

## General Biology Sequence TCSU BIOL SEQ A

### A. Description

Fundamental principles of biological systems, including microbes, plants and animals: structure and function of biological molecules; prokaryotic and eukaryotic cell structure; heredity and reproduction; physiology and metabolism, including respiration, photosynthesis and response to environment; development and structural organization of complex life forms; molecular biology and genetics; behavioral biology; community ecology and ecosystem interactions; population biology and evolution, including the diversity and relatedness of life on earth. The philosophy of science, scientific methods and experimental design are fundamental to the course.

### B. Recommended Preparation

None specified

### C. Prerequisites

None specified

### D. Minimum Unit Requirement

10 semester units – 6 units lecture, 4 units lab

### E. Course Topics

1. Atoms and molecules important for life
2. Protein structure and function
3. Nucleic acids and the RNA world
4. Carbohydrates
5. Lipids, membranes and the first cells
6. Cell structure – prokaryotic and eukaryotic
7. Cell-cell interactions
8. Cellular respiration and fermentation
9. Photosynthesis
10. The cell cycle and mitosis
11. Meiosis, gametogenesis
12. Mendel and the gene
13. DNA synthesis
14. How genes work, including transcription and translation
15. Regulation of prokaryotic and eukaryotic gene expression
16. Analyzing and engineering genes
17. Genomics
18. Fertilization and development, including pattern formation and cell differentiation
19. Plant form, function and reproduction
20. Plant nutrition, including water and sugar transport

21. Sensory systems in plants
22. Animal form, function and reproduction
23. Animal nutrition, including water and electrolyte balance, gas exchange and circulation, and electrical signals
24. Animal sensory systems and movement
25. Immune system of animals
26. Evolutionary processes, including evolution by natural selection and speciation
27. Phylogenies and the history of life
28. The diversity of life, including viruses, bacteria, archaea, protists, green plants, fungi, protostome and the history of life
29. Population and community ecology
30. Ecosystems and conservation biology
31. Behavior

## F. Student Learning Outcomes

Upon successful completion of the course, students will be able to:

1. Describe and distinguish various roles of major classes of biomolecules in living cells; illustrate key structural features and common reactions of these classes of biomolecules
2. Explain key structural and functional elements of biological membranes
3. Describe and differentiate prokaryotic and eukaryotic cell structure
4. Describe the basis of heredity in biological systems
5. Explain how DNA replicates and transmits genetic information within organisms and across generations
6. Describe the key features of plant and animal reproduction, including gametogenesis, fertilization, and cell and tissue differentiation; compare plant and animal reproductive strategies
7. Demonstrate knowledge of energy transformations and transfer within cells, including respiration, fermentation, and photosynthesis
8. Demonstrate knowledge of plant and animal physiology, including responses to the environment; compare plant and animal physiological systems
9. Describe the structural organization of complex life forms
10. Provide examples of and explain the functions of behaviors
11. Describe how organisms are organized into populations and communities, and how these communities interact in larger ecosystems
12. Explain how life changes over time leading to biodiversity (evolution)
13. Explain the relationships and diversity among major divisions of life on earth
14. Demonstrate an understanding of the scientific method, experimental design and the philosophy of science

## G. CAN Equivalent

CAN BIOL SEQ A (Equivalency ends Fall 2009)