

**Rhode Island College and TIMES<sup>2</sup> ACADEMY**

**Early Enrollment Program**

**Syllabus:** Biology 111: Introduction to Biology (4credits)

**Instructor:** Mark Fontaine, Ed.D

Fall 2017

**Course Description:**

This is an introductory biology course with an emphasis on the molecular and cellular nature of all living systems.

**Required Text:** Campbell Biology 10<sup>th</sup> Edition by Reece, Urry, Cain, et al: Pearson publishing

**Course Requirements:** Course topics include basic chemistry, biochemistry, genetics, DNA technology, evolution, taxonomy, virology, and bacteriology. Laboratory exercises are designed to expose students to key topics and show real world applications of those concepts. Furthermore, Labs will mirror those offered at RIC, as much as possible.

The course is delivered as a combination of lectures, labs, independent work, and collaborative projects. Students are expected to read and take notes on chapters prior to the beginning of the unit. Students will be prompt, responsible, and respectful regarding class time and each other. Assignments not turned in on time will receive no credit. Assignments assigned when a student is legitimately absent will be due within 5 days of the student's return. Extended absences will be handled on an individual basis.

**Grading Policy:**

1. Each assignment is given a point value based on the amount of student effort needed to complete the task. For example:
  - a. short in-class assignments where students can use their notes are worth 5 points
  - b. homework assignments are worth 5-15 points
  - c. labs are worth 15-20 points
  - d. tests are worth 100 points
2. The point value of each assignment will be announced when the assignment is given.
3. If a student is absent, he or she will have 5 school days to make up any missed work. It is the student's responsibility to inquire about what was missed.
4. The student's average will be calculated as a percentage of the total points possible.
5. The Three Exams will each count as 25% of the course grade.

## **UNIT ONE: INTRODUCTORY UNIT**

1. Discussion of the nature of college coursework
2. Characteristics of life
3. Scientific method
4. Metric system of measurement

## **UNIT TWO: CHEMISTRY/BIOCHEMISTRY**

1. Atomic structure/periodic table
2. Isotopes
3. Bonding
4. Acids and bases
5. Importance of water
6. Proteins / enzymes
7. Carbohydrates
8. Lipids
9. Nucleic Acids
10. ATP

## **UNIT THREE: THE CELL**

1. Prokaryotic vs. eukaryotic cells
2. Plant, animal and fungal eukaryotic cells
3. The cell theory
5. Parts of the eukaryotic cell
6. Structure and functions of the cell membrane
7. Osmosis and diffusion
8. Cell walls

## **UNIT FOUR: PHOTOSYNTHESIS AND RESPIRATION**

1. The overall general equation for photosynthesis
2. Oxidation and reduction
3. The light-dependent reactions of photosynthesis and chemiosmotic production of ATP
4. The light-independent reactions of photosynthesis
5. The effect of environmental factors on the rate of photosynthesis
6. Photorespiration
7. The C-4 pathway
8. CAM plants
9. Absorption and action spectra
10. The overall general equation for cellular respiration
11. The importance of ATP
12. Anaerobic respiration - glycolysis and fermentation
13. The Krebs cycle
14. Oxidative phosphorylation and chemiosmotic production of ATP

15. Regulation of the rate of respiration

## **UNIT FIVE: GENETICS**

1. Protein synthesis
2. Enzyme operation
3. Mitosis and cytokinesis
4. DNA replication
5. Sexual reproduction
6. Meiosis
7. Genetics basic vocabulary, Mendelian concepts
8. Monohybrid and dihybrid crosses
9. Linkage
10. X-linkage
11. Pleiotrophy, polygenic inheritance, epistasis, sex-influenced traits
12. Environmental factors

## **UNIT SIX: GENETIC DISORDERS**

1. Errors during DNA replication
2. Errors due to cross-over mistakes
3. Errors due to nondisjunction
4. Polyploidy

## **UNIT SEVEN: MODERN DNA TECHNOLOGY**

1. Recombinant DNA
2. Polymerase Chain Reaction (PCR)
3. Electrophoresis
4. Restriction Fragment Length Polymorphism (RFLP)
5. Human Genome Project
6. Genetic Engineering

## **UNIT EIGHT: EVOLUTION/ TAXONOMY**

1. Lamarck's theory of evolution.
2. Darwin's theory of evolution
3. Evidence for evolution
4. Population genetics - the Hardy-Weinberg equations
5. Causes of microevolutionary change
6. Speciation
7. Taxonomy and classification
8. The origin of life
9. Evolution can explain how not why

## **UNIT NINE: VIRUSES**

1. Description of the structure of various types of viruses
2. Discussion of why viruses are not considered alive

3. The lytic and lysogenic cycles
4. Transduction
5. Oncoviruses

## **UNIT TEN: PROKARYOTIC CELLS**

1. Structure of prokaryotic cells
2. Asexual reproduction of prokaryotic cells (binary fission)
3. Classification of prokaryotes
4. Difference between archaea and bacteria
5. Transformation (Experiments of Griffith and Avery)
6. Conjugation
7. Transduction
8. The operon theory of gene control

## **SEMESTER-LONG UNIT:**

1. Long-term scientific/engineering investigation (associated with participation in RISEF)
2. Current events and advances in Biology