



**MERCER COUNTY COMMUNITY COLLEGE
DIVISION OF MATH, SCIENCE, AND HEALTH PROFESSIONS**

**Course Outline
General Biology II**

**Course Number:
BIO 102**

**Course Title:
General Biology II**

**Credits:
4**

**Hours:
Lecture 3 / Laboratory 3**

Prerequisite: General Biology I (BIO 101) with a minimum of a "C" Final Grade.

Corequisites: BIO 102 Lab

Catalog description: Introduces fundamental concepts, principles, and applications of biology. Topics include photosynthesis, plant structure, growth, and reproduction, animal diversity, animal form and function, evolution, population ecology, community ecology, and ecosystem dynamics. Investigative laboratory exercises develop skills in basic techniques and reinforce lecture material. Required for biology majors.

Recommended texts/other materials:

Textbook: Biology, 11th Edition
Neil A. Campbell, Jane B. Reece. Pearson Benjamin Cummings Publishers 2016

Lab Manual: None

Course coordinator:

Ronald M. Smith, Ph.D.

Telephone: (609)-570-3395

Office: MS 108

E-mail: smithro@mccc.edu

Syllabus Revision date: Spring 2019

Course competencies/goals:

The students will be able to:

1. Examine the diversity of life and explain the biological processes that link them together.
2. Apply concepts of biological evolution to all course topics.
3. Describe the process of photosynthesis and develop an understanding in its role for supporting life.
4. Examine plant diversity and explain the process of nutrient uptake, reproduction, and adaptation to the environment.
5. Examine animal diversity and explain how structure and function regulate bioenergetic, physiological, and behavioral processes.
6. Describe the early conditions of Earth and investigate key events that shaped the evolutionary pathways of modern organisms.
7. Develop an understanding of Earth's biomes and describe how climate and disturbance shape them.
8. Explore ecological principles that link individuals at populations and community levels.
9. Investigate the effects humans are having on disrupting energy flow and geochemical cycles through ecosystems.

General education knowledge goals:

Goal 1. Communication. Students will communicate effectively in speech and writing.

Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.

Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.

Goal 8. Diversity. Students will understand the importance of a global perspective and culturally diverse peoples.

Goal 9. Ethical Reasoning and Action. Students will understand ethical issues and situations.

MCCC core skills:

Goal A. Written and Oral Communication in English. Students will communicate effectively in speech and writing, and demonstrate proficiency in reading.

Goal B. Critical Thinking and Problem-solving. Students will use critical thinking and problem solving skills in analyzing information.

Goal C. Ethical Decision-Making. Students will recognize, analyze and assess ethical issues and situations.

Goal D. Information Literacy. Students will recognize when information is needed and have the knowledge and skills to locate, evaluate, and effectively use information for college level work.

Goal E. Computer Literacy. Students will use computers to access, analyze or present information, solve problems, and communicate with others.

Goal F. Collaboration and Cooperation. Students will develop the interpersonal skills required for effective performance in group situations.

Goal G. Intra-Cultural and Inter-Cultural Responsibility. Students will demonstrate an awareness of the responsibilities of intelligent citizenship in a diverse and pluralistic society, and will demonstrate cultural, global, and environmental awareness.

Units of study in detail.

Unit 1: Photosynthesis

Learning Objectives:

The student will be able to...

1. Understand how photosynthesis converts light energy to the chemical energy of food. **(Course Goal 1, 2, 3, 4, 6, 9; Gen Ed 1, 2, 3, 4; Core A, B, D, E)**
2. Identify the nature of sunlight and photosynthetic pigments. **(Course Goal 1, 2, 3, 4, 6, 7, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**
3. Learn alternative mechanisms of carbon fixation and why they have evolved in hot, arid climates. **(Course Goal 1, 2, 3, 4, 6, 7, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**

Unit 2: Plant Structure, Growth, and Development

Learning Objectives:

The student will be able to...

1. Identify the organs, tissues, and cells of a plants body. **(Course Goal 1, 2, 3, 4, 6; Gen Ed 1, 3, 4; Core A, B, D, E)**
2. Discuss the mechanism as to how meristems generate cells for new organs. **(Course Goal 1, 2, 3, 4, 6, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**
3. Learn how primary growth lengthens roots and shoots. **(Course Goal 1, 2, 3, 4, 6, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**
4. Learn how secondary growth adds girth to stems and roots in woody plants. **(Course Goal 1, 2, 3, 4, 6, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**

Unit 3: Soil and Plant Nutrition

Learning Objectives:

The student will be able to...

1. Explain how soil is a living, finite resource. (**Course Goal 1, 2, 4, 6, 7, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E**)
2. Discuss the essential elements plants require to complete their life cycle. (**Course Goal 1, 2, 3, 4, 6, 7, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E**)
3. Learn how plant nutrition involves relationships with other organisms. (**Course Goal 1, 2, 3, 4, 6, 7, 8, 9; Gen Ed 1, 3, 4, 8, 9; Core A, B, C, D, E, G**)

Unit 4: Angiosperm Reproduction and Biotechnology

Learning Objectives:

The student will be able to...

1. Describe how flowers, double fertilization, and fruits are unique features of the angiosperm life cycle. (**Course Goal 1, 2, 4, 6; Gen Ed 1, 3, 4; Core A, B, D, E**)
2. Learn how flowering plants reproduce sexually, asexually, or both ways. (**Course Goal 1, 2, 4, 6, 7, 8; Gen Ed 1, 3, 4; Core A, B, D, E**)
3. Discuss how humans modify crops by plant breeding and genetic engineering. (**Course Goal 1, 2, 3, 4, 6, 7, 8, 9; Gen Ed 1, 3, 4, 8, 9; Core A, B, C, D, E, G**)

***Test 1: Covers units 1 – 4.**

Unit 5: An Overview of Animal Diversity

Learning Objectives:

The student will be able to...

1. Discuss how animals are multicellular, heterotrophic eukaryotes with tissues that develop from embryonic layers. (**Course Goal 1, 2, 5, 6; Gen Ed 1, 3, 4; Core A, B, D, E**)
2. Identify characteristics of animals. (**Course Goal 1, 2, 5, 6; Gen Ed 1, 3, 4; Core A, B, D, E**)
3. Describe features of animal body plans. (**Course Goal 1, 2, 5, 6; Gen Ed 1, 3, 4; Core A, B, D, E**)

Unit 6: Invertebrates

Learning Objectives:

The student will be able to...

1. Identify organisms that are grouped as invertebrates. (**Course Goal 1, 2, 5, 6, 7; Gen Ed 1, 3, 4; Core A, B, D, E**)
2. Describe body plan, characteristics, and life cycles of the phyla Porifera, Cnidaria, Platyhelminthes, Rotifera, Nemertea, Mollusca, Annelida, Nematoda,

Arthropoda, and Echinodermata. **(Course Goal 1, 2, 5, 6, 7, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**

3. Identify the characteristics that group echinoderms and chordates as deuterostomes. **(Course Goal 1, 2, 5, 6, 7; Gen Ed 1, 3, 4; Core A, B, D, E)**

Unit 7: Vertebrates

Learning Objectives:

The student will be able to...

1. Describe body plan, characteristics, and life cycles of the phylum Chordata and subphylum Vertebrata. **(Course Goal 1, 2, 5, 6, 7; Gen Ed 1, 3, 4; Core A, B, D, E)**
2. Describe the characteristics of vertebrates divided into the groups of craniates and gnathostomes. **(Course Goal 1, 2, 5, 6, 7; Gen Ed 1, 3, 4; Core A, B, D, E)**
3. Describe the characteristics of vertebrates divided into the groups of tetrapods and amniotes. **(Course Goal 1, 2, 5, 6, 7; Gen Ed 1, 3, 4; Core A, B, D, E)**
4. Identify unique characteristics of animals that fit the categories of mammals, primates, and humans. **(Course Goal 1, 2, 5, 6, 7; Gen Ed 1, 3, 4; Core A, B, D, E)**

Unit 8: Basic Principles of Animal Form and Function

Learning Objectives:

The student will be able to...

1. Describe how animal form and function are correlated at all levels of organization. **(Course Goal 1, 2, 5, 6; Gen Ed 1, 3, 4; Core A, B, D, E)**
2. Discuss how feedback control loops maintain the internal environment in many animals. **(Course Goal 1, 2, 5, 6, 7, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**
3. Identify how the homeostatic processes for thermoregulation involves form, function, and behavior. **(Course Goal 1, 2, 5, 6, 7; Gen Ed 1, 3, 4; Core A, B, D, E)**
4. Explain how energy requirements are related to animal size, activity, and environment. **(Course Goal 1, 2, 5, 6, 7, 9; Gen Ed 1, 2, 3, 4; Core A, B, D, E)**

Unit 9: The History of Life on Earth

Learning Objectives:

The student will be able to...

1. Describe how the conditions on early Earth made the origin of life possible. **(Course Goal 1, 2, 3, 4, 5, 6, 7, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**
2. Discuss how the fossil record documents the history of life. **(Course Goal 1, 2, 4, 5, 6, 7, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**

3. Define the key events in life's history including the origins of single-celled and multi-celled organisms. **(Course Goal 1, 2, 4, 5, 6, 7, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**
4. Identify how major changes in body form can result from changes in developmental genes. **(Course Goal 1, 2, 5, 6, 7, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**
5. Discuss the idea that evolution is not goal oriented. **(Course Goal 1, 2, 5, 6, 7, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**

***Test 2: Covers units 5 – 9.**

Unit 10: An Introduction to Ecology and the Biosphere

Learning Objectives:

The student will be able to...

1. Discuss how ecology integrates all areas of biological research and informs environmental decision-making. **(Course Goal 1, 2, 3, 4, 5, 6, 7, 8, 9; Gen Ed 1, 2, 3, 4, 8, 9; Core A, B, C, D, E, G)**
2. Identify how interactions between organisms and the environment limit the distribution of species. **(Course Goal 1, 2, 4, 5, 6, 7, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**
3. Describe the aquatic biomes and discuss why they are diverse and dynamic systems that cover most of the earth. **(Course Goal 1, 2, 4, 6, 7, 8, 9; Gen Ed 1, 3, 4, 8, 9; Core A, B, C, D, E, F, G)**
4. Describe the structure and distribution of terrestrial biomes and how they are controlled by climate and disturbance. **(Course Goal 1, 2, 4, 6, 7, 8, 9; Gen Ed 1, 3, 4, 8, 9; Core A, B, C, D, E, F, G)**

Unit 11: Population Ecology

Learning Objectives:

The student will be able to...

1. Determine the dynamic biological processes that influence population density, dispersion, and demographics. **(Course Goal 1, 2, 4, 5, 7, 8, 9; Gen Ed 1, 2, 3, 4; Core A, B, D, E)**
2. Explain how life history traits are products of natural selection. **(Course Goal 1, 2, 4, 5, 7, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**

3. Discuss how the exponential model describes population growth in an idealized, unlimited environment. **(Course Goal 1, 2, 4, 5, 7, 8; Gen Ed 1, 2, 3, 4; Core A, B, D, E)**
4. Demonstrate how the logistic model describes how a population grows more slowly as it nears its carrying capacity. **(Course Goal 1, 2, 4, 5, 7, 8, 9; Gen Ed 1, 2, 3, 4; Core A, B, D, E)**
5. Identify the factors that regulate population growth that are density dependent and density independent. **(Course Goal 1, 2, 4, 5, 7, 8; Gen Ed 1, 2, 3, 4; Core A, B, D, E)**
6. Discuss how the human population is no longer growing exponentially but it is still increasing rapidly and how this impacts the environment. **(Course Goal 1, 2, 4, 5, 7, 8, 9; Gen Ed 1, 2, 3, 4; Core A, B, D, E)**

Unit 12: Community Ecology

Learning Objectives:

The student will be able to...

1. Explain community interactions and how they are classified by whether they help, harm, or have no effect on the species involved. **(Course Goal 1, 2, 4, 5, 7, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**
2. Discuss why dominant and keystone species exert strong controls on community structure. **(Course Goal 1, 2, 4, 5, 7, 8, 9; Gen Ed 1, 2, 3, 4; Core A, B, D, E)**
3. Explain how disturbance influences species diversity and composition. **(Course Goal 1, 2, 4, 5, 7, 8, 9; Gen Ed 1, 2, 3, 4; Core A, B, D, E)**
4. Determine the biogeographic factors that affect community biodiversity. **(Course Goal 1, 2, 4, 5, 7, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**
5. Identify how community ecology is useful for understanding pathogen life cycles and controlling human disease. **(Course Goal 1, 2, 4, 5, 7, 8, 9; Gen Ed 1, 3, 4, 8, 9; Core A, B, C, D, E, G)**

Unit 13: Ecosystems and Restoration Ecology

Learning Objectives:

The student will be able to...

1. Describe the physical laws that govern energy flow and chemical cycling in ecosystems. **(Course Goal 1, 2, 4, 5, 7, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**
2. Identify limiting factors that control primary production in ecosystems. **(Course Goal 1, 2, 4, 5, 7, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E)**

3. Discuss energy transfer between trophic levels and why it is typically only 10% efficient. (Course Goal 1, 2, 4, 5, 7, 9; Gen Ed 1, 2, 3, 4, 8, 9; Core A, B, C, D, E, G)
4. Explain the biological and geochemical processes, which cycle nutrients between organic and inorganic parts of an ecosystem. (Course Goal 1, 2, 4, 5, 7, 8, 9; Gen Ed 1, 3, 4; Core A, B, D, E)
5. Explain how human activities now dominate most chemical cycles on earth. (Course Goal 1, 2, 4, 5, 7, 8, 9; Gen Ed 1, 3, 4, 8, 9; Core A, B, C, D, E, G)

***Test 3: Covers units 10 – 13.**

Philosophy of the course:

General Biology II (BIO 102) is intended to provide you with a continued exposure to a broad realm of fundamental concepts in the biological sciences. This course will assist you in attaining a basic understanding of biological principles, and it will help you to develop essential skills in these areas. The lecture presentations and discussions, laboratory experiments and exercises, lab quizzes, lab reports and practicals, textbook reading assignments, and major tests will provide you with an integrated selection of learning activities which can lead you to success. You are ultimately responsible for your own level of learning. It is you who will decide and determine how much time and effort will be devoted to this course and consequently how much you will learn from it.

Classroom conduct:

The college welcomes students into an environment that creates a sense of community, pride, and respect.

Attendance

It is a student's responsibility to attend all classes. If a class meeting is missed, the student is responsible for content covered, announcements made in his/her absence, and for acquiring materials distributed in class. The laboratory component of the course is critical to satisfying the course objectives. *A student who misses more than two laboratory sessions will fail the course. A passing grade must be obtained in the laboratory in order to pass the course.*

Tardiness

It is expected that students will be on time for all classes. Students must be on time for all exams. Students late for an exam will be denied the opportunity to take the exam. A student who enters the laboratory late may not be able to participate in the lab. *A student who is late for lab will miss the lab quiz and forfeit the points.*

Behavior

Students are expected to follow ordinary rules of courtesy during class sessions. The instructor has the right to eject a disruptive student from the class at any time. *Phones and other devices are to be turned off prior to the start of and not used during class time. This includes texting.* Leaving class and then returning while the class is in

session is not acceptable behavior. Children are not permitted in the classroom without prior approval of the instructor.

Evaluation of student learning:

All exams covering lecture and textbook content are given in class. Students must take the exams when they are normally scheduled. It is the students' responsibility to be present to take and complete all exams. Absence constitutes a zero score on any missed exam. Each exam can be taken one time only and there normally will be no make-ups. In the case of an emergency, the student must contact the instructor within 24 hours. Examination questions may be objective (multiple choice, T-F, matching, or fill-in the-blank) and/or short answer essay. **You are expected to arrive on time in order to take the test.**

Grading Procedure

Grades are based on the total accumulation of earned points. All exams covering the lecture and textbook material, homework, in-class graded activities, all laboratory quizzes, lab reports and lab practicals contribute to the total number of possible points.

Because the laboratory component is critical towards satisfying the educational requirements of BIO 102, *any student missing more than 2 laboratory sessions will receive an "F" (Failure) final grade for the semester unless the student has already officially withdrawn from the course.* Missed laboratory sessions cannot be made up; therefore, any potential concerns should be discussed in advance with the laboratory instructor.

<u>% of Total Points Earned:</u>	<u>Final Course Grade:</u>
93 – 100	A
90 – 92	A-
87 – 89	B+
83 – 86	B
80 – 82	B-
77 – 79	C+
70 – 76	C
60 – 69	D
0 – 59	F

Accommodations

Mercer County Community College is committed to ensuring the full participation of all students in its programs. If you have a documented differing ability or think that you may have a differing ability that is protected under the ADA and Section 504 of the Rehabilitation Act, please contact Arlene Stinson in LB 216 stinsona@mccc.edu for information regarding support services. Anyone with accommodations must notify me one full week before testing in the college testing center for **each** exam. If you do not have a documented differing ability, remember that other student resources are available to all students on campus including academic support through our Learning Center located in LB 214.

Academic Integrity Statement:

Any student who (a) knowingly represents the work of others as his/her own; (b) uses or obtains unauthorized assistance in the execution of any academic work; or (c) gives fraudulent assistance to another student is guilty of cheating. Violators will be penalized in accordance with established college regulations, policies, and procedures. **All violations of academic integrity will be reported to the Academic Integrity Committee.** Refer to the Student Handbook for additional information.

Laboratory Guidelines and Safety Procedures

FOOD AND DRINKS ARE NOT ALLOWED IN THE LABORATORY, ever!

Be professional

1. Be on time
2. Observe safety procedures
3. Work collegially with others
4. Be prepared to spend the entire laboratory period working
5. DO NOT text message in the laboratory

Observe safety measures

1. Wear gloves
2. Wash your hands with soap and water
3. Wipe down your lab bench with disinfectant before and after use
4. Read labels and follow instructions carefully
5. Do not contaminate solutions
6. Dispose of items appropriately

Note the location of:

1. eye-wash station, shower, fire blanket, fire extinguisher, and safety goggles
2. regular trash, biohazard and glass waste disposal units
3. master shut-off switch for electricity
4. exits

Before leaving, make certain that:

1. equipment is turned off
2. the chair is pushed in
3. work surfaces and equipment in the chemical or biological laboratory are cleaned and left in a neat condition
4. hands are washed

Laboratory Outline

Week of	Laboratory
1	<u>Fungi</u>
2	<u>Photosynthesis</u> Lab Quiz #1 on Fungi
3	<u>Terrestrial Plants</u> Lab Quiz #2 on Photosynthesis
4	<u>Structure of Flowering Plants</u> Lab Quiz #3 on Terrestrial Plants
5	<u>Simple Animals</u> Lab Quiz #4 on Structure of Flowering Plants
6	<u>Mollusks, Segmented Worms, and Arthropods</u> Lab Quiz #5 on Simple Animals
7	<u>FIRST LAB SKILLS TEST</u> Covers Material for Weeks #1 to 6
8	<u>Echinoderms and Chordates</u>
9	<u>Evolutionary Mechanisms</u> Lab Quiz #6 on Echinoderms and Chordates
10	<u>Animal Behavior</u> Lab Quiz #7 on Evolutionary Mechanisms
11	<u>Population Growth</u> Lab Quiz #8 on Animal Behavior
12	<u>Ecological Relationships</u> Lab Quiz #9 on Population Growth
13	<u>Field Exercise on Ecological Application</u> Lab Quiz #10 on Ecological Relationships
14	<u>SECOND LAB SKILLS TEST</u> : Covers Material for Weeks #8 to 13

Determining Your Grade:

3 Major Tests:

- (1) First Major Test: Maximum of 100 points available – Your earned points = _____
(2) Second Major Test: Maximum of 100 points available – Your earned points = _____
(3) Third Major Test: Maximum of 100 points available – Your earned points = _____

Homework/Biomes assignment: Maximum 100 points – Your earned points = _____

400 Total Major Test Points Available – Your Total Earned Test Points = _____

Lab Report (5 points each):

1. _____ 6. _____
2. _____ 7. _____
3. _____ 8. _____
4. _____ 9. _____
5. _____ 10. _____

Lab Quizzes (10 points each):

1. _____ 6. _____
2. _____ 7. _____
3. _____ 8. _____
4. _____ 9. _____
5. _____ 10. _____

135 Total Lab Quiz and Lab Report Points available (with lowest dropped) – Your Total Earned Points = _____

Laboratory Skills Tests (50 points each):

Your Earned Points For Each Lab Skills Test:

1. _____ 2. _____

Your Total Earned Points in the lab _____ * 0.25 = _____.

Your Total Earned Points in the lecture _____ * 0.75 = _____.

Lab and Lecture points added _____ / 355 = _____ (final course grade).

Lastly, I reserve the right to modify and alter this course syllabus at any time during the semester as may be professionally necessary and appropriate.