

LAST REVIEW: 2010-2011

(i.e. 2003-2004)

NEXT REVIEW: 2015-2016

(i.e. 2008-2009)

STATUS: A

(A, I, D)

COURSE TITLE: Introduction to Biology I Laboratory

COMMON COURSE NUMBER: BSC1010L

CREDIT HOURS: 1

CONTACT HOUR BREAKDOWN

(per 16 week term)

CLOCK HOURS:

(Voc. Course ONLY)

Lecture:

Lab: **48**

Clinic:

Other:

PREREQUISITE(S): CHM 1040 or CHM 1045 with a minimum grade of C

COREQUISITE(S): BSC1010 or CHM 1040 or CHM 1045 with a minimum grade of C

PRE/COREQUISITE(S):

COURSE DESCRIPTION *(750 characters, maximum):*

This laboratory course is the first of a two-semester sequence introducing science majors to biological principles including cell structure and function, cell reproduction, biochemistry and cell metabolism, classical and molecular genetics, and genetic engineering. Three hours laboratory per week.

General Education Requirements – Associate of Arts Degree (AA), meets Area(s):

4C

General Education Requirements – Associate in Science Degree (AS), meets Area(s):

4C

General Education Requirements – Associate in Applied Science Degree (AAS), meets Area(s): Area

UNIT TITLES

1. Reading and Writing in the Biological Sciences
2. Observation, Measurement, and the Scientific Method
3. Chemistry of Life
4. Microscopy
5. Membrane Transport
6. Enzymes
7. Photosynthesis
8. Respiration
9. Chromosomes, Mitosis and Meiosis
10. Classical Genetics
11. Molecular Genetics/Genetic Engineering

*** Complete the following only if course is seeking general education status ***

GENERAL EDUCATION Competencies and Skills *:

In the box to the right of the Competency/Skill, enter all specific **student learning outcome** unit numbers, as indicated in the course outline (i.e. 1.1, 2.7, 4.2, 4.0 and 5.12) that apply.

Course must include <u>all</u> of the following:	
1. Read with critical comprehension**	1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0
2. Write clearly and coherently**	1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0
3. Demonstrate literacy as appropriate within a given discipline** a) Information b) Technology c) Workplace d) Cultural e) Quantitative f) Scientific g) Environmental	(a) 1.0 (b) 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0 (c) 2.1-2.3; 6.5; 10.4 (d) (e) 1.0, 2.0, 3.0, 5.3, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0 (f) 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0 (g) 3.1
4. Apply problem solving skills or methods to make informed decisions in a variety of contexts**	2.1-2.3;3.0; 6.5; 8.2; 10.3 - 10.4
Course must include at least <u>one</u> of the following:	
5. Differentiate between ethical and unethical behavior	10.3; 11.3
6. Demonstrate an understanding of the physical, biological, and social environments and how individual behaviors impact this complex system.	10.3
7. Demonstrate an understanding of and appreciation for human diversities and commonalities.	10.3; 11.0
8. Speak and listen effectively.	

**General Education Competencies and Skills endorsed by 2010-2011 General Education Task Force*

****Required Competencies**

1) Read with critical comprehension.

The student will be introduced to the basic texts, concepts, vocabulary, and methods necessary for developing an understanding of the discipline and meeting the required benchmarks as stated in the course outline.

2) Write clearly and coherently.

The student will demonstrate an understanding and mastery of subject matter in a variety of ways, including writing. Writing activities may include both graded and ungraded essays, short answer quizzes, summaries, reactions, journals, and various other reports.

3) Demonstrate and apply literacy across all the disciplines (indicate which ones apply).

- a) **Information literacy** means understanding how to locate needed information, using the appropriate technology for the task, managing and evaluating the extracted information and using it effectively and ethically.
- b) **Technology literacy** is the ability to responsibly and effectively use appropriate technology to access, manage, integrate, or create information, and/or use technology to accomplish a given task.
- c) **Workplace literacy** is having the appropriate knowledge and skills to communicate and work with others effectively and perform job duties, whether it is through the use of computers and/or other technology.
- d) **Cultural literacy** is recognizing, understanding, and appreciating the similarities and differences between one's own culture and the cultures of others through a study of the arts, customs, beliefs, values, and history that define a culture.
- e) **Quantitative literacy** is having the ability to formulate, solve and interpret mathematical/statistical operations and graphical/tabular representations to make informed decisions.

- f) **Scientific literacy** means understanding the methodology and application of the scientific process, the physical and biological worlds, and recognizing that scientific knowledge is continuously updated or revised as new information is discovered.
- g) **Environmental literacy** is creating a context within which environmental issues can be viewed, imparting knowledge to enhance one's ability to analyze the issues, make the connections between humans' decisions and actions and the challenges facing the environment, and instilling the desire to sustain the environment through ethical practices in both one's professional and personal lives.

4. Apply problem-solving skills or methods to make informed decisions in a variety of contexts.

The student will use acquired skills or methods to recognize, analyze, adapt, and apply critical thinking to solve problems and make informed decisions.

EVALUATION:

In the box to the right of the Methods of Assessment, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 4.0, 4.2 and 5.12) that apply.

1. Portfolio	
2. Short essays	
3. Research Papers	
4. Group projects	2.0 - 11.0
5. Discussions (In class and online)	4.0 - 11.0
6. Multiple Choice tests	1.0 - 11.0
7. Presentations	
8. Service Learning Projects	
9. Quizzes (pop, announced, etc.)	2.0 - 11.0
10. Take-home tests	
11. Summaries, critiques, and analyses	1.0 - 11.0
12. Reaction papers	
13. Surveys	11.0
14. Performance	
15. Short answer tests	1.0 - 11.0
16. Classroom debates and colloquia	
17. Blogs, wikis, web pages	
18. Other (Please explain) Lab Reports	1.0 - 11.0

Common Course Number: BSC1010L

Unit 1: Reading and Writing in the Biological Sciences

General Outcome:

- 1.0 The students shall be able to clearly communicate in writing information derived from course related readings the major concepts and themes in the biological sciences.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 1.1 Demonstrate in writing the ability to analyze, evaluate, compare, and/or extract data relevant to biology from course related readings.
- 1.2 Evaluate the validity of information from a variety of sources, including but not limited to such sources as electronic, print sources, and data bases.
- 1.3 Demonstrate using diagrams, drawings, outlines, concept maps, and/or other methods connections among biological concepts.
- 1.4 Demonstrate the ability to use the appropriate technology to carry out course requirements.

Common Course Number: BSC1010L

UNITS

Unit 2: Observation, Measurement, and the Scientific Method

General Outcome:

- 2.0 The students shall be able to describe the scientific method of investigation, demonstrate reading with critical comprehension by performing selected laboratory exercises, and apply the scientific method in laboratory experiments.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 2.1 Measure common objects using metric measurements of length, weight, and volume.
- 2.2 Demonstrate proper analysis and presentation of data utilizing graphs.
- 2.3 Apply the scientific method to develop hypotheses and conclusions in solving a simple problem.
- 2.4 Demonstrate reading with critical comprehension by completing a variety of selected laboratory experiments using the scientific method.

Common Course Number: BSC1010L

Unit 3: Chemistry of Life

General Outcome:

3.0 The students shall be able to perform experiments to detect the presence of some of the more important molecules of life.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 3.1 Categorize and compare some of the properties of water that are essential in supporting life.
- 3.2 Demonstrate the use of indicator solutions as related to the measurement of pH.
- 3.3 Perform experiments that test for the presence of amino acids and/or proteins in a solution.
- 3.4 Perform an experiment to test for the presence of specified carbohydrates.
- 3.5 Perform an experiment to test for the presence of lipids.

Unit 4: Microscopy

General Outcome:

4.0 The students shall be able to use the microscope to view prokaryotic and eukaryotic cells.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 4.1 Identify principal parts of the compound and stereoscopic dissecting microscopes and demonstrate their function.
- 4.2 Demonstrate proper care and operation of the compound and stereoscopic dissecting microscopes.
- 4.3 Prepare a wet mount slide and stain selected specimens.
- 4.4 Demonstrate the methods used in describing the morphology of bacterial colonies and cells.
- 4.5 Categorize bacterial cells based upon staining methods.
- 4.6 Identify and compare major fungal structures.
- 4.7 Identify and compare various tissues.

Unit 5: Membrane Transport

General Outcome:

5.0 The students shall be able to demonstrate and explain several of the mechanisms responsible for moving materials into and out of the cell.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 5.1 Perform selected experiments that demonstrate molecular movement.
- 5.2 Perform selected experiments that demonstrate diffusion.
- 5.3 Perform selected experiments that measure the process of osmosis using a simulated cell membrane.
- 5.4 Perform selected experiments that demonstrate the process of dialysis.
- 5.5 Perform selected experiments that demonstrate the response of cells and/or organisms to changes in their osmotic environment and interpret the results.

Unit 6: Enzymes

General Outcome:

6.0 The students shall be able to perform experiments that explain variables, which affect enzyme activity and rates of reaction.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 6.1 Perform selected experiments that demonstrate the effect of the concentration of enzymes on the rate of enzyme-mediated reactions.
- 6.2 Perform selected experiments that demonstrate the effect of temperature on the rate of enzyme-mediated reactions.
- 6.3 Perform selected experiments that demonstrate the effect of pH on the rate of enzyme-mediated reactions.
- 6.4 Perform selected experiments that demonstrate the effect of inhibitors on the rate of enzyme-mediated reactions.
- 6.5 Illustrate and interpret the above experimental results using graphs and/or tables.

Common Course Number: BSC1010L

Unit 7: Photosynthesis

General Outcome:

7.0 The students shall be able to describe leaf structure and explain the influence of chlorophyll, light and carbon dioxide on photosynthetic reactions in green plants.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 7.1 Perform selected experiments to separate the pigments in a leaf using paper chromatography.
- 7.2 Examine and interpret the structure of a typical leaf.
- 7.3 Describe phototropic responses by photosynthetic organisms.
- 7.4 Use instruments such as the spectrophotometer to determine the absorption spectrum of chlorophyll.
- 7.5 Perform selected experiments that demonstrate the effect of selected variables on photosynthesis.

Common Course Number: BSC1010L

Unit 8: Respiration

General Outcome:

8.0 The students shall be able to perform selected experiments on various aspects of anaerobic respiration and aerobic respiration in selected organisms.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 8.1 Perform selected experiments that demonstrate anaerobic respiration in yeasts.
- 8.2 Measure aerobic respiration in plants by experiments that determine production of carbon dioxide.
- 8.3 Explain the procedure used in measuring the metabolic rate.

Common Course Number: BSC1010L

Unit 9: Chromosomes, Mitosis and Meiosis

General Outcome:

9.0 The students shall be able to recognize the stages of mitosis and meiosis in selected plant and animal cells.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 9.1 Prepare microscope slides and interpret chromosomes.
- 9.2 Identify the stages of mitosis in selected plant and animal cells through observation and/or experimentation.
- 9.3 Identify the stages of meiosis in selected plant and/or animal cells through observation and/or experimentation.

Unit 10: Classical Genetics

General Outcome:

10.0 The students shall be able to interpret the patterns of inheritance of selected genetic traits in plants and animals using statistical analysis of data.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 10.1 Compare complete and incomplete dominance using plant and/or animal models.
- 10.2 Demonstrate independent assortment using a dihybrid cross.
- 10.3 Compare phenotypes and genotypes for selected human traits and the bioethics related to them.
- 10.4 Use Chi Square analysis of the data collected to interpret the validity of the results.

Common Course Number: BSC1010L

Unit 11: Molecular Genetics/Genetic Engineering

General Outcome:

11.0 The students shall be able to explain recombinant DNA methodology by interpreting the results of selected experiments.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

11.1 Perform selected laboratory activities involving recombinant DNA technology or genetic engineering.

11.2 Analyze some of DNA's physical and chemical properties.

11.3 Discuss the bioethics of genetic engineering.