2015

BIOL 160-41 General Biology I

Dottie Engle
engle@xavier.edu

Follow this and additional works at: http://www.exhibit.xavier.edu/biology_syllabi_summer_2015

Recommended Citation
http://www.exhibit.xavier.edu/biology_syllabi_summer_2015/2

This Restricted-Access Syllabus is brought to you for free and open access by the Biology Syllabi 2015 at Exhibit. It has been accepted for inclusion in Biology Syllabi Summer 2015 by an authorized administrator of Exhibit. For more information, please contact exhibit@xavier.edu.
Lecture Syllabus – extended version
Introduction and Logistics quiz in Canvas to count for hw

Overall Course Goals
Your goal for this course is to learn as much Biology as possible. Since each person comes to this class with different backgrounds, study skills, desires, and abilities, “possible” for you may be different than for others. Your depth of knowledge should increase over the semester, regardless of where you start. So be cautious about comparing yourself to others. On the other hand, it can be useful to find out what very successful students are doing that makes them successful. In order to earn the grade that you want, you will have to “walk the walk”, modeling the study skills and behaviors of high-achieving students. For example, it will be better to discuss Biology during lunch than to discuss last weekend’s party during lab.

My goal is to facilitate your learning during our time together (3 hours a week in class and 1 hour a week in tests or other activities, plus some additional time with personal appointments as needed). In class I will define, explain, apply, ask and answer questions. I will give you opportunities to practice and reinforce what you learn. From tests and group activities you will get feedback on how much and how well you are learning Biology. I will help you as you refine study skills, explore career choices, and prepare for the future. I will even tell you a few jokes.

The Biology departments’ goal is for you to obtain a thorough understanding of fundamental biological concepts that you will use in the further study of Biology or related fields. The other teachers in the Biology Dept. expect to build on what you learned this semester.

Specific Learning Outcomes
When you are finished with this course, if you have applied appropriate amounts of time, attention and energy, you should be able to:

- define a “testable hypothesis” and distinguish between a hypothesis and a prediction
- define “scientific theory” and explain how a scientific theory differs from a hypothesis and from colloquial uses of the word “theory”
- name the seven characteristics common to all living things
- list the levels of biological organization and apply them to the study of vertebrate systems
- compare and contrast the structure of prokaryotic and eukaryotic cells
- describe the structure and function of organelles
- explain the relationship between chemistry and biology and describe how chemical reactions drive biological processes
- name the four major kinds of biological macromolecules and be able to recognize their structure
- define metabolism and homeostasis and explain their roles in living systems
- describe the structure and function of biological membranes, including chemical signalling
- describe the process and products of cellular respiration and explain its role in living systems
- describe the process and products of photosynthesis
- describe mitosis and meiosis and be able to compare and contrast these processes
- distinguish between “gene”, “allele”, “locus”, “genotype”, and “phenotype”
- describe inheritance in living systems, both at a chromosomal and molecular level
- construct a Punnett Square and conduct a simple pedigree analysis
- state and explain the “Central Dogma” of molecular biology
- describe the processes of DNA replication, transcription, and translation
- explain how it is possible that all cells in a body contain the same genetic information, but have different structures and functions
• describe current techniques in molecular biology and be able to apply these concepts to real situations
• describe the structure and function of various cell types in the body
• name the four basic tissue types in the body and be able to recognize them
• describe the structure and function of the digestive system of vertebrates
• describe the structure and function of the cardiopulmonary system of vertebrates
• describe the structure and function of the immune system of vertebrates
• describe the structure and function of the endocrine system of vertebrates
• describe vertebrate development, including the origins of different tissue types
• describe the structure and function of the nervous system, including the sensory mechanisms
• describe the structure and function of the skeleto-muscular system
• apply concepts of vertebrate physiology to real situations
• demonstrate higher-order (critical) thinking skills in using the understanding gained by meeting the previous objectives

Organization:

Cells
Part 1: A Tour of the Cell, Biological Molecules (Chapters 2 – 6)
Part 2: Cellular Work: Processes and Organelles (Chapters 7 – 11)

Genetics
Part 1: Genetic Principles for Cells and Organisms (Chapters 12 – 15)
Part 2: Molecular Genetics (Chapters 16 – 20)

Anatomy & Physiology
Part 1: Systems (Chapters 40 – 44)
Part 2: Systems and Control (Chapters 45 – 50)

Resources to Achieve Goals

In class
Use the lecture outline provided and bring your study notes from your out-of-class work.

During lecture I will explain concepts, simplify difficult areas, break complex material down into easier pieces, demonstrate how to solve problems, and give you practice working problems. In class, take notes using the lecture outline provided, but don’t be hysterical to get every detail. It is more important to get the big picture to connect to what you learned earlier, and to understand the “whys” and “hows”. Leave spaces between lines to fill in details from the textbook later, or plan to re-write your notes.

Useful things happen in class that can’t be replicated by reading the textbook on your own. Because teamwork is an important component of almost every career, some of our work will take place in small groups. The ability to work well with others is especially important in scientific research and/or health care, and is greatly emphasized in health professional schools. For example, medical school faculty have specifically requested that we use group work in at least some of our pre-med courses, and that we specifically evaluate your relevant interpersonal skills in letters of recommendation. In this course, in-class participation includes group exercises for credit.

Textbook
BIOLOGY by Urry et al. (10th ed.) (Formerly Campbell’s BIOLOGY.) Although the bookstore almost always markets the most recent edition, you can use any edition.

I strongly recommend that you skim the next chapter before each class. This gives you a good idea of what will be covered, prepares you to ask questions in class, and helps you remember what you already know from high school Biology (even if it was a long time ago.) The book comes with a useful web site that has learning activities, animations, and practice quizzes (see below).
In college you will have to read textbooks, articles, and primary sources such as historical documents or scientific papers. If some high schools do not emphasize good reading habits, then the amount of reading in college can come as a shock to students. I hope these hints will help you:

Make sure you know what is expected from the reading. Sometimes you are looking for simple facts or definitions. Other times you are reading to understand ideas or concepts. There may be examples that help you to understand the concepts; does the teacher expect you to memorize the examples or just understand the ideas? Early on, teachers will give you guidance about their expectations. Eventually, though, you should learn to figure out for yourself what level of reading depth is needed.

When reading something that has new words, attack it one paragraph at a time. First skim the paragraph and underline any words you don’t know. Then use lecture notes, the book’s glossary or a dictionary to find synonyms or short definitions for each word; write these above the word. Now read the paragraph, using the synonyms or definitions in place of the unfamiliar words. It even helps to read the paragraph out loud! This strategy is a great way to learn new vocabulary words as well as learn the ideas in the material.

When you take written notes on your reading, read a paragraph, then cover it and write down the main idea. Make sure that you “paraphrase” instead of copying. If you can’t put a definition or idea into your own words, then you don’t really understand it!

Don’t be surprised if you have to read something more than once. We all have to do this!

**Homework Assignments**

Daily homework assignments will be posted in via Canvas or occasionally given out in class. Some of these will help you assess your personal study skills and others will be personal preparation for group exercises.

**Office Hours**

If you have questions that are not answered in the syllabus or the textbook, then please visit me. I will be using Logan 101A as a temporary office, before (3:00 – 3:45) or after (5:45 – 6:30) class. Other times are available if you ask me.

**Assessment (Testing)**

We all need feedback to determine whether or not we are doing what we are supposed to be doing. “Formative Assessment” is used for practice and is done early so that you can revise your study strategies and correct mistakes; this is part of Studying and Homework (see below). “Evaluative Assessment”, aka TESTING, measures what you have learned. The last class meeting will be used for the last test and the cumulative Final Exam.

You may arrange to take a test at an alternate time, with appropriate supervision, if you have an immovable conflict or an excused absence.

**MAKEUP TESTS WILL BE GIVEN AT THE END OF THE TERM, ON THE LAST FRIDAY MAY 27.** If you miss a test due to illness or some other real emergency, you must write or e-mail me a note explaining your absence. You don’t have to do this the day of the missed test, but a reasonable student will provide the note when he/she is well enough to return to class. If you have a very long absence by college standards (more than 1-2 days), then you should contact all your teachers to work out reasonable long-term make-up arrangements. This is especially important for extended absences that could involve making up several tests or assignments.

**Academic Honesty**

In accordance with the Xavier University catalog, the penalty for intentional academic dishonesty in this course is a failing grade (F).

You may work with others on homework, as long as you do not just copy someone else’s answers (but of course, you already know that would be stupid).
Grading

Your grade is determined by a combination of tests, quizzes/assignments, and class participation.

Quizzes: 10%
Quizzes include in-class quizzes and certain quizzes in Canvas as noted. Averaged together these are worth 10% of your grade.

Team Exercises and Tests: 5%
In-class participation includes group exercises and group tests. Averaged together these are worth 5% of your grade. A peer evaluation score determines what proportion of the group score each person will earn. Normal participation will earn you all of the group points. The peer evaluation takes into account factors such as attendance, contribution to group work, treating team members with respect, completion of preparation assignments, etc. We will have a midterm peer evaluation for midterm grades, and a final one for final grades; in other words, a poor midterm evaluation will not hurt you if you use the feedback to revise your behavior for the rest of the term.

Tests: 85%
Tests will be multiple choice, ParScore-graded.

Grading Scale:
A = exceptionally qualified to continue in Biology (94%)
A' = especially well qualified to continue in Biology (91%)
B' = very well qualified to continue in Biology (88%)
B = well qualified to continue in Biology (84%)
B' = qualified to continue in Biology (80%)
C' = minimally prepared to continue in Biology (77%)
C = minimally prepared to continue in Biology if you improve your study skills and/or motivation (73%)
C' = not prepared to continue in Biology unless you greatly improve your study skills and/or motivation (70%)
D' = passing for Core Curriculum credit, but not sufficiently prepared to continue in Biology (67%)
D = passing for Core Curriculum credit, but not sufficiently prepared to continue in Biology (63%)
D' = minimum passing for Core Curriculum credit, but not sufficiently prepared to continue in Biology (60%)
F = no credit (below 60%)

Last year’s fall grade distribution:
A range 22%, B range 33%, C range 22%, D range 8%, F 4%, withdraw 6%, audit 4%.

How to Use the Resources: Studying and Homework

“Studying” is a key part of the learning cycle and includes two main components, preparing for class and preparing for evaluation or assessment (ie. tests). Probably the most common mistake that students make is trying to do all of this work in the night or two before the test. Plan to spend a minimum of 2 hours studying outside class for every hour in class. This works out to at least 6 hours a week of homework for this 3 credit course. To help you make the shift from high school studying to college studying, I will give you very specific assignments. The purpose is to reward you for establishing good study habits right at the beginning of your college career. Over time the responsibility for your studying will shift from me to you, so that by the end of the semester you should know what you need to do to succeed in college science courses.

In addition to allowing enough time for studying, you also need to decide what you will DO while studying. In general, study habits are actions. When designing good study habits it may be useful to know your individual learning style, or your best learning strategies. For example, some people are visual learners and learn best with pictures and diagrams. Other people may be auditory learners who process by listening and talking; they should definitely tape lectures, and also study by reading the text and lecture notes out loud. Some others learn most easily by reading; the textbook will be their best friend. In addition, it is often helpful to form a study group to enhance (not replace!) personal learning.
Successful performance in this course will require a large amount of factual memorization, but most importantly, conceptual understanding, as manifested by the synthesis and application of knowledge to solve problems. Your role and responsibility as a student is to *actively* learn. My role and responsibility as the instructor is to facilitate your learning.

- **Before a new topic:** Get “big picture” in preparation to understand the lecture.
  1. Access and complete pre-class material from Canvas.
  2. Read the Key Concept headings and sub-headings for the chapter, as this helps you understand how information fits together into the whole.

- **During Class:** Actively listen and participate to connect concepts.
  1. Take thorough notes. Take notes as if you were taking them for a best friend who was solely dependent upon the information you write down to be successful.
  2. Try to ask conceptual or higher level questions in class.
  3. Try to make connections between previous and current information.
  4. Bring colored pencils, as I sometimes utilize different colors to help explain concepts.
  5. Some people like to use a small tape recorder to tape lectures; then they can take fewer notes, expanding them out later while listening again. If you have a long commute to/from school, you can use the driving time to listen to lecture tapes.

- **After Class:** Flesh out and firm up your understanding.
  1. Revise your notes the same day. Make notes in the margin concerning information that is unclear.
  2. Do the assigned items in the Canvas module, and add this information to your notes.
  3. Obtain clarification of unclear information from the book, a peer, professor, or any other resource.
  4. If very helpful, re-write notes. I typically recommend this, although it can be time-consuming. However, the practice is extremely valuable in helping most students to better understand the information.
  5. Solve problems to assess your understanding.
  6. Complete the main studying within 2 days of the corresponding lecture for maximal benefit. Avoid procrastinating until the night before the test. Such procrastination prevents you from getting clarification on unclear concepts.
Lecture Syllabus – short version

Overall Course Goals

Your goal for this course is to learn as much Biology as possible.

My goal is to facilitate your learning during our time together (in class, office hours and with personal appointments as needed).

The Biology departments’ goal is for you to obtain a thorough understanding of fundamental biological concepts that you will use in the further study of Biology or related fields. The other teachers in the Biology Dept. expect to build on what you learned this semester.

Secondary Education: This course addresses NSTA standards 1a, 1b, 3a, 3b, 5d.

Useful Information:

Materials. For homework and lecture preparation, access materials posted in Canvas.

Attendance. In class, we will have lecture and group activities. Please bring your notes for the day’s material, and also an internet-connectable device (portable computer, tablet or phone, whatever you have).

Textbook. BIOLOGY by Urry et al. The most recent edition is the 10th. Originally Campbell’s BIOLOGY; any edition will be acceptable.

Homework Assignments
Daily homework assignments will be posted in CANVAS. Occasional paper homework assignments will be given out in class or posted in Canvas.

Office Hours. Before (3:00 – 3:45) or after (5:45 – 6:30) class, in Logan 100A. Other times available if you ask me.

Grading
Your grade is determined by a combination of tests, assignments, and class participation.

Quizzes: 10%
Quizzes include in-class quizzes and certain quizzes in Canvas as noted. Averaged together these are worth 10% of your grade.

Team Exercises: 5%
In-class participation includes group exercises and group quizzes. Averaged together these are worth 5% of your grade.

Tests: 85%

Organization:

Cells
Part 1: A Tour of the Cell, Biological Molecules (Chapters 2 – 6)
Part 2: Cellular Work: Processes and Organelles (Chapters 7 – 11)

Genetics
Part 1: Genetic Principles for Cells and Organisms (Chapters 12 – 15)
Part 2: Molecular Genetics (Chapters 16 – 20)

Anatomy & Physiology
Part 1: Systems (Chapters 40 – 44)
Part 2: Systems and Control (Chapters 45 – 50)
The schedule and procedures in this course are subject to change in the event of extenuating circumstances.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Homework after class and before the next class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M MAY 18</td>
<td>Introduction, Tour of the Cell</td>
<td>Introduction and Logistics module in Canvas; Learn the parts of the cell with a basic definition of each part’s function (see Chapter 6 module in Canvas).</td>
</tr>
<tr>
<td></td>
<td>T MAY 19</td>
<td>Tour of the Cell quiz and application; Begin Biological Molecules</td>
<td>High school Chemistry review (Chapter 2 as needed for reference), Chapter 3-4 module in Canvas.</td>
</tr>
<tr>
<td></td>
<td>W MAY 20</td>
<td>Water and Carbon quiz; Continue Biological molecules</td>
<td>Chapter 5 module in Canvas.</td>
</tr>
<tr>
<td></td>
<td>R MAY 21</td>
<td>Biological Molecules quiz and application; Cellular work: Metabolism</td>
<td>Chapter 8 module in Canvas.</td>
</tr>
<tr>
<td>2</td>
<td>M MAY 25</td>
<td>MEMORIAL DAY HOLIDAY</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T MAY 26</td>
<td>Test 1: Cell overview and molecules</td>
<td>Chapter 7 module in Canvas.</td>
</tr>
<tr>
<td></td>
<td>W MAY 27</td>
<td>Cellular Work: Communication</td>
<td>Chapter 11 and Chapter 10 modules in Canvas.</td>
</tr>
<tr>
<td></td>
<td>R MAY 28</td>
<td>Metabolism/Membranes/Communication quiz and application</td>
<td>Chapter 9 module in Canvas.</td>
</tr>
<tr>
<td>3</td>
<td>M JUNE 1</td>
<td>Photosynthesis/Respiration quiz and application</td>
<td>Chapter 12 module in Canvas.</td>
</tr>
<tr>
<td></td>
<td>T JUNE 2</td>
<td>Test 2: Cellular Work; Genetics: Meiosis</td>
<td>Chapter 13 module in Canvas.</td>
</tr>
<tr>
<td></td>
<td>W JUNE 3</td>
<td>Cell Cycle/ Meiosis quiz; Genetics: Genes and Chromosomes</td>
<td>Chapter 14 and Chapter 15 modules in Canvas.</td>
</tr>
<tr>
<td></td>
<td>R JUNE 4</td>
<td>Genes and Chromosomes application; Genetics: Genes are DNA</td>
<td>Chapter 16 module in Canvas.</td>
</tr>
<tr>
<td>4</td>
<td>M JUNE 8</td>
<td>Test 3: Genetics part 1 – Cell Cycle – Chromosomes</td>
<td>Chapter 17 module in Canvas.</td>
</tr>
<tr>
<td></td>
<td>T JUNE 9</td>
<td>Genetics/ Gene Expression quiz and application</td>
<td>Chapter 18 module in Canvas.</td>
</tr>
<tr>
<td></td>
<td>W JUNE 10</td>
<td>Genetics: Viruses DNA Technology</td>
<td>Chapter 19 and Chapter 20 modules in Canvas.</td>
</tr>
<tr>
<td></td>
<td>R JUNE 11</td>
<td>Gene Control/ DNA Technology Quiz and application</td>
<td>Chapter 20 module in Canvas.</td>
</tr>
<tr>
<td>5</td>
<td>M JUNE 15</td>
<td>Test 4: Genetics part 2 – Molecular Genetics</td>
<td>Chapter 21 module in Canvas.</td>
</tr>
<tr>
<td></td>
<td>T JUNE 16</td>
<td>Gas Exchange Circulation</td>
<td>Chapter 22 module in Canvas.</td>
</tr>
<tr>
<td></td>
<td>W JUNE 17</td>
<td>Nutrition/Respiration/Circulation quiz and application</td>
<td>Chapter 23 module in Canvas.</td>
</tr>
<tr>
<td></td>
<td>R JUNE 18</td>
<td>Excretion Reproduction</td>
<td>Chapter 24 module in Canvas.</td>
</tr>
<tr>
<td>6</td>
<td>M JUNE 22</td>
<td>Test 5: Anatomy &amp; Physiology part 1 - Animal nutrition - Excretion</td>
<td>Chapter 25 module in Canvas.</td>
</tr>
<tr>
<td></td>
<td>W JUNE 24</td>
<td>Nervous System quiz and application</td>
<td>Chapter 26 module in Canvas.</td>
</tr>
<tr>
<td></td>
<td>R JUNE 25</td>
<td>Test 6: Anatomy &amp; Physiology part 2 Cumulative Final exam</td>
<td>Chapter 27 module in Canvas.</td>
</tr>
</tbody>
</table>

Notes: Write down key points from the extended syllabus that you want to keep handy.