

LAST REVIEW: 2010-2011

(i.e. 2006-2007)

NEXT REVIEW: 2015-2016

(i.e. 2011-2012)

STATUS: A

(A, I, D)

COURSE TITLE: General Botany Lab

COMMON COURSE NUMBER: BOT2010LL

CREDIT HOURS: 1

CONTACT HOUR BREAKDOWN

(Per 16 week term)

CLOCK HOURS:

(Voc. Course ONLY)

Lecture:

Lab: **32**

Clinic:

Other:

PREREQUISITE(S): None

COREQUISITE(S): BOT2010L

PRE/COREQUISITE(S):

COURSE DESCRIPTION *(750 characters, maximum):* **Laboratory experiments and field trips to accompany BOT 2010. Upon successful completion of this course, The student shall: be able to demonstrate knowledge of the plant kingdom through prescribed activities that focus on morphology, taxonomy, anatomy and physiology of selected representative specimens. Dissection exercises included. Special fee charged.**

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 TITL

- 1. Reading and Writing in the Botanical Sciences**
- 2. Plant Gross Morphology**
- 3. Plant Taxonomy**
- 4. Microscope and Cells**
- 5. Plant Pigments and Chromatography (Optional)**
- 6. Stems**
- 7. Leaves**
- 8. Plant Metabolism**
- 9. Roots**
- 10. Soil Analysis (Optional)**
- 11. Flowers**
- 12. Fruit**
- 13. Propagation - Asexual (Optional)**
- 14. Ecology**
- 15. Survey of the Plant Kingdom**

*** 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**	2.5 3.3 4.4 5.2 6.3 7.4 8.5 9.5 10.2 11.1 12.1 13.4 14.1 15.2
2. Write clearly and coherently**	2.6 3.4 4.2 5.5 6.5 7.3 10.3 11.6 12.6 13.9 14.4 15.6
3. Demonstrate literacy as appropriate within a given discipline** B – Technology literacy F – Scientific literacy G – Environmental literacy	B – 4.1, 4.3; 5.3, 5.4; 7.7; 8.3, 8.6; 10.1,10.7, 10.8; 13.1, 13.2, 13.3, 13.5, 13.6, 13.7, 13.8 F – 2.1, 2.2, 2.3, 2.5, 2.6; 3.1, 3.3; 4.4; 5.1, 5.2; 6.1, 6.2, 6.3, 6.4, 6.6; 7.1, 7.2, 7.3, 7.4; 8.1, 8.4, 8.5; 9.1, 9.2, 9.3, 9.4, 9.5, 9.6; 10.1, 10.2, 10.3, 10.7; 11.1, 11.2, 11.3, 11.4, 11.5, 11.6; 12.1, 12.2, 12.3, 12.4, 12.5, 12.6; 13.4, 13.8,13.9; 14.4; 15.1, 15.2, 15.3, 15.4, 15.5, 15.6 G – 2.4; 7.5; 10.1, 10.6; 11.7; 14.1, 14.2, 14.3
4. Apply problem solving skills or methods to make informed decisions in a variety of contexts**	2.4; 3.2; 5.5; 7.5; 10.6; 12.3; 14.2
Course must include at least <u>one</u> of the following:	
5. Differentiate between ethical and unethical behavior	
6. Demonstrate an understanding of the physical, biological, and social environments and how individual behaviors impact this complex system.	2.4; 7.5; 8.2; 10.4, 10.6; 11.7; 14.1, 14.2, 14.3; 15.3
7. Demonstrate an understanding of and appreciation for human diversities and commonalities.	
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	6.2, 8.1, 10.5, 14.4
3. Research Papers	
4. Group projects	
5. Discussions (In class and online)	2.4, 3.1, 8.2, 15.3
6. Multiple Choice tests	11.2, 12.2, 14.1, 15.5
7. Presentations	
8. Service Learning Projects	
9. Quizzes (pop, announced, etc.)	
10. Take-home tests	
11. Summaries, critiques, and analyses	2.1, 3.2, 5.1, 12.6
12. Reaction papers	
13. Surveys	
14. Performance	
15. Short answer tests	6.6, 7.4, 9.3, 11.6
16. Classroom debates and colloquia	
17. Blogs, wikis, web pages	
18. Other (Please explain) Diagrams, concept maps	4.5, 5.5, 6.3, 9.2

UNITS Plant Gross Morphology**Unit 1 Reading and Writing in the Biological Sciences****General Outcome:**

- 1.0 The student shall be able to demonstrate reading with critical comprehension by clearly communicating 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 through an analysis of the textbook, lab manual, and assigned readings shall be able to:

- 1.1 demonstrate in writing the ability to analyze and extract data relevant to biology from course related readings.
- 1.2 evaluate the validity of information from a variety of sources.
- 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.

Unit 2 Plant Gross Morphology

General Outcome:

- 2.0 **The student shall: be able to demonstrate an understanding of the external parts of angiosperm stems and leaves.**

Specific Measurable Learning Outcomes:

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

- 2.1 **discriminate between monocot and eudicot plants.**
- 2.2 **discriminate between woody and herbaceous stems.**
- 2.3 **discriminate the different leaf types.**
- 2.4 **select the leaf type that would be the most environmentally effective in phytoremediating a selected ecosystem.**
- 2.5 **compare phyllotaxis.**
- 2.6 **assess the functions of terminal and axillary buds.**

Unit 3 Plant Taxonomy

General Outcome:

3.0 The student shall: be able to demonstrate an understanding of plant identification.

Specific Measurable Learning Outcomes:

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

- 3.1 evaluate plant keys.**
- 3.2 select the most appropriate plant key for selected specimens.**
- 3.3 categorize plants utilizing a plant key.**
- 3.4 decide what are the pitfalls in using any plant key.**

Unit 4 Microscope and Cells

General Outcome:

- 4.0 The student shall: be able to demonstrate an understanding of how to operate a dissecting and light microscope.**

Specific Measurable Learning Outcomes:

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

- 4.1 operate proficiently both dissecting and light microscopes.**
- 4.2 compare the functions of each part of both the dissecting and light microscopes.**
- 4.3 assemble proficiently various wet mounts.**
- 4.4 justify the uses of different plant tissue dyes.**
- 4.5 contrast the basic cell types.**

Common Course Number: BOT2010L

Unit 5 Plant Pigments and Chromatography (Optional)

General Outcome:

5.0 The student shall: be able to demonstrate an understanding of chromatograms of selected plant pigments.

Specific Measurable Learning Outcomes:

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

- 5.1 assess the value of chromatography in identifying unknown compounds.**
- 5.2 evaluate selected types of chromatography.**
- 5.3 create proficiently a chlorophyll extract and run a paper chromatogram.**
- 5.4 determine proficiently the identification of unknown substances when compared to controls.**
- 5.5 design the reference index of a chromatogram.**

Unit 6 Stems

General Outcome:

- 6.0 The student shall: be able to demonstrate an understanding of the development, morphology and anatomy of angiosperm and gymnosperm plant stems.**

Specific Measurable Learning Outcomes:

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

- 6.1 generate an explanation of vascular tissue ontogeny development in stems.**
- 6.2 compare the primary and secondary meristems and the tissues produced by each.**
- 6.3 contrast the tissues in plant stems.**
- 6.4 determine the functions of each stem cell and the tissue in which it is found.**
- 6.5 inventory the differences among monocot, eudicot and gymnosperm stems.**

Unit 7 Leaves

General Outcome:

- 7.0 The student shall: be able to demonstrate an understanding of the development, morphology and anatomy of angiosperm and gymnosperm plant leaves.**

Specific Measurable Learning Outcomes:

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

- 7.1 generate an explanation of vascular tissue ontogeny development in leaves.**
- 7.2 compare the primary meristems and tissues produced by each.**
- 7.3 contrast the tissues and cell types in leaves.**
- 7.4 determine the functions of each leaf cell type.**
- 7.5 select the plant stomata that would have the most environmentally positive effect on a selected ecosystem.**
- 7.6 inventory the differences among monocot, eudicot and gymnosperm leaves.**
- *7.7 create proficiently various hand sectioned leaf specimens and stained live tissue.**

***Optional**

Unit 8 Plant Metabolism

General Outcome:

- 8.0 **The student shall: be able to demonstrate an understanding of the physiological processes concerned with the digestive and respiratory processes occurring in plant tissues.**

Specific Measurable Learning Outcomes:

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

- 8.1 **formulate an explanation of stored foods in plants.**
- 8.2 **examine the environmental impact of stored plant foods on a selected ecosystem.**
- *8.3 **create an extract of the stored foods in seeds and test for the presence of lipids, proteins, and carbohydrates.**
- 8.4 **determine the enzymes necessary for cellular respiration.**
- 8.5 **compare the products and by-products of cellular respiration.**
- 8.6 **test for the presence of starch in any plant tissue.**

***Optional**

Unit 9 Roots

General Outcome:

- 9.0 **The student shall: be able to demonstrate an understanding of the development, morphology and anatomy of plant root systems.**

Specific Measurable Learning Outcomes:

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

- 9.1 **generate an explanation of vascular tissue ontogeny development in roots.**
- 9.2 **differentiate the four root tip zones.**
- 9.3 **contrast the primary and secondary meristems and the tissues produced by each.**
- 9.4 **compare the tissues and cells in plant roots.**
- 9.5 **analyze the functions of each root cell and the tissue in which it is found.**
- 9.6 **determine the differences among monocot, eudicot and gymnosperm roots.**

Unit 10 Soil Analysis (Optional)

General Outcome:

- 10.0 **The student shall: be able to demonstrate an understanding of soil structure, classification, and analyzing soil for humus, pH, nitrogen, phosphorus and potassium.**

Specific Measurable Learning Outcomes:

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

- 10.1 **determine the structure of a soil by mechanical analysis and feel.**
- 10.2 **contrast soil classes based on relative amounts of sand, silt and clay particles.**
- 10.3 **evaluate the nutrient analysis of a selected soil.**
- 10.4 **inventory the environmental impact of a nutrient poor soil on a selected ecosystem.**
- 10.5 **compare various methods of renourishing soil.**
- 10.6 **select the most environmentally beneficial method of renourishing soil.**
- 10.7 **assess the humus and pH values of a selected soil.**
- 10.8 **analyze a selected soil for the relative concentrations of nitrogen, phosphorus and potassium.**

Unit 11 Flowers

General Outcome:

- 11.0 The student shall: be able to demonstrate an understanding of the development, morphology and anatomy of angiosperm flowers.

Specific Measurable Learning Outcomes:

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

- 11.1 discriminate between monocot and eudicot flowers.
- 11.2 inventory the major parts of the flower.
- 11.3 differentiate the parts of the ovary.
- 11.4 examine the basic inflorescence types.
- 11.5 contrast complete, incomplete, perfect and imperfect flowers.
- 11.6 compare the difference between self and cross pollination.
- 11.7 determine the environmental impact of self versus cross pollination on other organisms in a selected ecosystem.

Unit 12 Fruit

General Outcome:

- 12.0 **The student shall: be able to demonstrate an understanding of the development, morphology and anatomy of angiosperm fruits.**

Specific Measurable Learning Outcomes:

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

- 12.1 **compare monocot and eudicot fruits.**
- 12.2 **inventory the parts of the fruit.**
- 12.3 **conclude whether a fruit came from a superior or inferior ovary.**
- *12.4 **categorize fruits utilizing a key.**
- 12.5 **distinguish between a normal fruit and an accessory fruit.**
- 12.6 **analyze the differences between a simple and a compound fruit.**

***Optional**

Unit 13 Propagation - Asexual (Optional)

General Outcome:

- 13.0 The student shall: be able to demonstrate an understanding of asexual methods employed in plant propagation.

Specific Measurable Learning Outcomes:

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

- 13.1 construct a simple propagation unit.
- 13.2 devise woody and herbaceous stem cuttings.
- 13.3 create herbaceous leaf cuttings.
- 13.4 judge the merits of different propagation mediums.
- 13.5 demonstrate proficiency in the process of marcottage.
- 13.6 demonstrate proficiency in making T and chip buds.
- 13.7 demonstrate proficiency in making veneer and cleft grafts.
- 13.8 compare budding and stem grafting.
- 13.9 evaluate the differences between a scion and a rootstock.

Unit 14 Ecology

General Outcome:

- 14.0 **The student shall: be able to demonstrate an understanding of the relationship of plants to their environment.**

Specific Measurable Learning Outcomes:

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

- 14.1 **contrast selected plant habitats and the relationship of plants to their environment.**
- 14.2 **select the most environmentally suitable plant for a selected ecosystem.**
- 14.3 **evaluate the environmental impact of an unsuitable plant on organisms in a selected ecosystem.**
- 14.4 **generate an explanation of the differences between xerophytic, mesophytic, and hydrophytic habitats.**

Unit 15 Survey of the Plant Kingdom

General Outcome:

- 15.0 The student shall: be able to demonstrate an understanding of algae, fungi, bryophytes and prototracheophytes .

Specific Measurable Learning Outcomes:

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

- 15.1 differentiate the thallophytes and tracheophytes.
- 15.2 evaluate and discuss the basic life cycles of selected algae.
- 15.3 determine the environmental impact of algae blooms on a selected ecosystem.
- 15.4 evaluate and discuss the basic life cycles of selected fungi and lichens.
- 15.5 evaluate and discuss the basic life cycles of selected prototracheophytes.
- 15.6 evaluate and discuss the basic life cycles of selected ferns.