of March 17th is our Spring Break, hence unit 5 goes over 3 weeks.
Unit 6:	Nucleic Acids and Gene Expression
	<p>Reading: <i>Biology</i> 7th edition (2005) by Neil A. Campbell and Jane B. Reece, Chapter 5 section 5.5; Chapter 17.</p> <p>Darnell, J.E. Jr., "RNA," <i>Scientific American</i>, 253: 68-78 (1985).</p> <p>Freeland, S.J., and Hurst, L. D. "Evolution Encoded" <i>Scientific American</i> April 2004, pages 84- 91.</p> <p>This is not required, but it will definitely update your knowledge!</p> <p>Couzin, Jennifer, "MicroRNAs Make Big Impressions in Disease After Disease," <i>Science</i> 319: 1782-1784 (2008).</p>
	<input type="checkbox"/> Lecture: Nucleic Acids
	<input type="checkbox"/> Flash Tutorial: DNA Replication
	<input type="checkbox"/> Flash Tutorial: Transcription
	<input type="checkbox"/> Flash Tutorial: Translation
	<input type="checkbox"/> Discussion: RNA, DNA, and Evolution
	<input type="checkbox"/> Activity: Reading DNA
	<input type="checkbox"/> Assignment: Express Yourself: How would you present it?
	<input type="checkbox"/> Diagnostic Learning Log
	<input type="checkbox"/> Quiz: Self Assessment Quiz #6
Unit 7:	Cell Membrane, Membrane Transport, and Cell Signaling
	<p>Reading: <i>Biology 7th edition</i> (2005) by Neil A. Campbell and Jane B. Reece, Chapters 7 and 11.</p> <p>Edidin, Michael, "Lipids on the frontier: a century of cell-membrane bilayers," <i>Nature Reviews Molecular Cell Biology</i> 4 : 414 – 419. (Available on eReserves)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lecture: Cell Membrane <input type="checkbox"/> Lecture: Membrane Transport <input type="checkbox"/> Lecture: Cell Signaling <input type="checkbox"/> Discussion: Cutting edge of membrane research <input type="checkbox"/> Activity: Modeling Hormones and Receptors

	<ul style="list-style-type: none"> ❑ Assignment: There is more than one way to cross a membrane ❑ Diagnostic Learning Log ❑ Quiz: Self Assessment Quiz #7
Unit 8:	Cell Respiration and Photosynthesis
	<ul style="list-style-type: none"> ❑ Reading: <i>Biology 7th edition</i> (2005) by Neil A. Campbell and Jane B. Reece, Chapters 9 and 10. <p>Hall, Alan, "Molecular Model-T" <i>Scientific American</i> September 21, 1999. (Available on eReserves).</p> <ul style="list-style-type: none"> ❑ Lecture: Cell Respiration I ❑ Lecture: Cell Respiration II ❑ Lecture: Photosynthesis ❑ Discussion: Watching Molecules ❑ Activity: Concept Map: Cell Respiration and Photosynthesis ❑ Assignment: Case Study: <i>A Case of Deadly Supplements</i> ❑ Diagnostic Learning Log ❑ Quiz: Self Assessment Quiz #8 <ul style="list-style-type: none"> ❑ Term Paper Due (Date TBA) ❑ Final Exam (Dates TBA)

Discussion and Assignment Policies:

As there is no "face time," online courses depend on interactions amongst the class through asynchronous discussion threads and between the instructors and the student through the completion of assignments. **Therefore it is critical that you actively participate in all discussions and turn in assignments on time.**

All discussions must originate by the first Monday of the unit at 7 AM MST and at least one response must be submitted by the first Tuesday of the unit at 7 AM MST. At least one more response must be posted by 7 AM MST on the final day of the unit. All assignments must be turned in by 7 AM MST on the day they are due. The exact due dates will be noted on the discussion and assignments.

Discussion will be graded on both participation and the quality of your comments. All questions posed for the discussion need to be addressed. Responses should have more depth than "I agree." Where appropriate, please bring in relevant examples from your experiences in the classroom or your work on the assignments.

No late assignments will be accepted, and no Incomplete grades will be given. In return, we pledge to get you feedback on written assignments and discussions promptly so that you will know where you stand.

**Grading
Grading**

Assignment	Points
Weekly Discussion Topic (8 total; 20 points each)	160
Weekly Activity Discussion (7 total; 20 points each)	140
Unit One Assignment	30
Unit Two Assignment	40
Unit Three Assignment	35
Unit Four Assignment	40
Unit Five Assignment	50
Unit Six Assignment	35
Unit Seven Assignment	35
Unit Eight Assignment	35
Diagnostic Learning Logs (8 total; 5 point each)	40
Self Assessment Quizzes (8 total)	160
Term Paper	100
Final	100
TOTAL	1000

Grades will be assigned as follows: A, 90-100%; B, 80-89%; C, 70-79%, D, 60-69%, E, below 60%.

Academic Integrity: Violations of scholastic ethics are considered serious offenses by the University of Arizona, the College of Science Teacher Preparation Program, and by your instructors. All work done for this class must be your own. You may collaborate with your colleagues in class activities and projects, but your performance on written exams should be your own. Any ideas “borrowed” from others should be plainly represented as such. Any form of cheating or plagiarism will be dealt with severely and may result in a grade of “E” for the course.

Prohibited Behavior: *Threatening behavior is prohibited.* “Threatening behavior” means any statement, communication, conduct or gesture, including those in written form, directed toward any member of the University community that causes a reasonable apprehension of physical or emotional harm to a person or property. A student can be guilty of threatening behavior even if the person who is the object of the threat does not observe or receive it, so long as a reasonable person would interpret the maker’s statement, communication, conduct or gesture as a serious expression of intent to physically harm or emotionally damage. In the event of threatening behavior by one of the students in the course, official policies and procedures will be followed as described at <http://policy.web.arizona.edu/~policy/threaten.shtml> .

Changes to this syllabus: The information contained in this syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as seemed appropriate by the instructors.

