Supporting Services- Tutoring Services available in Math & Science Tutorial Center, PH 132.

Attendance Policy: The University’s attendance policy will be followed in this course.

NOTE: Any student requiring alternative formats for testing and/or handouts for this course, or other types of accommodations, due to a handicapping condition, should advise the instructor within the first week of classes.

COURSE DESCRIPTION: This is Part I of a survey course in general biology. The topics covered in this course are: the scientific method, general chemistry, biological molecules, cell structure and function, photosynthesis, cellular respiration, mitosis, meiosis, genetics, and an overview of the taxonomy of the five biological kingdoms with special emphasis on kingdoms Monera and Protista.

COURSE OBJECTIVES: The following learning objectives will be addressed in this course. Each topic represents a broad study area in biology.

Objective 1. Demonstrate an understanding of the study of life (Chapt. 1)
Objective 2. Demonstrate an understanding of the molecules of cells (Chapt. 2)

Objective 3. Demonstrate an understanding of Cell Structure and Function (Chapt. 3), Membrane structure and function (Chapt. 4) and Cell Metabolism (Chapt. 6)
Objective 4. Demonstrate an understanding of Cellular respiration (Chapt. 7) and Photosynthesis (Chapt. 8)

Objective 5. Demonstrate an understanding of Cell Division (Chapt. 5)
Objective 6. Demonstrate an understanding of the Patterns of Gene inheritance (Chapt. 23) and the Chromosomal basis of Inheritance (Chapt. 24)

Objective 7. Demonstrate an understanding of DNA Structure and the Control of Gene Expression (Chapt. 25) and Biotechnology and Genomics (Chapt. 26)
Objective 8. Demonstrate an understanding of Microbiology (Chapt. 28) and Plants (Chapt. 29)


Objective 10. Review scientific literature and complete writing assignments

EVALUATION AND MINIMUM STANDARDS

Testing
During the semester four exams will be given that will evaluate the objectives of the course. The first exam will test objectives 1-2, the mid-term exam will test objectives 3-4, the third exam will test objectives 5-6 and final exam will test objectives 7-8.

Writing Exercise (s)
To achieve objective 10, (an) acceptable written report(s) must be prepared. The lecture instructor will evaluate the assignment(s).

**Tutorial Assistance**
If students do not perform satisfactorily on a test, they should seek help from their instructors or tutors in the Mathematics and Science Center (PH 132).

**Summary of Evaluation Procedure**

<table>
<thead>
<tr>
<th>Test</th>
<th>No. of Questions</th>
<th>Objectives</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>50</td>
<td>1-2</td>
<td>100</td>
</tr>
<tr>
<td>Mid-term</td>
<td>50</td>
<td>3-4</td>
<td>100</td>
</tr>
<tr>
<td>Test 3</td>
<td>50</td>
<td>5-6</td>
<td>100</td>
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<tr>
<td>Final</td>
<td>50</td>
<td>7-8</td>
<td>100</td>
</tr>
<tr>
<td>Critical thinking exercises</td>
<td>9</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>and quizzes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Writing assignments</td>
<td>10</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td><strong>Total Points Possible</strong></td>
<td></td>
<td></td>
<td>600</td>
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</table>

**Grade Assignments**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90-100%</td>
</tr>
<tr>
<td>B</td>
<td>80-89%</td>
</tr>
<tr>
<td>C</td>
<td>70-79%</td>
</tr>
<tr>
<td>D</td>
<td>60-69%</td>
</tr>
<tr>
<td>F</td>
<td>Below 60%</td>
</tr>
</tbody>
</table>

*All the students with D or F as a Final grade will be required to repeat the course, a university college core course requirement.*

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**DETAILED COURSE OBJECTIVES**

**Objective 1.** The study of life (Chapt. 1)

Students should be able to:
1. list the levels of organization in order of increasing complexity
2. define and explain the scientific method
3. list steps of the scientific process
4. explain biological diversity
5. define relevance of living organisms and their environment
6. define different branches of biology (appendix 1)

**Vocabulary**
Chapt. 1.-Ecosystem, community, population, organism, organ systems, tissue, cell, molecule, hypothesis, controlled and experimental groups.

**Objective 2.** The molecules of cells (Chapt. 2)

Students should be able to:
1. define components of atom
2. state the relevance of isotopes in life
3. define electron arrangement of an atom
4. state various bonds in molecules
5. explain the importance of acidic and basic conditions in living organisms
6. explain importance of carbon in molecules
7. define functional groups
8. state the processes by which large molecules are formed
9. name and define carbohydrates
10. explain lipids and their uses in living systems
11. list the amino acids and how they are converted into proteins

**Vocabulary**
Chapt. 2-Compound, atom, protons, electrons, neutrons, atomic number, atomic weight, radioactive isotopes, electron shells, chemical bonds, ion, ionic bond, covalent bond, nonpolar, polar molecule, cohesion, surface tension, solution, solute, solvent, acid, base, buffers, organic compound, hydrocarbons, hydrophilic, hydroxyl group, carbonyl group, amino group, polymers, monomers, monosaccharides, polysaccharides, hydrophobic, protein, peptide bond.

**Objective 3.** Cell structure and function (Chapt. 3), Membrane structure and function (Chapt. 4) and Cell Metabolism (Chapt. 6)

Students should be able to:
1. explain principle of microscopy
2. state prokaryotic and eukaryotic cells
3. list and define cell organelles
4. state basic functions of cell components
5. define functions of eukaryotic organelles
6. enumerate and explain laws of thermodynamics
7. explain mechanism of energy coupling
8. describe the enzymes, their mechanisms and types inhibitors
9. state cellular membranes and its constituents
10. explain passive and active transports

**Vocabulary**
Chapt. 3 and 4-Magnification, resolving power, cell theory, prokaryotic and eukaryotic cells, fluid mosaic, signal transduction, diffusion, passive transport, concentration gradient, osmosis, hypertonic, hypotonic, isotonic, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis, receptor-mediated endocytosis, exergonic, endergonic, ATP.

**Objective 4.** Cellular respiration (Chapt. 7) and Photosynthesis (Chapt. 8)

Student should be able to:
1. state aerobic and anaerobic respiration
2. explain the role ATP in cellular activities
3. define electron transport chain
4. state mechanisms of ATP production
5. enumerate steps involved in glycolysis, krebs cycle, and chemiosmosis
6. explain anaerobic respiration
7. define autotrophs and heterotrophs
8. list the components of chloroplast and their role in photosynthesis
9. name the stages and mechanisms of photosynthesis
10. explain how ATP, O2 and NADPH are generated
11. state process of photophosphorylation
12. define Calvin cycle

Vocabulary
Chapt. 7-Oxidation, reduction, electron transport chains, chemiosmosis, glycolysis, Krebs cycle.
Chapt. 8 - Photosynthesis, autotrophs, producers, thylakoids, grana, light reaction, carbon fixation, photosynthesis, reaction center, photosystem, photophosphorylation, photorespiration, C3/C4 plants.

Objective 5. Cell division (Chapt. 5)

Students should be able to:
1. define binary fission
2. state cell cycle
3. explain the process of cell division
4. name the stages of mitosis
5. distinguish cytokinesis between animal and plant cells
6. state functions of mitosis in living organisms
7. explain how gametes are formed
8. explain the process of meiosis
9. compare mitosis and meiosis
10. discuss the process of sexual reproduction
11. explain genetic variability

Vocabulary
Chapt. 5.-Sexual/asexual reproduction, binary fission, chromatin, somatic cells, sister chromatids, centromere, cell cycle, mitosis, mitotic spindle,

Objective 6. Patterns of gene inheritance (Chapt. 23) and the Chromosomal basis of Inheritance (Chapt. 24)

Students should be able to:
1. describe concepts of Mendelian genetics
2. explain laws of segregation and independent assortment
3. state Mendelian principles in inheritance human traits
4. define incomplete dominance
5. exemplify forms of gene
6. define pleiotropy, polygenic, and chromosomal theory of inheritance
7. discuss linked genes and crossing over
8. enumerate sex chromosomes and its pattern of inheritance
9. define nucleotides
10. describe DNA as double helical molecule
11. explain the process of DNA replication, transcription and translation
12. discuss genetic materials of viruses and their mode of replication

Vocabulary
Chapt. 23.-Self/cross fertilization, hybrids, dominant/recessive alleles, homozygous, heterozygous, phenotype, genotype, test cross, incomplete dominance, codominance, pleiotropy, genetic disorders.
Chapt. 24.-Karyotype, Chromosomal diseases, Deletion, duplication, translocation, inversion, sex-linked trait.
Objective 7. DNA Structure and Control of Gene Expression (Chapt. 25) and Biotechnology and genomics (Chapt. 26)

Students should be able to:

1. explain structure and function of nucleotides
2. describe how genes are turned on and off
3. explain bacterial operon
4. state gene expression
5. exemplify signal transduction
6. define recombinant DNA
7. explain transformation
8. state RFLPs, PCR, DNA and fingerprinting
9. illustrate significance of DNA technology in human health, and agriculture

Vocabulary

Objective 8. Microbiology (Chapt. 28) and Plants (Chapt. 29)

Students should be able to:

1. describe basic principles of systematics
2. explain phylogenetic lineage
3. name kingdoms of classification scheme
4. describe evidences of origin of life
5. state prokaryotic evolution
6. describe different groups of bacteria and their properties
7. list protists and their salient features

Vocabulary
Chapt. 28.-Monera, cocci, bacillus, spirillum, heterotrophs, autotrophs, pathogens, exotoxins, endotoxins, lyme disease, plasmodium, fungi, dinoflagellates, diatoms, green algae.
Chapt. 29.- Mycorrhiza ; sporangia ; bryophytes ; seeds, pollen, gymnosperm, angiosperm; fungi, hyphae, mycelium ; dikaryotic phase ;

Objective 9. Critical thinking exercises and quizzes.
Individual instructor will determine format, frequency, and scoring of critical thinking exercise(s) and quizzes.

Objective 10. Writing assignment (s)
Students will research topics critical to learning and understanding contemporary topics in biology, and write a scientific review paper based on information gathered using library and information technology tools.

Reading/Writing Literacy
Students will demonstrate enhanced competence in reading/writing literacy knowledge and skills in biology.
1. Students will be able to read and respond in writing to challenging texts that demand critical thinking in Biology.

**Exercise or Activity:** *Scientific writing assignment*

**Performance Indicators:**

- Use appropriate writing conventions to organize and categorize information/materials.
- Use information from library and information technology tools, scientific journals, books, magazines, newspapers, textbooks, audio and media presentations, and from such forms as basic charts, graphs, maps, and diagrams to write for critical analysis and evaluation

2. Students will be able to demonstrate effective use of various patterns for organizing and developing written communication in biology.

**Exercise or Activity:** *Scientific writing assignment*

**Performance Indicators:**

- Address assigned topics, providing adequate and specific supporting evidence.
- Identify the pattern of development (narration, description, process, comparison-contrast, illustration).

3. Students will be able to recognize and use correctly and effectively the rules and conventions of standard English as applied in scientific communication.

- Students will be able to write various types of sentences (simple, compound, complex) that convey clear thought, using correctly the grammar and mechanics of standard English.
- Students will be able to parse sentences in texts written by professional writers and by their peers, identifying what makes the sentences work to convey a clear message.

**Exercise or Activity:** *Scientific writing assignment*

**Performance Indicators:**

- Write personal responses to scientific literature and vocabulary.
- Communicate the meaning of scientific literature by using appropriate citation and documentation techniques.

Quantitative literacy

Students will demonstrate enhanced competence in quantitative literacy knowledge and skills

1. Students will demonstrate knowledge of fundamental mathematical concepts, symbols, and principles in performing basic computational operations

**Exercise or Activity:** *Scientific writing assignment*

**Performance Indicators:**

- Evaluate basic mathematical calculations used in scientific research such as preparation of media, or buffers
2. Students will interpret mathematical, quantitative models (such as formulas, graphs, charts, tables and maps) that describe real-world phenomena.

**Exercise or Activity:** Scientific writing assignment  
**Performance Indicators:**
- Interpret the tables, charts, graphs and figures used in scientific literature
- Evaluate mathematical data from several studies, and draw pertinent conclusions

3. Students will demonstrate competence in analytical and quantitative reasoning skills as these apply to real world situations

**Exercise or Activity:** Scientific writing assignment  
**Performance Indicators:**
- Evaluate quantitative data from scientific literature associated with human health
- Interpret the data to discover trends and draw reasonable scientific conclusions

**Information literacy**  
Students will demonstrate enhanced competence in information literacy knowledge and skills

1. Students will be able to identify and articulate their information needs in the process of defining a problem, question, or project for research

**Exercise or Activity:** Scientific writing assignment  
**Performance Indicators:**
- Take a short seminar on defining problems, identifying research topics, and gathering scientific information.

2. Students will be able to use library and information technology tools and resources to carry out research

**Exercise or Activity:** Scientific writing assignment  
**Performance Indicators:**
- Visit the library and learn how to use various scientific databases such as Science direct and Pubmed to gather information on the research topic assigned

3. Students will be able to design and execute a research project using a systematic process to collect, analyze, and present information in written formats, properly incorporating, citing, and documenting resources

**Exercise or Activity:** Scientific writing assignment  
**Performance Indicators:**
Students will

- Systematically evaluate and analyze the data collected and complete a research paper citing the references in the text with a proper literature cited section at the end.