

General Biology

Biology 127 (Honors)

Alabama State University
Department of Math and Science

Fall Semester- Credit Hours-3

Textbook: Biology 6th Edition by Campbell and Reece

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).

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

Note: Any student requiring alternate 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 class.

Course Description: This is a General Biology course designed to serve honor students who have shown their dedication in learning biology. This course entails a wide array of biological phenomena and each phenomenon will be rigorously discussed. A variety of teaching tools will be employed to achieve presentational clarity of the subject. Students will be challenged with various activities in the class to test their intelligence. Each learning objective will consist of several reasoning and thought provoking concepts, which will be carried out in the form of group discussion or mini seminar sessions.

Course Goals: This course has the following major goals:

1. To cover various biological phenomena in depth.
2. To provide students an opportunity to be actively involved in learning most recent biological principles and theories.
3. To provide students an opportunity to express creativity through group discussions, seminars, and other class room activities.
4. To implement a rigorous methodology to enable students with reading and comprehending scientific articles related to biology.
5. To develop students' skills in writing, analytical thinking, and problem solving with an emphasis on application of every-day biological concepts.
6. To familiarize students with use of databases, internet, and literature research.

Summary of Evaluation Procedure

Test	No. of Questions	Objectives	Points
Test 1	1-2 100		50
Mid-term	50	3-4	100
Test 3	50	5-6	100
Final	50	7-8	100
Writing exercises, quizzes and assignments		9-10	200
Total Points Possible			600

Grade Assignments

Grade	Grade Percentile
A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	Below 60%

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

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 9, (an) acceptable written report(s) must be prepared. The lecture instructor will evaluate the assignment(s).

Description of Tests and Classroom activities

Test 1	Objectives 1 & 2
Test 2 (Midterm)	Objectives 3 & 4
Test 3	Objectives 5 & 6
Test 4 (Final)	Objectives 7 & 8
Scientific Paper/Presentation	Objectives 9 & 10

Test 1-4 will consist of objective questions. To pass an objective, the student must earn a minimum of 70% of the total points for that objective.

Assignments will be given in the form of study guides and scientific article summaries. They are to be completed by the students and turned in on their due dates.

Scientific Paper will count as a test grade. You will be required to write a 10 page research paper using the internet, scientific article from journals and books to collect information for the paper. An outline and format will be given to you to follow.

Presentations will consist of the research paper topic chosen by you. The presentation will also count as a test grade. An outline and format will be given to you to follow.

Group Discussions are designed to discuss the topics from the textbook, papers and other sources. All students are required to participate and discuss the topic. Group discussions will count as an assignment grade.

Detailed Course Objectives

Objective 1. Chemistry of Life

Subtopics:

1. Themes in the study of science
2. The chemical context of life
3. Water and the fitness of the environment
4. Carbon and the molecular diversity of life

Students should be able to:

1. Use scientific inquiry as a thought process; formulate hypothesis, design experiments, and draw conclusions from the experiment results
2. List chemical elements and their role in life
3. Describe various chemical reactions in relation to biological functions
4. Discuss the importance of water in biological processes
5. Explain carbon and carbon-derived compounds and their contribution to life

Objective 2. The Cell

Subtopics:

1. A tour of the cells
2. Membrane structure and function

Students should be able to:

1. Explain cell structures and their functions, importance of individual cell organelles
2. Discuss cellular membranes, their composition, function and importance in cell survival

Objective 3. Energy pathways

Subtopics:

1. Cellular respiration
2. An introduction to metabolism
3. Photosynthesis

Students should be able to:

1. Explain generation of energy, aerobic and anaerobic respiration, glycolysis, Krebs cycle, and electron transport phosphorylation

2. Discuss metabolism, energy transformation and the role of enzymes in metabolism
3. Summarize light capture, energy generation, and the conversion of CO₂ into sugar

Objective 4. Mitosis and Meiosis

Subtopics:

1. The reproduction of cells
2. The Mitotic cell cycle
3. Meiosis and Sexual life cycles

Students should be able to:

1. Summarize the process of cell reproduction, growth and repair.
2. List stages of mitosis and cytokinesis
3. Explain control of cell division
4. Discuss the process of meiosis and sexual reproduction.

Objective 5. Genetics

Subtopics:

1. Mendel and the gene idea
2. The chromosomal basis of inheritance
3. The molecular basis of inheritance

Students should be able to:

1. Discuss Mendelian genetics, human disorders and their inheritance, and tools for genetic testing
2. Summarize linked genes, genetic recombination, chromosomal sex inheritance, and effect of genes inherited from parents
3. explain DNA as genetic material, Watson and Crick DNA, DNA duplication and enzyme proofreading

Objective 6. From Genes to Proteins

Subtopics:

1. The connection between genes and proteins
2. The synthesis and processing of RNA
3. The synthesis of protein

Students should be able to:

1. Define the term gene
2. Explain the process of transcription and translation
3. Summarize protein synthesis in prokaryotes and eukaryotes

Objective 7. Molecular Biology

Subtopics:

1. Microbial models: The genetics of viruses and bacteria
2. The organization and control of eukaryotic genomes
3. DNA technology (genetic engineering)

Students should be able to:

1. Discuss genetics of viruses and bacteria
2. Explain gene expression in eukaryotes, control of gene expression, and abnormal gene expression resulting in cancer
3. Summarize recombinant DNA technology, its use in human health, agriculture and the environment

Objective 8. Mechanisms of Evolution

Subtopic:

The evolutions of populations

Students should be able to:

1. Explain modern evolution-Darwinism and Mendelism
2. Discuss population, gene frequency, microevolution and genetic drift.
3. List mutations, natural selection and genetic variation

Objective 9. The Scientific Research Paper**Components**

1. Title
2. Abstract
3. Introduction
4. Content
 - a. Significance of Paper to Humans
 - b. Characteristics of topic
 - c. Prevention of topic
5. Resent Advances in Research of the Topic
6. Conclusions
7. Discussions
8. References

Description of Components

Title: Should be typed on a separate page, in the middle of the page with name subject and date centered at the bottom of the page.

Abstract: Brief overview of the entire paper, which states the main points or finding of the research don. It should be at least one full paragraph (3-4 sentences).

Introduction: A more detailed summary of the paper. It emphasizes important points or facts stated in the abstract. It should be at least 1 full typed page.

Content: should contain all information pertinent to the research done. It may include several summaries of each subtopic mentioned in the introduction. It should be at least 3 full pages.

Resent Advances: Should reemphasize recent research findings as they relate to the topic. It should be at least one full paragraph.

Conclusion: Should summarize the entire paper and serve as a review of the research findings. It should be at least one full paragraph.

Discussion: Should give the opinion of the writer about the research findings. It should be at least one full paragraph.

References: Should list the sources from which information was obtained. It should include scientific journal articles, books and web sites.

Potential Topics

1. Acid Precipitation
3. Tay-Sachs Disease
5. How Antibiotics Inhibit Enzymes
7. Rotenone
9. Carbon Monoxide
11. Green House Effect
13. Carcinomas
15. Leukemias
17. Down Syndrome
19. Turner Syndrome
21. Achondroplasia
23. Ultrasound Imaging
25. Hemophilia
27. Cancers
 - a. Prostate
 - b. Breast
 - c. Lung
 - d. Colon and Rectum
 - e. Bladder
 - f. Melanoma of the skin
 - g. Uterus
 - h. Kidney
 - i. Mouth and throat
 - j. Pancreas
 - k. Ovary
 - l. Stomach
 - m. Brain and nerve
 - n. Liver
 - o. Cervix
2. Anabolic Steroids
4. How Pesticides Inhibit Enzymes
6. Hypercholesterolemia
8. Cyanide
10. Oligomycin
12. Tumors
14. Sarcomas
16. Lymphomas
18. Klinefelter Syndrome
20. Cystic Fibrosis
22. Huntington's Disease
24. Genetic Screening
26. Duchenne Muscular Dystrophy
28. Human Genome Project
29. DNA Fingerprinting
30. Cyanobacteria

Any other disease affecting humans can be chosen as a topic. The above topics and other topics may be found in some of the scientific journals mentioned below (available at the ASU library): Science, Nature, Endocrinology, Experimental Cell Research, Journal of Clinical Microbiology, Journal of Bacteriology, Journal of Biological Chemistry, Journal of Immunology, the New England Journal of Medicine, Modern Medicine, etc. Some databases like Medline (www.nlm.nih.gov) and Health Info Trac can be helpful to find relevant material.

Objective 10. The Scientific Presentation

Students will make an oral presentation of 5 minutes on the topic selected for their research paper. Students will utilize modern instructional/ multimedia technology in making this presentation.

Components

Introduction

Epidemiology

- a. Incidence
- b. Control
- c. Distribution

Recent Advances in Research of the Disease

Conclusions

Discussion

GENERAL BIOLOGY LABORATORY HONORS (BIO 127) Credit Hour - 01
Fall/Spring Semester

Laboratory Manual: Exploring Biology in the Laboratory

Shree R. Singh & Karyn D. Scissum Gunn

Lab Section _____ Lab Hour & Day _____ Lab Room-SB 203
Instructor _____ Office Extension _____ Office Hours _____

Supporting Services- Tutoring/Audio-Visuals/Computer software
Math & Science Tutorial Center, PH 132 (8:00 a.m.-5:00 p.m., M-F)

Attendance Policy: Each student is expected to attend all lectures, seminars, laboratories and field work for each registered course, including the first class session. Attendance is required to verify official enrollment and continuance in each course. When students are absent from class for authorized reasons such as death in the family, illness, hindrance by true emergency situations or University activities, they will be allowed to make up assignments/ examinations that they missed. Instructors, of course, are not obligated to provide makeup opportunities for students who are absent, unless the absences have been officially approved. Official excuses can be obtained from the Office of Student Affairs.

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 general biology laboratory course is designed to correspond with the first part of the introductory biology. This course is contrived to expose students with the basic principles and theories of biology. Each laboratory exercise provides ample hands-on experience based on every day observations in life. This laboratory course will enable students to be familiar with biological instruments, chemicals, solutions, experimentation and some current techniques. The laboratory exercises range from the study of microscopes, plant and animal cells, mitosis, meiosis, and photosynthesis to recombinant DNA techniques.

Course Goals:

To provide students with the opportunity to receive “hands-on” experience with scientific techniques and methods, so that the student will be able to relate the information gained in this course to everyday life situations. This course has following major objectives:

1. To introduce and familiarize students with basic biological phenomena
2. To provide students an opportunity to be actively involved in carrying out an experiment
3. To encourage students to design their own ideas and experimentation based on biological principles
4. To develop the student’s skill in writing, reading, analytical thinking, problem solving, graphics and mathematical calculations.

To meet the above goals, this course will focus on the following **objectives**. Each objective is diverse and covers different activities as described in detail description of the course.

Objective*	Corresponding Labs in the Manual
1 Scientific Inquiry	Laboratory 1
2 Measurement and Chemical Solutions	Laboratory 2
3 Microscopy	Laboratory 3
4 DNA: The Genetic Material	Laboratory 4
5 Cell Structure and Function	Laboratory 5
6 Diffusion and Osmosis	Laboratory 6
7 Photosynthesis and Plant Structure	Laboratory 7, Laboratory 13, and Laboratory 14
8 Mitosis & Meiosis	Laboratory 8
9 Mendelian and Human Genetics	Laboratory 9

- 10 Molecular Biology Laboratory 10
Recombinant DNA Technology
- 11 Monera and Protista Laboratory 11
- 12 Laboratory Assignments
- 13. Lab Report(s)

*Laboratory experiments may vary depending on the availability of instruments and supplies.

EVALUATION AND MINIMUM STANDARDS

Testing: During this laboratory course, students will be tested from each objective. **The midterm and final exams will be comprehensive.**

Number of Tests: There will be a total of four tests including midterm and final. Instructors may give additional quizzes during the semester.

Composition of Tests: Test items on the test may be multiple-choice (MC), fill in the blanks (FB), matching (MT), completion (CP), and calculations (CAL). Midterm and final exams will contain practical lab questions inclusive of identification (PR). The instructors will determine the number of these questions. Each objective will be weighed equally in terms of testing. Students will be tested on the terms discussed in each objective.

Minimum Standard for Passing: To pass an objective, students must obtain 70% of the points for each objective. To pass the lab, students have to score a total of **420 points and pass 8/11 objectives**. Students must pass **objective 12** to pass the course.

Testing Table

Test	No. of Que.	Composition	Points
Test 1	50	MC+FB+MT+CAL	100
Mid-term	50	MC+PR+FB+MT+CAL	100
Test 2	50	MC+FB+MT	100
Lab Report(s)		Essay	100
Assignments		Essay	100
Final	50	MC+PR+FB+MT+CAL	100
Total			600

To pass the lab, students have to score a total of 420 points and pass 8/11 objectives.

Grading Table

Grade	Range of total points	Objectives to be passed
A	540-600	10
B	480-539	9
C	420-479	8
D	360-419	7
F	below 360	below 6

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

LABORATORY POLICIES

All students are expected to arrive for class ON TIME and leave ONLY after the work is completed. A

student may not be allowed to attend the lab if he/she arrives late. You must abide by the University's attendance policy. All students are expected to read each exercise before coming to class. This includes the introduction, procedures and all the terminology in bold face. You may be tested on these exercises. The students should read and follow the instructions in the lab manual while performing the experiment. Attending one of the labs that meets during the week the lab experiment was missed can make up lab experiments. Examinations can be made up **only at the end of semester (last week of labs)**, if an official excuse is presented. Unexcused absences from any examination or laboratory will count as zero.

LISTED BELOW ARE A FEW RULES TO FOLLOW IN YOUR LABORATORY WORK:

1. Read and follow directions given in your lab manual.
2. Handle all equipment with care.
3. Leave equipment, slides or preserved materials on the lab tables neatly arranged.
4. Discard materials as directed.
5. Do not remove solutions or other materials from demonstration table.
6. Always handle all the chemicals with care.
7. Always empty and rinse all glassware used and return it to your work place.
8. Beepers and telephones are not allowed in the lab.
9. Dress properly (No Hats).
10. There will be a severe disciplinary action if any student is caught while cheating during the test.

Detailed Course Objective

The following laboratory exercises are designed to meet the objective of this course. Each objective contains variety of reading/writing exercises, mathematical calculations and scientific reasoning.

Objective 1. Scientific Inquiry (Laboratory 1)

Students should be able to:

1. formulate and test hypotheses
2. design an experiment to answer questions
3. write scientific research papers

Terms to define: Theory, induction, deduction, hypothesis, variables, graphs.

I.	Effect of Smoking	Lab 1.1
II.	Variables in the experiment	Lab 1.2
III.	Effect of Protease inhibitor	Lab 1.3
IV.	Format of scientific article	Lab 1.4
V.	Presentation of Results	Lab 1.5

Lab Assignment: Lab 1. Scientific Inquiry

Objectives 2 & 3. Measurements and Microscopy (Laboratory 2 & 3)

Students should be able to:

1. recognize graduated cylinders, beakers, flasks, pipets, and test tubes
2. explain the concepts of measurements such as length, volume and mass
3. describe different measurement systems
4. convert units from one system to another
5. describe how to care for a microscope
6. recognize the parts of compound microscope and know their functions
7. define the principles of microscopy

Terms to define: Qualitative and quantitative observation, gram, meter, liter, degree Celsius ($^{\circ}\text{C}$), Fahrenheit ($^{\circ}\text{F}$), kilogram.

Equipment to identify: beaker, graduated cylinder, pipet, Erlenmeyer flask, balances, thermometers, and some other commonly used equipment.

Experiments:

A.	Length	Lab 2.1
B.	Mass	Lab 2.2
C.	Volume	Lab 2.3
D.	Temperature	Lab 2.4
E.	Percent Solutions	Lab 2.5
F.	Molar Solutions	Lab 2.6
	TEST FOR STARCH, PROTEIN & GLUCOSE	Lab 2.7

Lab Assignment: Lab 2. Measurements and Chemical Solutions

Microscopy (Laboratory 3)

Terms to define: Magnification, resolution, contrast, parfocal, parcentral, working distance

Equipment to know: Compound light microscope, dissecting microscope, know all the parts of the light microscope and their function.

Video tape: Using the compound Microscope

Experiments:

I.	The compound light microscope	
A.	Proper handling and care of microscopes	Lab 3.1
B.	Parts of the Compound Light Microscope	Lab 3.2
C.	How to use a microscope to observe a specimen	Lab 3.2
D.	Measurement of the field of view	Lab 3.4
II.	The stereoscopic microscope	Lab 3.5
III.	Other microscopes	
A.	Phase contrast	Lab 3.6-1
B.	Electron Microscope	Lab 3.6-2
a.	Transmission Electron Microscope (TEM)	
b.	Scanning Electron Microscope (SEM)	

Lab Assignment: Lab 3. Microscopy

Objective 4. DNA: The Genetic Material (Laboratory 8)

Students should be able to:

1. describe the components of DNA
2. distinguish between DNA and RNA
3. demonstrate the structure of DNA and RNA
4. match the codons with anticodons

Terms to define: DNA, RNA, replication, transcription, translation, purine, pyrimidine, codon, peptide bond, and amino acids.

Video Tape: Protein Synthesis

Experiments:

I.	Prepare a double helix DNA using DNA made easy kit	Lab 8.1
II.	Modeling DNA replication	Lab 8.2
III.	Modeling Transcription	Lab 8.3
IV.	Modeling Translation	Lab 8.4

Lab Assignment: Lab 8. DNA The Genetic Material

Objective 5. Cell Structure and Functions (Laboratory 4)

Students should be able to:

1. recognize different parts of the cell
2. differentiate between plant and animal cell
3. make plant and animal cell slides
4. state the function of different cellular components
5. state the properties of prokaryotic and eukaryotic cells

Terms to define: Cell, cell theory, prokaryotes, eukaryotes etc.

Identify: Animal and plant cells, parts of the cell- plasma membrane, cytoplasm, E.R., ribosomes, mitochondria, golgibodies, nuclear envelope, nucleus, nucleolus, vacuoles, chloroplast, lysosomes.

Video Tape: Structure and function of living cells

Experiments:

- | | | |
|------|---|---------|
| I. | Study of Cell components | Lab 4.1 |
| II. | Difference between plant and animal cells | Lab 4.2 |
| III. | Study a plant cell | Lab 4.3 |
| IV. | Examine Elodea leaf cells | Lab 4.4 |
| V. | Observing Human Check Cell | Lab 4.5 |

Lab Assignment: Lab 4. Cell structure and function

Objective 6. Diffusion and Osmosis (Laboratory 5)

Students should be able to:

1. explain the significance of the concentration gradient
2. describe the significance of the selectively permeable membrane
3. distinguish between osmosis and diffusion
4. state the role of varying osmotic concentrations

Terms to define: Osmosis, diffusion, solvent, solute, tonicity, hypotonic, hypertonic, isotonic and selectively permeable membrane.

Experiments:

- | | | |
|------|--|---------|
| I. | Process of diffusion | Lab 5.1 |
| II. | Diffusion of KMnO_4 | Lab 5.2 |
| III. | Immunodiffusion | Lab 5.3 |
| IV. | Performing osmosis using dialysis tubing | Lab 5.4 |
| V. | Demonstration of tonicity using raisins and grapes | Lab 5.5 |
| VI. | Demonstrating plasmolysis and turgidity | Lab 5.6 |

Lab Assignment: Lab 5. Diffusion and osmosis

Objective 7. Photosynthesis (Laboratory 6)

Students should be able to:

1. state the role of CO_2 and light in photosynthesis
2. explain the importance of colors based on their wavelength
3. identify the pigments found in the green leaf
4. explain the different plant cell structures involved in photosynthesis
5. describe the characteristics of vascular plants
6. understand the function of vascular plants

7. recognize the structure of flowering plants

Terms to define: Photosynthesis, autotrophs, heterotrophs, chromatogram, stroma, grana, thylakoid disk, seedless plants, gymnosperm, angiosperm, bryophytes, cones, seeds.

Equipment of identify: Chromatography chamber, Chromatogram, Chromatography paper.

Experiments:

- | | |
|---|---------|
| I. Floating Leaf Disk Assay | Lab 6.1 |
| II. Role of light in photosynthesis | Lab 6.2 |
| III. Pigment separation by Paper Chromatography | Lab 6.3 |
| IV. Observing structure of the chloroplast in Elodea leaf | Lab 6.4 |

Lab Assignment. Lab 6. Photosynthesis

Objective 8. Mitosis and Meiosis (Laboratory 7)

Students should be able to:

1. state the stages of cell division
2. distinguish between cytokinesis and mitosis
3. recognize the changes in chromosome structure during mitosis and meiosis
4. differentiate between plant and animal cytokinesis
5. identify the similarities and differences between mitosis and meiosis
6. illustrate the gamete constitution of body cells and sex cells
7. describe the genetic process of egg and sperm formation

Terms to define: Cell cycle, mitosis, prophase, metaphase, anaphase, telophase, cytokinesis, DNA replication, chromatid, spindle apparatus, fertilization, zygote, sperm, egg, meiosis, homologue, diploid, haploid, allele, gamete etc.

Video Tape: Cell cycle

Experiments:

- | | |
|--|---------|
| I. The Cell cycle | Lab 7.1 |
| II. Observing Onion root tip slides | Lab 7.2 |
| III. Observing animal and plant mitosis models | Lab 7.3 |
| IV. Plant and animal cytokinesis models | Lab 7.4 |
| V. Observing Gametogenesis models | Lab 7.5 |

Lab Assignment: Lab 7. Mitosis and Meiosis

Objective 9. Mendelian and Human Genetics (Laboratory 9)

Students should be able to:

1. solve monohybrid problems
2. solve dihybrid problems
3. describe the inheritance of characteristics from generation to generation
4. determine the phenotype of an individual based on the genotype
5. define genetic abnormality and disorder
6. analyze data presented in a pedigree

Terms to define: Genetics, dominance, recessive, complete dominance, incomplete dominance, true breeding, gamete, allele, homozygous, heterozygous, monohybrid cross, dihybrid cross, sex-linked traits, multiple alleles, phenotype, genotype, Punnett square

Video Tape: Heredity I- Traits, genes, and alleles

Experiments:

I.	The Monohybrid Cross	Lab 9.1
II.	The Dihybrid Cross	Lab 9.2
III.	Exceptions to the Mendel's Laws	Lab 9.3
IV.	Study of Pedigree	
V.	Inheritance of characters in humans	
VI.	Genetic Abnormalities/ Disorders	
VII.	Karyotype Analysis	

Lab Assignment: Lab 9. Mendelian Genetics

Objective 10. Molecular Biology and Recombination of DNA (Laboratory 10 and 11)

Students should be able to:

1. state the definitions of plasmids
2. illustrate the use of genetic engineering
3. describe the process of gel electrophoresis
4. explain restriction fragment mapping
5. explain the importance of restriction enzymes
6. state the mechanism of restriction enzyme cleavage and ligation
7. illustrate the transformation process

Terms to define: genetic engineering, autosomal dominant inheritance, mutation, DNA ligase, deletion, recombinant DNA, sticky ends, plasmid, construct, clone, and transformation.

Experiments:

I.	Manipulating DNA using restriction enzymes and gel electrophoresis	Lab 10.1
II.	Restriction fragment mapping: size estimation	Lab 10.2
III.	DNA ligation from two unknown sources	Lab 11.1
IV.	Transformation	Lab 11.2

Lab Assignment: Lab 10 and 11

Objective 11. Taxonomy-Monerans and Protistans (Laboratory 12)

Students should be able to:

1. distinguish common names from scientific names
2. illustrate the importance of scientific names in biology
3. identify the genus and specific epithet in scientific name
4. identify and classify different bacterial species and protozoans
5. define the different forms of bacterial shapes
6. understand the economic relevance of monerans and protistans

Terms to define: common name, scientific name, binomial nomenclature, genus, specific epithet, decomposer, decomposer, producer, consumer, gram stain, antibiotic, cilia, flagella, pseudopodia, micronuclei, and macronucleus.

Experiments:

I.	Kingdom Monera	Lab 12.1
II.	Kingdom Protista	Lab 12.2

Lab Assignment: Lab 12.

Objective 12. Writing Exercises

Writing exercise(s), quizzes, and assignments.

Individual instructors will determine format, frequency, and scoring of writing exercise(s), quizzes and assignments.

At the end of each laboratory there are lab assignments. These lab assignments are to be completed after your instructor has taught the lab. You will be graded on the assignment that will contribute to a total of 100 points. You must answer 70% of the questions correctly to pass an assignment. Your instructor will determine the number of lab assignments. Following are some of the ways that can be used by your instructor to grade the lab assignments:

You may be required to turn in Ten (10) assignments each worth 10 points

OR

You may be required to turn in Five (5) selective lab assignments each worth 20 points

In order to pass this objective, you must earn 70 points

Lab Reports

You are required by your instructors to submit several lab reports during the semester. The composite scores of all reports will be 100 points. Your lab report should consist of following.

1. Title	10%
2. Objective	10%
3. Materials and Methods	20%
4. Results and Discussion	30%
5. Conclusion	15%
6. References	15%

Title: The title should be less than ten well chosen words indicating the subject.

Objective: The objective should tell exactly what is expected to be learned from the experiment.

Materials and Methods: Include a brief description of the procedures, materials and the equipments involved in the experiment.

Results: Present your findings in logical order, what you have found out in your experiment. The result should summarize the data from experiment. Also explain the reasoning to support your result. The data may be organized in tables, graphs, figures, photographs etc.

Conclusion: Summarize the findings of the experiment and its significance.

References: This section contains all the articles and or any source of information used in the report. The listing should be in the alphabetical order by the last name of the authors. You must cite all the references otherwise it will be considered Plagiarism.