

# ASSESSMENT CENTER

## BIOLOGY PLACEMENT EXAM

The Biology Placement Exams are administered up to 1 hour before closing. The exam is administered by the Assessment Center: Main Campus SSC- 204 (505) 224-3244; Montoya Campus TW – 201 (505) 224-5761 and Westside Campus WS2-113 (505) 224-5382.

**This exam is intended for students with significant prior experience in chemistry and biology.**

Passing the exam will allow a student to enroll in Biology 22107/2292L and/or Biology 2110/2192L without taking the Biology 1410/1492L and Chemistry 1410/1492L prerequisites. A grade of “B” or better in high school biology and chemistry within the last three years or significant background experience in these two areas is the suggested minimum preparation.

The exam will consist of 50 questions in a multiple choice and true/false format covering introductory chemistry and biology. Each question is worth two points for a total possible 100 points.

**NO COMPUTER SKILLS NEEDED** – The biology exam is administered on a personal computer. You do not need prior experience with computers. You can skip questions, go back, and change or review your answers.

### **TESTING RULES**

- A valid picture ID (driver’s license, etc.) will be required to take the exam.
- No calculators, books, notes, or scratch paper will be allowed while taking the exam.
- No breaks will be allowed while taking the exam.

**HOW LONG IT TAKES** - There is a time limit of one hour to complete the exam.

### **TEST RESULTS -**

A score of **64 points or better** on the exam will allow a student to enroll in Biology 2210/2292L and/or Biology 2110/2192L without the required biology and chemistry prerequisites. Students who successfully pass the placement exam will need to see an advisor to be eligible to register. Exam scores are valid for one year after the testing date.

A score of less than 64 will require that a student successfully complete the Biology 1410/1492L and Chemistry 1410/1492L prerequisites before enrolling in Biology 2210/2292L and Biology 2110/2192L

**RETESTING** - A student may attempt the placement exam only twice, (Form A once, Form B once) ever. Students choosing to retest are required to wait twenty four hours. Attempting to circumvent these rules will result in a violation of CNM’s Code of Conduct Policy and disciplinary proceedings.

# PREPARING FOR THE EXAM

The following is an outline of the topics covered on the CNM biology placement exam, followed by sample questions. College level introductory biology and chemistry textbooks should cover all of these topics in detail.

## Chemistry for Biology

- Review the metric units for length, volume, mass and temperature
- Be able to convert units within the metric system
- Review significant figures and scientific notation
- Be familiar with the process of balancing chemical equations
- Be able to differentiate between chemical and physical properties
- Be able to determine the amount of a substance needed to make a molar solution
- Be able to determine the density of an object.
- Understand the difference between oxidation and reduction
- Review the organization of the periodic table of elements
- Describe the arrangement of protons, neutrons, and electrons in an atom
- Distinguish between atomic mass and atomic number
- Review the properties of ions and isotopes
- Describe covalent, ionic and hydrogen bonds.
- Review the properties of water
- Compare hydrophobic and hydrophilic molecules
- Review the pH scale and properties of acids and bases
- Be able to identify the solvent and solute molecules in a solution.

## Biological Macromolecules

- Review the properties of an organic molecule
- Describe a dehydration synthesis reaction and a hydrolysis reaction
- Review the structural diagrams of the following functional groups: amino, hydroxyl, carboxyl, aldehyde, phosphate
- Be able to describe the properties of the four groups of macromolecules and give examples of each
- Review the first and second laws of thermodynamics and how living systems conform to these laws

## Cell Structure and Function

- Review the concepts of evolution and natural selection
- Describe the steps involved in using the scientific method
- Identify the three domains of life and characteristics of organisms found in each group
- Compare energy flow and material cycling through ecosystems
- Differentiate between living and nonliving entities
- Compare prokaryotic and eukaryotic cells.
- Review the structure and function of the following cell components: cell wall, plasma membrane, ribosomes, cytoskeleton, nucleus, chromosomes, nucleoli, golgi apparatus, smooth and rough ER, lysosomes, mitochondria, chloroplasts, vacuoles, cilia, and flagella
- Review the parts of a compound light microscope
- Differentiate between a transmission electron microscope and a scanning electron microscope

### Enzymes and Membranes

- Review the general structure and function of enzymes
- Be able to describe temperature and pH affects on enzyme activity
- Be able to identify the substrate, enzyme and products of a reaction
- Describe the structure of a cell membrane
- Review membrane transport mechanisms, including diffusion, facilitated diffusion, osmosis, and active transport
- Be able to describe the tonicity of solutions, and predict which way water will move under different osmotic conditions
- Be able to explain exocytosis and the different types of endocytosis

### Metabolism

- Review the role of ATP and NADH in cell metabolism
- Be able to write the overall reaction for aerobic respiration.
- Review glycolysis, Krebs cycle, and electron transport system
- Be able to describe the role of  $H^+$  and  $e^-$  and ATP synthase in chemiosmosis
- Review the final electron acceptors for aerobic and anaerobic respiration
- Review the overall reactions of alcoholic and acid fermentation

### Mitosis and Meiosis

- Distinguish between mitosis, meiosis and cytokinesis.
- Summarize the events that occur during interphase, prophase, metaphase, anaphase & telophase.
- Describe the role of these structures in cell division: mitotic spindle fibers, sister chromatids, centromere, centrosomes.
- Be able to distinguish between a monad, a dyad, and a tetrad; chromatin and chromosome; diploid and haploid
- Review the role of homologous chromosomes in mitosis and meiosis
- Be able to describe synapsis and crossing over

### Patterns of Inheritance

- Review the following terms: gene, allele, genotype, phenotype, homozygous, heterozygous, dominant, recessive, autosomes, sex chromosomes, incomplete dominance, and carrier
- Be able to work these types of crosses: monohybrid, dihybrid, incomplete dominance, and sex-linked
- Review the inheritance of human blood types, hemophilia, cystic fibrosis, Down syndrome, and sickle-cell anemia

### DNA Replication and Protein Synthesis

- Review the process of DNA replication, including the enzymes involved in the process.
- Review the processes of transcription and translation
- Identify the three types of RNA and give their functions
- Be able to describe RNA processing
- Review the function of the codon and anticodon
- Review the different causes of mutations and the effect that they have on transcription and translation.

# Sample Questions:

1. What happens when a red blood cell is placed in a hypertonic solution?
  - a. it will lose water
  - b. it will gain water
  - c. it will lyse
  - d. the pH of the cell will increase
  - e. both b and d
2. Which of the following on a microscope magnify the specimen?
  - a. ocular
  - b. objective
  - c. condenser
  - d. fine focus
  - e. both a and b
3. 15 km is equal to how many cm?
  - a. 150
  - b.  $1.5 \times 10^{-6}$
  - c.  $1.5 \times 10^{-5}$
  - d.  $1.5 \times 10^6$
  - e.  $1.5 \times 10^5$
4. Unequal sharing of electrons between atoms results in:
  - a. ion formation
  - b. hydrogen bonds
  - c. nonpolar covalent bonds
  - d. polar covalent bonds
  - e. both a and b
5. Proteins are composed of:
  - a. monosaccharides
  - b. amino acids
  - c. nucleic acids
  - e. glycerol
6. Which part of the cell is responsible for protein synthesis?
  - a. cell membrane
  - b. mitochondria
  - c. lysosome
  - d. microtubules
  - e. ribosomes
7. A competitive inhibitor binds:
  - a. in the active site of an enzyme
  - b. to the nitrogenous bases of DNA
  - c. to the phospholipids of the cell membrane
  - d. to the initial monosaccharide of cellulose
  - e. all of the above
8. Where does glycolysis occur?
  - a. in the cytoplasm
  - b. in the chloroplast
  - c. in the nucleus
  - d. in the mitochondria
  - e. in the endoplasmic reticulum
9. Dyads separate into monads during which phase of mitosis?
  - a. telophase
  - b. interphase
  - c. prophase
  - d. metaphase
  - e. anaphase
10. Genetic information on the DNA molecule is transferred to RNA during a process termed:
  - a. replication
  - b. transformation
  - c. respiration
  - d. translation
  - e. transcription
11. Which of the following is a compound?
  - a. Lead
  - b. Gold
  - c. Potassium
  - d. Water
  - e. Sodium

ANSWERS KEY :

1. C
2. E
3. D
4. D
5. B
6. E
7. A
8. A
9. E
10. E
11. D