BIO 1570 Microbiology of Health and Disease
BIO 2630 Human Anatomy and Physiology I

In order to enroll in **BIO 1570 (Microbiology of Health and Disease)** or **BIO 2630 (Human Anatomy and Physiology I)**, you must have:

- earned a C or higher in BIO 1511 or BIO 1530 (or equivalent college transfer course) within the past 5 years.

OR

- earned 70% on the Biology Proficiency Test

The Biology Proficiency Test is a 60 question, multiple-choice test. We recommend that you spend time reviewing the material before taking the test. (See topics on the back) You are allowed to retake the test one time. If you do not earn 70% on your second attempt, you must enroll in BIO 1511 or BIO 1530 (see a counselor before enrolling in BIO 1530).

Students are exempt if they meet any one of the following conditions:

- If you earned a C or higher in BIO 1570 and want to enroll in BIO 2630 or earned a C in BIO 2630 and want to enroll in BIO 1570 (obtain a signed "Prerequisite Exemption" form from the department chair)
- If you are retaking BIO 1570/BIO 2630 and received a C or higher the first time (obtain a signed "Prerequisite Exemption" form from the department chair)
- If you received a 3 or higher on the AP Biology exam (submit test results to a counselor)
- If you have achieved a passing CLEP score on the SUBJECT exam in General Biology (submit test results to a counselor)
- If you have earned a bachelor's degree or higher from a US institution or equivalent (see a counselor)
- If you have been admitted under a guest application from another college (high school guest students are not eligible)

How to prepare for the test:

The test evaluates your knowledge of high school biology and chemistry as well as your reading and problem solving skills. Below is a list of test topics and a sample test. It is strongly recommended that you review the corresponding chapters in biology textbooks placed on reserve at each OCC library along with books such as 'Get Ready for Anatomy' and 'Get Ready for Microbiology'.

Be prepared to define or briefly describe the following concepts and solve problems involving them:

1. Foundational
    a) Scientific method and cell theory
    b) Basics of microscopy
    c) Metric system conversions
2. Basic Chemistry
    a) Atoms, isotopes, ions, molecules
    b) Types of chemical bonds
    c) Water and pH
3. Chemistry of Living Systems
    a) Biosynthetic vs degradative reactions
    b) Functional groups, monomers vs. polymers
    c) Structure and functions of carbohydrates, lipids, proteins, and nucleic acids
    d) Enzymes-chemical nature, function, allosteric regulation
    e) Roles of ATP
4. Cells
    a) Organelles and organelle systems
    b) Membrane structure and basic functions
    c) Active vs. passive transport
    d) Osmosis and its consequences
5. Cellular Metabolism
    a) Key pathways in cell metabolism (Glycolysis, Krebs cycle, Electron transport chain)
        i. Locations
        ii. Input/output
        iii. Oxygen requirements
6. Molecular Genetics
    a) Synthesis of DNA, RNA, and proteins
    b) Mutations
    c) Horizontal gene transfer
    d) Mitosis and meiosis

OCC BIOLOGY PROFICIENCY PRACTICE TEST

1. Thirty-seven micrometers equals:

a) 3.7 x 10-3 mm b) 0.037 mm c) 0.37 mm d) 3.7 mm

2. A hypothesis can be defined as

a) a belief based on knowledge
b) knowledge based on belief
c) a scientific explanation that is subject to testing
d) a theory that has been thoroughly tested

3. The _____ charge of a proton in an atom is exactly balanced by the _____ charge of a(n) _____.

a) negative, positive, electron
b) positive, neutral, neutron
c) positive, negative, electron
d) neutral, negative, electron
e) negative, neutral, electron

4. A solution with a pH of 6 _____ than a solution with a pH of 9.

a) has 3 times more H+
b) is less concentrated
c) has 3 times less H+
d) has 1,000 times more H+
e) has 1,000 times more OH-

5. The monomer unit of polysaccharides such as starch and cellulose is

a) glucose b) ribose c) steroid d) fatty acid e)amino acid

6. RNA plays an important role in what biological process?

a) replication
b) lipid metabolism
c) translation
d) transcription
e) water transport

7. Proteins can function as

a) enzymes b) receptors c) antibodies d) **a, b** and **c**

8. What is embedded in rough endoplasmic reticulum?

a) lysosomes b) chromatin c) vesicles d) ribosomes e) Golgi apparatus

9. When cells with intact cell walls are placed in a hypertonic solution they will

a) plasmolyze b) burst c) remain unchanged d) swell e) replicate

10. Which of the following is not required for glycolysis?

a) ATP
b) NAD+(oxidative coenzyme)
c) enzymes
d) oxygen
e) all of the above are required

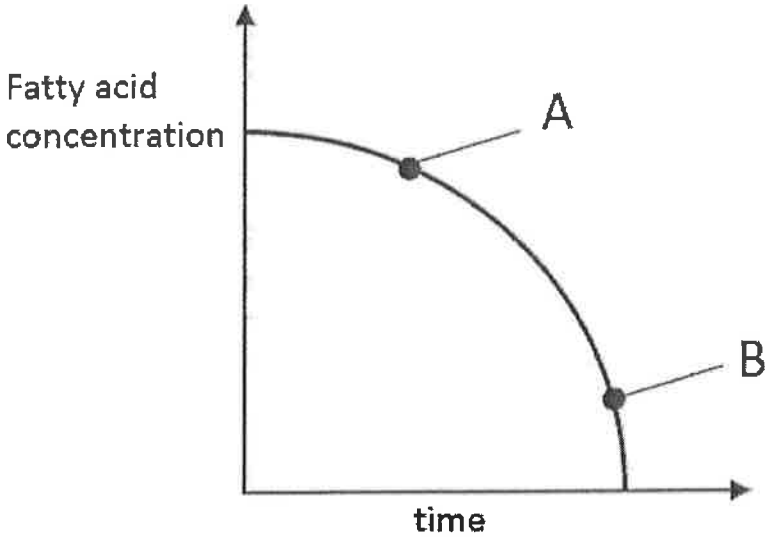
11. When a part of a gene with the sequence TAGACGA serves as the template to make RNA, the corresponding RNA sequence will be

a) ATCTGCT b) UAGACGA C) AUCUGCU d) CGAGUAG

12. The products of mitosis are

a) one nucleus containing twice as much DNA as the parent nucleus
b) four nuclei containing half as much DNA as the parent nucleus
c) four genetically identical nuclei
d) two genetically identical nuclei

13. A biosynthetic enzyme **E** makes a diglyceride from two fatty acids and glycerol. An experiment was performed in which the fatty acids were incubated with glycerol and enzyme **E** for different time periods and the concentration of fatty acids in the reaction tube was determined at the end of each incubation period. The results collected are shown in the graph below.



A

Which statement best describes point A and point B on the graph?

a) the concentration of diglyceride is greater at point A than it is at point B
b) the concentration of fatty acids is greater at point B than it is at point A
c) the diglyceride concentration is greater at point B than it is at point A
d) the fatty acid concentration is not affected by the length of incubation
e) both **a** and **b** are correct

14. A eukaryotic protein P has 120 amino acids. The mRNA coding for P contains approximately _____ codons.

a) 40 b) 120 c) 360 d) 1,200

Answers: 1. b; 2. c; 3. c; 4. d; 5. a; 6. c; 7. d; 8. d; 9. a; 10. d; 11. c; 12. d; 13. c; 14. b

Biology Proficiency Test: Study Guide Outline

It is recommended that you use the book, Get Ready for Biology by Lori K. Garrett. It is very useful for many of the topics on the test. The Internet is a great resource for topics not covered in the book. Some of the topics below have recommendations for helpful YouTube videos.

Here is a list of the concepts you should have knowledge about before you take the test:

- **Atomic and Subatomic Particles:** Electrons, protons and neutrons; know the charge and the location of each one.
- **Acid and Base Chemistry / pH Scale:** An excess of H+ is acidic (pH<7) and an excess of OH- is basic pH >7. Water has a pH =7. Know that a pH of 9 is 100x more basic (less acidic) that a pH of 7. Each increment has a value of 10. (Youtube: Bozeman Science – acids, bases, and pH)
- **DNA/RNA Structures / Codons to Protein:** Know that there is one codon for each amino acid in the chain of a protein. (Youtube: Bozeman Science – DNA and RNA Part 1 & 2)
- **Transcription and Translation:** DNA transcribes to mRNA in the nucleus and with the help of tRNA on a ribosome translates to a protein. (Youtube: Bozeman Science – Transcription and Translation)
- **Tonicity of Solutions:** Water will diffuse to wherever the solution is more concentrated leaving the cell to shrink or lyse. (Youtube: Ricochet Science – Osmosis and Tonicity)
- **Cell Respiration:** Takes place in the mitochondria by which glucose goes through 1) glycolysis, 2) the Kreb's cycle and 3) the Electron Transport Chain. This process produces energy in the form of ATP vs. photosynthesis in the chloroplast of a plant to produce carbohydrates and oxygen gas. (Youtube: Fuse School Chemistry - Photosynthesis and respiration)
- **Enzyme / Substrate Interactions:** Know the shape of the substrate has to match the active site on the enzyme. (Youtube: Bozeman Science - Enzymes)
- **Anabolic versus Catabolic Processes:** Anabolic processes make a substance; catabolic processes break compounds down.
- **Plant vs. Animal Organelles**
- **Types of Diffusion:** Passive and facilitated require no energy. Active transport requires ATP.
- **Macromolecules:** Proteins made of amino acids, carbohydrates made of glucose units and lipids made of a glycerol and 3 fatty acids
- **Microscope Parts and Magnification:** The objective lens needs to be multiplied by 10 due to a lens in the ocular of the microscope to calculate magnification.
- **Mitosis for Growth and Repair: Mitosis** has one round of prophase, metaphase, anaphase, telophase and cytokinesis. **Meiosis** has two rounds and leads to an egg and sperm.
- **Chromosome Number for a Human:** 46 chromosomes in 23 pairs: one of each pair from the mother and one from the father.
- **Be able to calculate metric conversions:** For examples converting microliters to milliliters (or grams or meters). There are 1000 microliters in a milliliter.
- **Interpreting graphs.**