



# Master Course Syllabus

Common Course Prefix and Number: BIOL 1406

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Prepared by:

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Brenham Campus / Date

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Bryan Campus / Date

Confirmed by:

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Division Chair, Brenham Campus / Date

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Division Chair, Bryan Campus / Date

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Brenham Academic Dean / Date

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Bryan Academic Dean / Date

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Vice President Academic Affairs / Date

## **BIOL 1406 General Biology I**

This course is in the core curriculum.

### **Purpose Statement**

The purpose of the natural science component in the core curriculum is to enable students to enable students to understand basic concepts in the natural sciences and to apply that understanding to the analysis of current issues in society. Specifically, Biology 1406 is an introductory biology course designed to provide students with an understanding of basic concepts in the life sciences with an emphasis on the cell as the basic unit of life and serves as a foundation for more advanced biology courses required by students majoring in biology or a related field.

### **Course Description**

Biology 1406- General Biology I

General Biology I is an introductory survey of contemporary biology that includes the chemical basis of life, structure and function of cells, energy transformation, and genetics. Prerequisite: Appropriate THEA test score or READ 0306 with a grade of "C" or better. Three class hours and three laboratory hours per week. Credit: four semester hours.

### **1. Expanded Course Description**

A. Major areas to be covered in lecture are:

- 1) Introduction to Biology
- 2) Scientific Problem-Solving
- 3) Characteristics of Life
- 4) Evolution – A unifying concept of biology
- 5) Atoms and Molecules
- 6) Biologically Important Organic Compounds
- 7) The Origin of Cells
- 8) Cell Structure
- 9) Biological Membranes
- 10) Cell to Cell Interaction
- 11) Energy and Metabolism
- 12) Cellular Respiration
- 13) Photosynthesis
- 14) Mitosis and Meiosis
- 15) Mendelian Genetics
- 16) DNA - the Carrier of Genetic Information
- 17) Transcription and Translation
- 18) Gene Regulation
- 19) Biotechnology

B. Major areas to be covered in laboratory are:

- 1) Scientific Method
- 2) Observations and Measurement
- 3) Acids and Bases
- 4) Organic Molecules
- 5) Introduction to the Microscope
- 6) Cells and their Structures

- 7) Osmosis and Diffusion
- 8) Enzymes
- 9) Cellular Respiration
- 10) Photosynthesis
- 11) Mitosis
- 12) Meiosis
- 13) Mendelian Genetics
- 14) Protein Expression
- 15) Molecular Genetics and Genetic Engineering

**2. Classroom Hours:** Three lecture hours and three laboratory hours per week.

**3. Credit Hours:** Four credit hours.

**4. Prerequisite:** None

**5. Core Course:** This is a Core Course in the 42-hour Core of Blinn College; more can be found at [www.blinn.edu/corecurriculum/](http://www.blinn.edu/corecurriculum/). As such, students will develop proficiency in the appropriate Intellectual Competencies, Exemplary Educational Objectives, and Perspectives as listed below.

**A. Intellectual Competencies**

- 1) **Reading:** The ability to analyze and interpret a variety of printed materials, books, documents and articles – above the 12<sup>th</sup> grade level.
- 2) **Writing:** The ability to produce clear, correct and coherent prose adapted to purpose, occasion and audience - above the 12<sup>th</sup> grade level.
- 3) **Listening:** The ability to analyze and interpret various forms of spoken communication, possess sufficient literacy skills of writing, reading – above 12<sup>th</sup> grade level.
- 4) **Critical Thinking:** The ability to think and analyze at a critical level.
- 5) **Computer Literacy:** The ability to understand our technological society; use computer-based technology in communications, solving problems, and acquisition of information.

**B. Exemplary Educational Objectives**

- 1) Understand and apply methods and appropriate technology in the study of the natural sciences.
- 2) Recognize scientific and quantitative methods and the differences between these approaches and other methods of inquiry in order to communicate findings and analyses.
- 3) Identify and recognize the differences among competing scientific theories.
- 4) Demonstrate knowledge of the major issues and problems facing modern science, including issues that touch upon ethics, values, and public policies.
- 5) Demonstrate knowledge of the interdependence of science and technology and their influence on, and contribution to, modern culture.

**C. Perspectives**

- 1) Recognize the importance of maintaining health and wellness.
- 2) Develop a capacity to use knowledge of how science and technology affect their lives.
- 3) Develop personal values for ethical behavior.
- 4) Use logical reasoning in problem solving.
- 5) To integrate knowledge and understand the interrelationships of the scholarly disciplines.

**Course Objectives and Student Learning Outcomes**

These learning outcomes and course objectives will include the student demonstrating competence in the following areas.

**Lecture Objectives:**

- 1) Differentiate between science and other fields of knowledge and learning.
- 2) Understand the underlying unity to the diversity of life.
- 3) Demonstrate knowledge of the role of natural selection in evolutionary change.
- 4) Explain the major molecular structures basic to life.
- 5) Display knowledge of the anatomy and physiology of cells.
- 6) Exhibit an understanding of the processes involved in cellular respiration and photosynthesis.
- 7) Differentiate among the processes and stages of cellular reproduction.
- 8) Demonstrate an understanding of the mechanisms of inheritance.
- 9) Elaborate on the role of DNA in cellular function and homeostasis.
- 10) Communicate an understanding of the regulation of gene expression.
- 11) Evaluate environmental and genetic interactions.
- 12) Communicate effectively an understanding of the role of genetic engineering and biotechnology in the areas of agriculture, medicine, and society as a whole.

**Laboratory Objectives:**

- 1) Demonstrate familiarity with the fundamentals of laboratory safety.
- 2) Display an understanding of problem solving in science.
- 3) Using laboratory equipment in a correct manner.
- 4) Relate biological concepts to laboratory activities.

**Course Requirements**

Upon completion of the course, the student will have an overall average of  $\geq 60\%$  of the combined lecture and laboratory components of the course. This includes at least 3 major lecture exams and a comprehensive final examination. The student will demonstrate an understanding of the laboratory exercises through analysis of the data and the ability to use the data to solve problems. Laboratory examinations will be designed to address both knowledge and skills.

**Grading System**

The following areas will be clearly outlined by the instructor in the Course Information Sheet given to the students.

1. Major Exams: At least three major exams covering the lecture material, evenly distributed throughout the semester. Information from the laboratory experiments may be included on major exams.
2. Laboratory: At least two laboratory examinations covering the knowledge and skills acquired through laboratory activities.
3. Minor Exams/Quizzes/Homework: Given at the discretion of the instructor.
4. Additional Reports or Projects: Assigned at the discretion of the instructor.
5. Final Exam: Comprehensive exam covering the entire course.

## Outcomes Inventory

Biology 1406 will be evaluated through the following methods:

1. A pre-test and post-test instrument to determine the extent of student improvement during the semester.
2. Each Intellectual Competency listed above will be evaluated to measure its attainment:
  - A. **Reading:**
    - 1) Pre- and Post Test or Exam or quiz over assigned textbook readings or
    - 2) Lab assignment or exam or quiz over lab book readings or
    - 3) Exam or written assignment over assigned journal articles.
  - B. **Writing:**
    - 1) Written assignment or term paper or
    - 2) Essay question on exam.
  - C. **Listening:**
    - 1) Exam or quiz over lecture material OR
    - 2) Quiz over video viewed.
  - D. **Critical Thinking:**
    - 1) Lab assignment or exam involving problem solving.
  - E. **Computer Literacy:**
    - 1) Quiz over assignments using internet and/or other computer activities.

## Calendar

The instructor will ensure that the course content is covered in a manner that fulfills the course objectives. The instructor will also provide Course Information Sheets to the students and the administration. Important details including tentative examination dates and due dates for assignments are provided.

### Lecture Topic

1. Introduction to Biology
2. Atoms and Molecules
3. Organic Chemistry
4. Organization of the Cell
5. Cell Membranes and Cell to Cell Interaction
6. Energy and Metabolism
7. Cellular Respiration
8. Photosynthesis
9. Mitosis and Meiosis
10. Mendelian Genetics
11. DNA - The Carrier of Genetic Information
12. Transcription and Translation
13. Gene Regulation
14. Biotechnology

### **Laboratory Topic**

1. Laboratory Safety and Orientation, Scientific Method
2. Measuring Techniques and Observations
3. Acids and Bases
4. Organic Molecules and DNA Isolation
5. The Microscope, Cells and their Structures
6. Diffusion, Osmosis, and Dialysis
7. Enzymes
8. Fermentation and Respiration
9. Photosynthesis
10. Mitosis and Meiosis
11. Mendelian Genetics
12. Protein Synthesis
13. Molecular Genetics
14. Biotechnology

### **Materials:**

Required:

Lecture Materials:

*Biology*, 7<sup>th</sup> ed. 2005. Raven, Johnson, Losos & Singer, McGraw Hill Higher Education.

Laboratory Materials:

Brenham- Reflections In Biology, 3rd edition, Volume 1 – 1406, Greg Phillips and Eric Winkler: 2005, Pearson Publishing Co.

Brenham- Solenopsis Software CD - Biological Programs and Images.

Bryan – *Biology Laboratory Manual*, 8th, 2004, S. Mader. McGraw-Hill Co.

Recommended:

*Student Study Guide for Biology*, 7<sup>th</sup> ed., 2005. Raven, Johnson, Losos & Singer. McGraw-Hill Co.

## **Addendum for BIOL 1406 Internet Course**

### **Course Requirements**

1. The student should do each of the following:
  - a. Have access to a computer with a reliable internet connection
  - b. Access to an instructor approved proctored testing center.
  - c. Effectively use the computer software and tools for the online classroom including navigating the web using an Internet browser such as Netscape or Internet Explorer.
  - d. Download and upload files from the Internet and attach and save files associated with e-mail.
  - e. Read the assigned chapters in the textbook and laboratory manual.
  - f. Take notes on the assigned reading materials.
  - g. Complete assigned reading material and homework that may include online class discussions.
  - h. Complete and submit quizzes online.
  - i. Complete major exams on the assigned dates at an instructor approved proctored testing facility; exams may include essay questions.
  - j. View audiovisual materials and supplemental Internet resources on selected topics as directed.
  - k. Participate in optional online tutorial sessions.
  
2. For laboratory the student should:
  - a. Read and comprehend exercises assigned from the laboratory manual or from files available in the online classroom.
  - b. Successfully complete pre-lab assignments and quizzes for each laboratory module and submit by the assigned date using the tools of the online classroom.
  - c. Attend scheduled Saturday labs.
  - d. Understand the theory behind each experiment or demonstration performed.
  - e. Successfully complete post-lab assignments and quizzes for each laboratory module and submit by the assigned date using the tools of the online classroom
  - f. Complete laboratory practicals (exams) as scheduled.

### **Materials:**

Required:

Lecture:

*Biology*, 6<sup>th</sup> ed., 2001. P.H. Raven and G.B. Johnson, McGraw Hill Higher Education.

Laboratory Materials:

*Biology in the Laboratory*, 3<sup>rd</sup> Edition, Customized for Blinn College, D.R. Helms, C.W. Helms, R.J. Kosinski, and J.R. Cummings, W.H. Freeman and Company.