2014

160-02 General Biology I

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I. Lecture Topics and Dates

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Reading Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/25</td>
<td>Introduction, Process of Science</td>
<td>Ch. 1</td>
</tr>
<tr>
<td>8/27</td>
<td>Tour of the Cell, Chemistry</td>
<td>Ch. 6, Ch. 2</td>
</tr>
<tr>
<td>8/29</td>
<td>General Chem., Water and Carbon</td>
<td>Ch. 2, 3, 4</td>
</tr>
<tr>
<td></td>
<td>Learning Style Assessment/SI/LAC</td>
<td></td>
</tr>
<tr>
<td>8/29</td>
<td>Labor Day Holiday</td>
<td></td>
</tr>
<tr>
<td>9/3</td>
<td>Macromolecules</td>
<td>Ch. 5</td>
</tr>
<tr>
<td>9/5</td>
<td>Macromolecules</td>
<td>Ch. 5</td>
</tr>
<tr>
<td>9/5</td>
<td>Information Session: Health Care Careers 1: Behind the medical curtain</td>
<td></td>
</tr>
<tr>
<td>9/8</td>
<td>Metabolism</td>
<td>Ch. 8</td>
</tr>
<tr>
<td>9/10</td>
<td>Metabolism</td>
<td>Ch. 8</td>
</tr>
<tr>
<td>9/12</td>
<td>Membrane Structure</td>
<td>Ch. 7</td>
</tr>
<tr>
<td>9/12</td>
<td>EXAM 1 (Ch. 1, 2, 3, 4, 5, 6, 8) 115 points</td>
<td></td>
</tr>
<tr>
<td>9/15</td>
<td>Membrane Structure/Photosynthesis</td>
<td>Ch. 7, Ch. 10</td>
</tr>
<tr>
<td>9/17</td>
<td>Photosynthesis</td>
<td>Ch. 10</td>
</tr>
<tr>
<td>9/19</td>
<td>Cellular Respiration</td>
<td>Ch. 9</td>
</tr>
<tr>
<td>9/19</td>
<td>Information Session: Health Care Careers 2 Patient Care</td>
<td></td>
</tr>
<tr>
<td>9/22</td>
<td>Mitosis</td>
<td>Ch. 12</td>
</tr>
<tr>
<td>9/24</td>
<td>Meiosis</td>
<td>Ch. 13</td>
</tr>
<tr>
<td>9/26</td>
<td>Mendel and the Gene</td>
<td>Ch. 14</td>
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<tr>
<td>9/26</td>
<td>EXAM 2 (Ch. 7, 9, 10, 12) 115 points</td>
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<tr>
<td>9/29</td>
<td>Mendel and the Gene</td>
<td>Ch. 14</td>
</tr>
<tr>
<td>10/1</td>
<td>Chromosomal Basis of Inheritance</td>
<td>Ch. 15</td>
</tr>
<tr>
<td>10/3</td>
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<td>Ch. 15</td>
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<tr>
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<tr>
<td>10/6</td>
<td>The Molecular Basis of Inheritance</td>
<td>Ch. 16</td>
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<tr>
<td>10/8</td>
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<td>Ch. 16</td>
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<tr>
<td>10/10</td>
<td>Fall Holiday</td>
<td></td>
</tr>
<tr>
<td>10/13</td>
<td>From Gene to Protein</td>
<td>Ch. 17</td>
</tr>
<tr>
<td>10/15</td>
<td>Bacteria and Viruses</td>
<td>Ch. 18a, 19</td>
</tr>
<tr>
<td>10/17</td>
<td>Currently open</td>
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<tr>
<td>10/20</td>
<td>Bacteria and Viruses/Biotechnology</td>
<td>Ch. 18a, 19, 20</td>
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<tr>
<td>10/22</td>
<td>Biotechnology</td>
<td>Ch. 20</td>
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<tr>
<td>10/24</td>
<td>Animal Structure and Function</td>
<td>Ch. 40</td>
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<tr>
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II. Course Description:
   This course will provide the student with a comprehensive introduction to fundamental biological concepts.

III. Course Goals:
   A. General
      • To develop a vocabulary that prepares the student to be successful in upper-division biology courses.
      • To develop successful study habits and time management skills.
      • To ensure that all students are competent in foundational biological principles in preparation to be successful in upper-division biology courses.

II.

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B. Specific Learning Outcomes

- 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 pedigree analysis
- state and explain the “Central Dogma” of molecular biology
- describe the processes of DNA replication, transcription, and translation
- explain how 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
- 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 the structure and function of the reproductive system of vertebrates
• describe vertebrate development, including the origins of different tissue types
• describe the structure and function of the nervous system, including sensory mechanisms
• describe the structure and function of the skeletomuscular system
• apply concepts of vertebrate physiology to real situations
• demonstrate higher-order (critical) thinking skills in using the understanding gained by meeting the previously listed objectives

IV. Attendance:
I expect you to attend class.

V. Course Materials:
A. Biology, 10th edition, by Urry et al.

B. Lecture Notes, Video Lectures and other Canvas postings
I will post lecture notes/outlines on Canvas that you should download before class.
I will post some video lectures that should be viewed before class.
I will also post supplemental, non-graded, worksheets containing practice problems for some chapters.
I will also post exam questions from previous years. YOU are responsible for ensuring that posted exam answers are correct, in the event that I mistakenly post an incorrect answer. Stating that you incorrectly answered an exam question based on an incorrect answer I had posted for a practice question is not a suitable reason to award credit for a wrong exam answer.

C. Mastering Biology
Pre-class and Post-class Assignments for each chapter will be posted within the Mastering Biology interactive website. You can access the site through Canvas. You will need:
1- email address
2- your personal access code that came with your new textbook or that you purchased separately,
3- you Xavier student ID number
4- the Course ID is paulding36042

You will use NINE digits for your ID. Below is an example for entering your ID:
If your Xavier student ID is 000327925,
Enter 100 plus six memorable digits, if you are in the 8:00-8:50 class (Section 01), OR
Enter 200 plus six memorable digits, if you are in the 11:00-11:50 class (Section 02).

VI. Grading
A. Pop quizzes:
There will be 12-15, unannounced, timed, weekly quizzes. I will count your 10-12 best scores. If you miss a quiz for any reason, the missed quiz will count as one of your 2 dropped quiz scores. Zeros will be assigned for fewer quiz scores than the total number counted.

B. Exams:
Point values for exams are listed in bold on the two previous pages.
Exams will be multiple choice. You MUST correctly fill in your Name and ID number on your Scranton sheet. I WILL DEDUCT 4 POINTS FOR INCORRECTLY FILLED IN SCANTRON SHEETS.

If you are an athlete and miss an exam because of a meet, you must take the exam before you leave, or I will provide a team official a copy of the exam and the official can administer the exam to you on the road.

*If any student misses one of the first six exams with a suitable excuse (letter from a doctor or university official), he/she can take a make-up exam ONLY on a specified date at the end of the semester. If a student misses one of the first six exams without a suitable excuse, his/her grade for that exam will be a zero. If a student misses the Final exam (Exam 7) with a suitable excuse, he/she will receive a grade of Incomplete for the semester. As soon as possible next semester, the student must contact me to make arrangements to take a make-up exam. If a student misses the final without a suitable excuse, the student’s grade on the Final exam will be a zero.

Your final grade will be determined by a combination of pop quizzes, exams and Freshman Friday attendance.

<table>
<thead>
<tr>
<th>Section</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Pop quizzes:</td>
<td>10%</td>
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<tr>
<td>Exams:</td>
<td>85%</td>
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<tr>
<td>Attendance:</td>
<td>5%</td>
</tr>
<tr>
<td>Total:</td>
<td>100%</td>
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</tbody>
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**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%)

**Grades:**
1. Purpose
   - Assessment provides feedback useful for making behavioral modification related to goal setting and future planning.
   - To provide a rough estimate that someone who is unfamiliar with the person in question can use to predict one’s ability to be successful in a given environment.

2. Extra credit
   - As in life, there is no extra credit in this course, only credit for what you do.
VII. Strategies for Success:

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.

“Studying” is a key part of the learning cycle and includes two main components, preparing for class and preparing for evaluation or assessment (i.e., 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. However, some students will require much more. 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. In collaboration with the Learning Assistance Center, we will conduct a Learning Style Assessment the first week. 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 or join Supplemental Instruction to enhance (not replace!) personal learning.

A. Class Lecture

• **Before Class:** Get “big picture” in preparation to understand the lecture.
  1. Download notes from Canvas. Watch video if appropriate. Define terms and/or label diagrams as indicated.
  2. Read the Key Concept headings and sub-headings for the chapter, as this helps one understand how information fits together into the whole.
  3. Watch the animations posted on Canvas for the chapter.
  4. Complete the Pre-class assignment on Mastering Biology.
  5. Watch the animations again, (on both Canvas and Mastering Biology).

• **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 application 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.

• **After Class: Assess your understanding.**
  1. Review your notes the same day. Make notes in the margin concerning information that is unclear.
  2. Obtain clarification of unclear lecture information from the book, a peer, SI leader, tutor, professor, or any other resource.
  3. Only if very helpful, re-write notes. I typically do not recommend this, as it’s very time-consuming. However, the practice is extremely valuable in helping most students better understand the information.
  4. Solve problems to assess your understanding. Worksheets are provided for some sections and the “Study Area” of Mastering Biology is exceptional.
  5. Complete the Post-Class assignment within 2 days of the corresponding lecture for maximal benefit. Avoid completing all the post-class assignments Thursday night, before the exam on Friday. Such procrastination prevents one from getting clarification on unclear concepts.
  6. Attend Supplemental Instruction on a regular basis.

B. **Supplemental Instruction (SI) Study Groups:**
   The Learning Assistance Center is offering weekly study groups with structured activities designed to reinforce the material in General Biology I.

This year’s SI leader and sessions are
Section 01: Sarah Haas, haas@xavier.edu
Section 02: Tyler Sauerbeck, sauerbeck@xavier.edu

C. **Practical Tools Useful for Information Mastery**
   1. Write and/or verbalize notes from memory.
   2. Draw diagrams from memory.
   3. Rapid-fire partner quizzing of factual information.
   4. Make flashcards utilizing pictures. See example on pages 8 and 9 of syllabus.
   5. Construct concept maps. See example on page 10 of syllabus. Combining individual maps into a single group map is a great way to review with peers.

D. **Exam Preparation Tips**
   1. **STUDY DAILY.** Don’t fall behind, as it’s almost impossible to catch up. Spend time daily performing the previously suggested “Strategies for Success”.
   2. Utilize one or more of the “Practical Tools” as needed, based on personal usefulness.
   3. Take the Practice Exam as if it were the actual exam. Do not use your notes for help, nor look at the answers before finishing the exam.
   4. Correct all questions missed on Practice Exam, making sure you fully comprehend why the question was missed.

VIII. **Academic Honesty**
(From the Xavier University Catalog.) “The pursuit of truth demands high standards of personal honesty. Academic and professional life requires a trust based upon integrity of the written and spoken word. Accordingly, violations of certain standards of ethical behavior will not be tolerated at Xavier University. These include theft, cheating, plagiarism, and unauthorized assistance in assignments and tests...All work submitted for academic evaluation must be the student’s own. Certainly, the activities of other scholars will influence all students. However, the direct and unattributed use of another’s efforts is prohibited as is the use of any work untruthfully submitted
as one’s own. Penalties for violations of this policy may include one or more of the following: a zero for that assignment or test, a grade of F in the course, and expulsion from the University.”
Flashcard Examples:

Condensation Reaction

- Same as dehydration
- Same as condensation-dehydration

When making flashcards, write the term on the front of the card and draw a picture on the back of the card. The true test of whether you understand a term is if you associate that term with a physical object or process. This also helps one place the term in the correct context with related terms. It also helps one recognize incomplete understanding. For example, consider the term “petunia”. While most students would associate the term with a flower, could you differentiate it from other types of flowers? Drawing a picture would complete your understanding! Incomplete understanding of a term is often times the source of students feeling that exam questions are vague. Complete understanding of terminology helps one differentiate and rule out incorrect choices on an exam.
Again, notice how drawing a picture helps to both reinforce knowledge, while simultaneously placing terminology in the right conceptual framework.

Additionally, many studies have concluded that the process of writing helps one remember information much more effectively than only reading the information.
Concept Map Example:

A concept map is an effective studying and learning tool that helps one organize many terms and concepts into a functional framework. Concepts are placed in a box. Labeled arrows explaining how different boxes are related are then drawn between boxes.

Tips for making concept maps:
- There is no right or wrong way to make a concept map. Each map will be unique to the student.
- Make a list of important terms.
- Place general terms/ideas at the top of the map, then more detailed terms/ideas as you move down.
- Link each term to as many other terms as possible. Try especially to link terms on different levels. For diagram clarity, I did so sparingly on this map, but the more links one can make, the deeper one’s conceptual understanding.