

# **BEAMAN - BIOLOGY 1308 Syllabus ADDENDUM, SPRING SEMESTER 2010**

## **INSTRUCTIONAL METHODOLOGY**

This course is taught in the classroom as a lecture.

## **COURSE RATIONALE**

The goal of Biology 1308 is to adequately prepare students with the information necessary to begin any of the health science programs at ACC. The first step is to pass the Anatomy Assessment Test. This class will provide the student with the specific skills and competencies necessary to pass the test.

## **COMMON COURSE OBJECTIVES**

Common course objectives are attached. They can also be found at:

<http://www2.austincc.edu/biology/ccobjectives>

### **ACCOMMODATION OF SPECIAL NEEDS**

Students with special needs that are documented by letters from the Office of Students with Disabilities must meet with the instructor during the first week of class in order to make arrangements for accommodation of their needs.

### **ATTENDANCE**

Your performance in the course is dependent on your attendance, so please make every effort to attend all classes as scheduled.

### **LECTURES**

The lecture schedule indicates the chapter reading assignments in the textbook for each lecture period. The student is expected to read the assigned material before the scheduled date, and should be prepared to discuss assigned material in class.

### **EXAMS**

**Students are expected to prepare for examination over all material scheduled, regardless of lecture coverage.**

### ***EXAM FORMAT***

Exams will include a combination of matching, multiple choice, short answer and fill-in-the-blank, and discussion or essay questions. There may be charts, graphs, and tables to either read and interpret, or for you to complete.

### **MISSED EXAMS**

Missed Exams may be made up, **with the instructor's permission**, if an adequate reason is provided by the student, and if the exam is made up within one week of the scheduled date of the missed exam. Make-up exams may differ in format and level of difficulty from scheduled exams. Time and place of make up exams are arranged with the instructor.

**Incomplete (I)** grades will be given in consultation with the student and upon agreement of the instructor when extenuating circumstances have prevented the student from

completing the course. In order to be considered for an “I”, a student must have successfully completed a minimum of three units in the course.

Note the Incomplete (I) grade must be completed by a college-wide deadline before the end of the succeeding semester including the summer term. If not completed by that deadline, the incomplete (I) grade automatically becomes a failing grade (F).

**A WITHDRAWAL (W) MUST BE INITIATED BY THE STUDENT. The instructor does not withdraw students. Drop date for SPRING 2010 semester is APRIL 26<sup>TH</sup>.**

### **REINSTATEMENT**

In order to be reinstated in the class, the student must have been enrolled in the course on the state reporting date, as demonstrated by the twelfth-day class roll, must have been withdrawn from the course in error, must show evidence of being capable of passing the course within the time remaining in the semester, and the instructor must have documentation that the student is eligible to be reinstated in the course.

### **Statement on Scholastic Dishonesty**

“Acts prohibited by the college for which discipline may be administered include scholastic dishonesty, including but not limited to, cheating on an exam or quiz, plagiarizing, and unauthorized collaboration with another in preparing outside work. Academic work submitted by students shall be the result of their thought, research or self-expression. Academic work is defined as, but not limited to, tests, quizzes, whether taken electronically or on paper; projects, either individual or group; classroom presentations; and homework.”

### *Statement on Students with Disabilities*

“Each ACC campus offers support services for students with documented physical or psychological disabilities. Students with disabilities must request reasonable accommodations through the Office of Students with Disabilities on the campus where they expect to take the majority of their classes. Students are encouraged to do this three weeks before the start of the semester. Students who are requesting accommodation must provide the instructor with a letter of accommodation from the Office of Students with Disabilities (OSD) at the beginning of the semester. Accommodations can only be made after the instructor receives the letter of accommodation from OSD AND STUDENT SPECIFICALLY REQUESTS ACCOMODATIONS.”

### *Statement on Academic Freedom*

“Institutions of higher education are conducted for the common good. The common good depends upon a search for truth and upon free expression. In this course the professor and students shall strive to protect free inquiry and the open exchange of facts, ideas, and opinions. Students are free to take exception to views offered in this course and to reserve judgment about debatable issues. Grades will not be affected by personal views. With this freedom comes the responsibility of civility and a respect for a diversity of ideas and opinions. This means that students must take turns speaking, listen to others speak without interruption, and refrain from name-calling or other personal attacks.”

### *Statement on Lab Safety*

“Health and safety are paramount values in science classrooms, laboratories and field activities. Students are expected to learn, understand and comply with environmental, health and safety (EHS) procedures and protocols, and must agree to abide by the ACC science safety policy. Students are expected to conduct themselves with appropriate professional behavior and with respect and courtesy to all. Anyone who thoughtlessly or

intentionally jeopardizes the health or safety of another individual will be immediately dismissed from the day's activity, may be withdrawn from the class, and/or barred from attending all activities. Specific safety information for each activity will be discussed at the beginning of the activity. For those activities that require specific safety training, a student who is late and misses the safety training will not be able to participate in the activity." The comprehensive science safety policy can be found at:

[http://www.austincc.edu/sci\\_safe/](http://www.austincc.edu/sci_safe/).

## TESTING CENTER POLICY

ACC Testing Center policies can be found at: <http://www2.austincc.edu/testctr/>

## STUDENT SERVICES

The web address for student services is: <http://www3.austin.cc.tx.us/evpcss/rss/Default.htm>.

The ACC student handbook can be found at: <http://www3.austincc.edu/evpcss/handbk/toc.htm>.

## INSTRUCTIONAL SERVICES

The web address is: <http://www3.austincc.edu/evpcss/memos/reference.htm>, then click on "Campus Based Student Support Overview".

The "New and Improved" Common Course Objectives for 1308

### **Biology 1308 Common Course Objectives**

#### **A. Overview**

1. Describe the levels of organization in multicellular organisms starting with *atoms* and ending with *organisms*.
2. Define the term *homeostasis*.
3. Describe, in general terms, how negative and positive feedback mechanisms are used by organisms to maintain homeostasis.

#### **B. The Metric System**

1. State the basic units of the metric system for length, mass, time and volume.
2. Identify the fraction or multiple associated with each of the following prefixes: *kilo*, *deci*, *centi*, *milli*, *micro*, and *nano*.
3. Combine the prefixes above with a metric unit and know the correct abbreviation of the combined prefix and unit.
4. Convert quantities between the metric units.
5. Convert between metric and English units (weight, volume, length, and temperature).

[Note: Objective #B5 is NOT a Human Anatomy or Human Physiology Assessment Test Objective.]

#### **C. Atoms, Molecules, Bonds and Properties of Matter**

1. Define the term *element*.

2. Identify the common chemical symbols for: oxygen, carbon, hydrogen, nitrogen, calcium, potassium, sodium, chlorine, iron, and phosphorus.
3. Identify the chemical formulas for carbon dioxide, carbon monoxide, water, hydrochloric acid, sodium chloride, glucose, and sodium bicarbonate (also known as sodium hydrogen carbonate).
4. Define the term *atom*.
5. Describe the basic structure of an atom (protons, neutrons, and electrons).
6. Identify the charge and the location in an atom of protons, neutrons and electrons.
7. Define the term *isotope*.
8. Recognize that isotopes are used in diagnosis and treatment in medicine.
9. Define the terms *molecule* and *ion*. Explain the role of electrons in chemical bonding.
10. Compare how covalent and ionic bonds hold atoms together and how each type of bond is shown in a diagram.
11. Discuss the relative strengths of covalent and ionic bonds (how easily the bonds can be broken).
12. Compare polar and nonpolar bonds. Compare and contrast the characteristics of polar and nonpolar molecules.
13. Identify the type of bond (polar covalent, nonpolar covalent, or ionic) found in the following molecules: carbon dioxide, water, hydrochloric acid, sodium chloride, oxygen gas, and sodium bicarbonate.
14. Define the term hydrogen bond. Describe the characteristics of hydrogen bonds.
15. Identify how hydrogen bonds are shown in a diagram.
16. Define the terms *matter* and *mass*.
17. Identify and describe the properties of the 3 states of matter.
18. Compare and contrast the random motion of particles in a liquid, solid, and gas and the effect of temperature on the motion.
19. Describe the relationships between temperature, pressure and volume in a closed system. (Note: You do NOT need to know the formulas-just the relationships.)

#### **D. Water**

1. Describe the polarity of water.
2. List and describe the properties of water (high heat capacity, essential reactant, excellent solvent, cohesion (also called surface tension) and how they benefit organisms).
3. Explain the biological importance of hydrogen bonds between water molecules and between other polar covalent molecules.
4. Distinguish between hydrophilic & hydrophobic substances and describe their interactions.

#### **E. Acids, Bases, pH, and Buffers**

1. Define the terms *acid*, *base*, and *hydrogen ion* (also called a *proton*).
2. Define pH and relate pH to the concentration of hydrogen ions/protons.

1. Read a pH scale and determine whether the solution is acid, basic, or neutral.
2. Compare the properties of salts, acids, and bases.
3. Define the term *buffer*.
4. Describe how buffers work to keep the pH within a narrow range to maintain homeostasis.
5. Define the term *dissociation*.
6. Describe the effect of dissociation in producing anions and cations.
7. Describe the effect of dissociation on the strength of an acid or base.
8. Identify the characteristics of a neutralization reaction.
9. Be able to use a pH meter or pH paper to measure the pH of a solution.

[Note: Objective #E11 is NOT a Human Anatomy or Human Physiology Assessment Test Objective.]

## F. Chemical Reactions

1. Differentiate between kinetic energy and potential energy and know their characteristics.
2. Recognize examples of kinetic energy and potential energy.
3. Explain how organisms use chemical reactions to capture and release energy and to make new compounds and break down compounds.
4. Write a simple chemical reaction using proper chemical notation (Note: See "Rules of Chemical Notation posted on the Biology Department website, [www.austincc.edu/biology](http://www.austincc.edu/biology) .)
5. Interpret a simple chemical reaction, identifying reactants, products, and enzyme involved.
6. Recognize that in a reaction at equilibrium the forward and reverse reactions are occurring at the same rate.
7. Define the following terms: *catalyst*, *enzyme*, *substrate*, *products*, *activation energy*, and *active site*.
8. Explain the characteristics of enzymes, including their specificity and that enzymes are not altered or used up in a reaction.
9. Describe how enzymes work, including how they affect the activation energy of a reaction and the rate of a reaction.
10. Identify the factors that affect enzyme activity (pH and temperature).

## G. Biomolecules

1. Describe why carbon is a versatile element and found in the structure of all biomolecules.
2. Identify the following functional groups and describe their properties: hydroxyl, carbonyl, carboxyl, amine, phosphate, and sulfhydryl.
3. Define the terms *monomer* (also called *subunit* or *building block*) and *polymer*.
4. Describe the reactions (dehydration/synthesis or condensation/hydrolysis) used to make and break down polymers.

### Carbohydrates:

5. Define the terms *monosaccharide*, *disaccharide*, and *polysaccharide*. Identify monosaccharides as the monomers/subunits joined to make disaccharides and polysaccharides.
6. Name and classify the following common carbohydrates as either *monosaccharides*, *dissacharides*, or *polysaccharides*: glucose, fructose, galactose, ribose, deoxyribose, sucrose, lactose, glycogen, starch, and cellulose.
7. Describe the function of each of the common carbohydrates listed above.

### Proteins:

8. Identify amino acids as the monomers/subunits joined to make proteins/polypeptides.
9. Name the parts of an amino acid: (central carbon, amino group, carboxyl group, R group, and H atom).
10. Describe how the R group in each of the 20 different amino acids determines each amino acid's characteristics.
11. Describe the four levels of a protein's structure, including at which level of structure covalent bonds are important and at which level of structure hydrogen bonds are important.
12. Describe the importance of shape to protein function.
13. Define the term *denaturation*.
14. Explain how denaturation affects the function of a protein.
15. Describe how pH and temperature affect protein function.
16. List examples of the functions of proteins in cells.
17. Identify the various ways in which proteins are shown in a diagram.

[Note: Objective #G17 is NOT in a Human Anatomy or Human Physiology Assessment Test Objective.]

### Nucleic acids

18. Name the two major nucleic acids found in cells.
19. Identify nucleotides as the monomers/subunits joined to make nucleic acids.
20. Identify the three main parts of a nucleotide.
21. Distinguish between the four nucleotides used to make RNA and the four nucleotides used to make DNA.
22. Identify genes as pieces of DNA with the instructions for making a specific protein.
23. Describe how two DNA strands are complementary to each other.
24. Identify ATP (adenosine triphosphate) as the RNA "A" nucleotide with two extra phosphate groups.

### Lipids:

25. Identify lipids as molecules that are hydrophobic or at least partially hydrophobic.
26. List three types of lipids (triglycerides, phospholipids, and steroids).
27. Compare the structure of triglycerides, phospholipids, and steroids.
28. Compare the function of triglycerides, phospholipids and the steroid cholesterol, including the role of cholesterol as a precursor to other steroids.

## H. DNA, RNA, and Protein Synthesis

1. Define the term *DNA replication* and state where in the cell DNA replication occurs.
2. Describe how DNA is replicated using complementary base pairing. (Note: You do NOT need to know the enzymes involved in DNA replication.)
3. Define and describe the relationship between genes, DNA, and chromosomes.
4. Define the term *mutation*. Understand that mutations to a gene (piece of DNA) can change the structure and function of the protein that the gene codes for.
5. Define the terms *transcription* and *translation* and state where in the cell transcription and translation occur.
6. Describe the processes of transcription and translation in the making of proteins. (Note: You do NOT need to know the enzymes involved in transcription and translation).
7. *Briefly* describe the role of mRNA, tRNA, and rRNA in translation.

## I. Structure and Function of Cells

1. State the three tenets of the cell theory.
2. Describe the basic structure of eukaryotic cells: plasma membrane, nucleus, and cytoplasm.
3. Describe the location of intracellular and extracellular fluids and the relationship between the two.
4. Describe the structure and function of the cytoskeleton of the cell. (Note: You do NOT need to differentiate between microtubules, microfilaments, and intermediate filaments.)
5. Describe the structure and function of ribosomes, the rough endoplasmic reticulum (RER), and the Golgi apparatus (also called Golgi body or Golgi complex).
6. Describe how ribosomes, the rough endoplasmic reticulum and the Golgi apparatus work together in protein synthesis and packaging.
7. Describe the structure and function of the smooth endoplasmic reticulum (SER).
8. Describe the structure and function of lysosomes.
9. Describe the structure of the mitochondrion and its role in energy capture in the cell.
10. Describe the structure and function of the nucleus.
11. Describe the structure and function of cilia and flagella.

## J. The Plasma Membrane

1. Describe the structure of the plasma membrane (phospholipid bilayer, cholesterol, proteins, and carbohydrates) and its overall functions.
2. Identify the function of each following parts of the plasma membrane: phospholipid bilayer, cholesterol, proteins, and carbohydrates.
3. Explain how protein receptors in the plasma membrane allow cells to communicate with each other.



4. Explain how the size, electric charge, and lipid solubility of molecules affects their movement across the plasma membrane.
5. Compare how substances are moved into and out of the cell by each of the following: simple diffusion, osmosis, facilitated diffusion, active transport/solute pumping, endocytosis, and exocytosis.
6. Identify the energy needs of simple diffusion, osmosis, facilitated diffusion, active transport/solute pumping, endocytosis, and exocytosis.
7. Define each of the following terms: *isotonic solution*, *hypotonic solution*, and *hypertonic solution*.
8. Describe the effects on cell volume when cells are exposed to isotonic, hypotonic, and hypertonic solutions.
9. Determine whether a cell's environment is hypotonic, hypertonic, or isotonic with respect to the cell when given the concentration of solutes in the environment and in the cell.
10. Determine which way water will move by osmosis and whether the cell will shrink, stay the same shape, or swell, when given the concentration of solutes in the cell and in the environment.

#### **K. Energy and Cells**

1. Explain the role of ATP (adenosine triphosphate) and ADP (adenosine diphosphate) in energy transfer.
2. Define each of the following terms: *cellular respiration*, *glycolysis*, *citric acid cycle* (also called *Krebs cycle* or *tricarboxylic acid cycle*), *oxidative phosphorylation*, and *electron transport chain*.
3. Recognize that breaking the bonds in glucose and other food molecules releases the energy used to make ATP during cellular respiration.
4. Name the location in the cell where glycolysis occurs.
5. Describe the purpose of glycolysis and its benefit to cells.
6. Identify the reactants and products of glycolysis.
7. Name the location in the cell where the citric acid cycle occurs.
8. Identify the products of the citric acid cycle.
9. Name the location in the cell where oxidative phosphorylation occurs, including the specific structure (electron transport chain).
10. Identify the products of oxidative phosphorylation.
11. Describe the role of oxygen in oxidative phosphorylation.
12. Compare and contrast the relative amount of ATP production in glycolysis, the citric acid cycle, and oxidative phosphorylation.
13. Recognize that lactic acid fermentation (not the citric acid cycle) occurs after glycolysis whenever oxygen is not present in the cell's environment.

[Note: You do NOT need to know the intermediate steps of glycolysis, the citric acid cycle, or oxidative phosphorylation.]

## L. Mitosis and Meiosis

1. Define the term *mitosis*.
2. Describe the outcome of mitosis in terms of the number of daughter cells that result after the parent cell divides and in terms of the number of chromosomes in each of the resulting daughter cells. (Note: You do NOT need to know each of the phases of mitosis.)
3. Compare when mitosis occurs (during growth and repair) and when meiosis occurs (during gamete production).
4. State the function of mitosis and distinguish it from cell division.
5. Define the term *meiosis*.
6. Define the terms *crossing over* and *independent assortment*.
7. Identify crossing over and independent assortment as two processes that contribute to genetic variation.
8. Describe the outcome of meiosis in terms of the number of daughter cells that result and in terms of the number of chromosomes in each of the resulting daughter cells. (Note: You do NOT need to know each of the phases of meiosis.)
9. Define the term *gamete* and explain why meiosis is necessary to maintain proper chromosome number after fertilization.

## M. Body Systems

1. Describe the overall functions of the circulatory, digestive, nervous, endocrine, reproductive, integumentary, skeletal, respiratory, muscular, urinary, and immune systems.

## N. Reading Skills

1. Read a short science article that relates in some fashion to the objectives above. After reading the article, answer a series of questions concerning the information covered in the article.

## O. Study Skills

1. Identify the different learning styles.
2. Determine which learning style(s) is most effective for you when learning biology topics.
3. Determine which text-reading techniques correspond to your learning style when reading biology textbooks.
4. Determine the test-studying techniques that correspond to your learning style when studying biology topics.
5. Describe techniques to reduce test anxiety.
6. Describe time management techniques for studying and test-taking when studying biology topics.
7. Avoid self-deception when evaluating how prepared you are for upcoming exams.
8. Be able to write a useful lecture notes during a science lecture class.

[Note: Objectives O1 through O6 are NOT Human Anatomy or Human Physiology Assessment Test Objectives.]

**P. Critical Thinking Skills**

1. Describe Bloom's Taxonomy.
2. Identify where a given problem or activity is situated on Bloom's taxonomy.
3. Demonstrate proficiency in answering problems at the analysis, synthesis and evaluation levels of Bloom's taxonomy.

[Note: Objectives P1 through P3 are NOT Human Anatomy or Human Physiology Assessment Test Objectives.]

**Q. Math Skills**

1. Be able to use dimensional analysis to solve a unit conversion problem.
2. Be able to calculate a percent.
3. Be able to solve for one variable in a linear equation.
4. Be able to create bar, line, and pie graphs when given a set of data.
5. Be able to interpret a bar, line, or pie graph.
6. Be able to calculate a ratio.
7. Be able to describe the relationship between two variables in an equation.

[Note: Objectives Q1 through Q3 are NOT Human Anatomy or Human Physiology Assessment Test Objectives.]