Course Syllabus
General Biology I (BIO-101)

Semester and year: 
Course Number: 
Meeting Times and Locations: 

Instructor: 
Office Location: 
Phone: 
Office Hours: 
Email Address: 

Course Title: General Biology I (BIO -101)

Prerequisites: None

Course Credits/Hours: 4 credits / 3 hr lectures, 3 hr labs

General Education Course: Yes

Course Description: BIO-101 General Biology I is the first course in a two semester sequence in general biology. It is designed to explain the fundamental principles of biology and to promote an awareness of their significance to society. Lecture topics include: introduction to biology, review of basic chemistry, cell biology, genetics, and a survey of kingdoms Monera, Protista, and Fungi. Laboratory exercises develop proficiency in the use of laboratory equipment and guide students in investigations of cell biology, genetics, and microbiology.


Supplementary Materials: 

Student Learning Objectives and Student Assessment—“The student will be able to”:

1. Describe the nature of science as it specifically applies to the discipline of biology. Students will be evaluated by lecture and laboratory examinations.

2. Explain the process of evolution and research the impact that Charles Darwin and other evolutionists had on the explanation of the process. Students will be evaluated by lecture examinations.

3. Investigate the knowledge of the chemical basis of living organisms and how chemistry defines a large part of the study of biology. Students will be evaluated by lecture examinations.
4. Examine the characteristics of water, the medium on which all life on earth depends. Students will be evaluated by lecture examinations.

5. Analyze the nature of organic biocompounds (carbohydrates, proteins etc…) and their importance as building blocks of living systems. Students will be evaluated by lecture examinations.

6. Identify the chemical and physical structure and diversity of living organisms and research how they interact with the environment. Students will be evaluated by lecture examinations.

7. Identify the characteristics of living organisms. Students will be evaluated by lecture examinations and student projects.

8. Explain the composition and function of biological membranes. Students will be evaluated by lecture and laboratory examinations.

9. Define passive transport – diffusion, osmosis, and facilitated diffusion and relate the changing conditions inside and outside of cells to these definitions. Students will be evaluated by lecture and laboratory examinations.

10. Define active transport and relate the changing conditions inside and outside of cells to the need for AT. Students will be evaluated by lecture examinations.

11. Examine the nature of free energy and the application of free energy to living systems, mainly in the metabolism of cells. Students will be evaluated by lecture examinations.

12. Explain and describe the nature of enzymes and their critical importance to living systems. Students will be evaluated by lecture and laboratory examinations.

13. Assess the cell’s metabolic pathways and their energetic products in both phototrophic and chemotrophic organisms. Students will be evaluated by lecture examinations.

14. Explain the need for cellular reproduction and the different types carried out by selected organisms. Students will be evaluated by lecture and laboratory examinations.

15. Examine the nature of informational molecules (DNA and RNA) and the expression of this information through the process of gene expression. Students will be evaluated by lecture examinations.

16. Compare Mendelian and non-mendelian inheritance and describe the way living organisms pass characteristics from one generation to the next. Students will be evaluated by lecture examinations and student papers.

17. Investigate the importance of the light microscope to the practice of biology. Students will be evaluated in the laboratory regarding the proper use of the microscope during a laboratory practical. Students’ laboratory participation may also be evaluated in the form of a student laboratory project.

18. Model proper use of the microscope to examine the difference between selected prokaryotic and eukaryotic organisms. Students will be evaluated by laboratory observation and laboratory exams.

19. Make a wet-mount of selected biological material and properly use the microscope to view the material. Students will be evaluated by laboratory observation and laboratory exams.

20. Show how to properly sample the local environment for the presence of microbial organisms by making an environmental plate. Students will be evaluated in the laboratory by demonstration of their technique and by the development of their plates.

21. Discover the importance of recording laboratory data in the form of a notebook or a laboratory report. Student notebooks or laboratory reports will be evaluated by their instructors as part of their final grade.

22. Construct two different types of graphs (histogram and Cartesian) and be able to survey each graph for general trends that appear upon the analysis of biological data. Students will be evaluated by lab examinations and or lab reports.

23. Work as a member of a laboratory group and model how to collect data or information as part of this group. Students will be evaluated during the laboratory period and the participation will be recorded as a component of
The evaluation may be in the form of a laboratory presentation in addition to the class participation.

The above student learning objectives will be generally assessed or evaluated by instructors using a variety of assessment instruments including lecture exams, laboratory exams, quizzes, laboratory reports, written reports, presentations, projects, etc. The decisions concerning the type or types and number of instruments that are used in a specific section of the course will be left to the instructor of that section. This information, when given by the instructor should be recorded by the student on page 7 of this document.

## Course Content

### Lecture Topics:

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<td>The Science of life.</td>
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<td>The Nature of Science.</td>
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<td>An Example of Scientific Inquiry: Darwin and Evolution.</td>
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<td>Unifying Themes in Biology</td>
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<td>The Nature of Atoms.</td>
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<td>Elements found in Living Systems.</td>
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<td>The Nature of Chemical Bonds.</td>
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<td>Properties of Water.</td>
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<td>Acids and Bases</td>
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<td>The Chemical Building Blocks of Life</td>
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<td>Carbon: The Frame work of Biological Molecules.</td>
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<td>Carbohydrates: Energy Storage and Structural Molecules.</td>
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<td>Nucleic Acids: Information Molecules.</td>
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<td>Proteins: Molecules with Diverse Structures and Functions</td>
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<td>The Endomembrane System</td>
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<td>Mitochondria and Chloroplasts: Cellular Generators</td>
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<td>The Cytoskeleton</td>
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<td>Extracellular Structures and Cell Movement</td>
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<td>Proteins: Multifunctional Components.</td>
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<td>Passive Transport Across Membranes.</td>
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<td>Active Transport Across Membranes.</td>
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<td>Bulk Transport by Endocytosis and Exocytosis</td>
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   The Laws of Thermodynamics and Free Energy
   ATP: The Energy Currency in Cells
   Enzymes Biological Catalysts.
   Metabolism: The Chemical Description of Cell Function
7 How Cells Harvest Energy
   Overview of Respiration.
   Glycolysis: Splitting of Glucose
   The Oxidation of Pyruvate to Produce Acetyl CoA
   The Krebs Cycle.
   The Electron Transport Chain and Chemiosmosis
   Energy Yield of Aerobic Respiration
   Regulation of Aerobic Respiration
   Oxidation Without O₂
   Catabolism of Proteins and Fats
8 Photosynthesis
   Overview of Photosynthesis
   The Discovery of Photosynthetic Processes
   Pigments.
   Photosystem Organization
   The Light Dependent reactions
   Carbon Fixation: The Calvin Cycle
   Photorespiration
10 How Cells Divide
    Bacterial Cell Division.
    Eukaryotic Chromosomes.
    Overview of the Eukaryotic Cell Cycle.
    Interphase: Preparation for Mitosis.
    Mitosis Chromosome Segregation.
    Cytokinesis: The Division of Cytoplasmic Contents.
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11 Sexual Reproduction and Meiosis
    Sexual Reproduction Requires Meiosis.
    Features of Meiosis
    The Process of Meiosis.
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12 Patterns of Inheritance
    The Mystery of Heredity.
    Monohybrid Crosses: The Principle of Segregation
    Dihybrid Crosses: The Principle of Independent Assortment
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    The Test Cross: Revealing Unknown Genotypes.
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14 DNA: The Genetic Material
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    DNA Structure
    Basic Characteristics of DNA Replication.
    Prokaryotic Replication.
    Eukaryotic Replication.
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15  Genes and How They Work  
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   The Genetic Code.  
   Prokaryotic and Eukaryotic Transcription.  
   Eukaryotic pre-mRNA Splicing.  
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   Mutation: Altered Genes  
   (RJ): p. 277

17  Biotechnology (Optional)  
   (RJ): p. 327

23  Systematics and the Phylogenetic Revolution  
   Systematics  
   Cladistics.  
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   (RJ): p. 456

26  The Tree of Life  
   Origins of Life  
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27  Viruses  
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   Bacteriophages: Bacterial Viruses.  
   Human Immunodeficiency Virus (HIV).  
   Other Viral Diseases  
   Prions and Viroids: Subviral Particles  
   (RJ): p. 528

28  Prokaryotes  
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   Prokaryotic Diversity.  
   Prokaryotic Cell Structure.  
   Prokaryotic Metabolism.  
   Human Bacterial Disease.  
   Beneficial Prokaryotes  
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29  Protists  
   Eukaryotic Origins and Endosymbiosis  
   Defining Protists.  
   The General Biology and Ecology of the Protists.  
   Protist Taxa  
   Protozoan Parasites and Diseases  
   (RJ): p. 567

31  Fungi  
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# Course Content

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<td>Protists, Plant Cells, and Animal Cells</td>
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8. **Energy Generating Pathways**
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14. **The Protozoa**
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<td>Lecture Examinations</td>
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<td>Laboratory Component</td>
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<td><strong>Total</strong></td>
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Addenda:

**Lecture Attendance:** As per instructor

**Lab Attendance:** As per instructor

**Policy Concerning Late Assignments:** As per instructor

**Policy Concerning Make-Up Testing:** As per instructor

**Smoking Policy:** As of January 1, 1992, Bergen Community College facilities are smoke free. Smoking is not allowed in any building on campus.

**Eating and Drinking:** Eating and drinking in classrooms, lecture halls, laboratories, or passageways is forbidden. Eating and drinking are permitted in the cafeteria and vending areas only.

**Faculty Absence:** If a class finds the instructor is absent, the class representative should report to the Office of the Divisional Dean (A325) or the Evening Office (L113) after ten minutes of the period has elapsed. The class should remain until the representative returns with instructions.

**Safety Information:** As per instructor and assigned exercise

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