##### Biology 271: Introduction to Plant Biology: Policies

T-TH 9:30 AM in 202 Wilson Hall

Lab (required): sec 401 T, 12:30-3:20 PM; Lab sec 402: W, 12:30-3:20 PM, in 140 Wilson Hall

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Lab Instructor: Derick Poindexter Office: 401a Coker Hall (Herbarium)

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**Objectives of the course:** The purpose of this course is to acquaint you through a variety of activities with the group of organisms termed plants. These organisms are distinctive relative to other types in the following ways:

1. They have indeterminate growth, localized in specific regions termed meristems;
2. plants don’t move (although their reproductive cells might);
3. plants are the major organisms that convert carbon dioxide into sugar, using the energy of the sun. Plants, chemoautotrophic bacteria and photosynthetic protists are the primary producers and only organisms that pull new energy into the biosphere;
4. plants exhibit many adaptations to cope with survival on land in their structural organization, their methods of reproduction, and their biochemistry/metabolism that add to our understanding of biological processes;
5. plants are of major importance to humans as a source of food, clothing, shelter, fuel, medicines, etc.

For these reasons, especially item 3, a study and understanding of plants is an essential part of biological training and can be applied in many every-day situations by biology majors or non-majors.

**Target audience:** Students (biology majors or non-majors) who have taken introductory biology and require a course with lab, and ideally who are interested in the diversity of life (which includes plants)**.** Second-semester freshmen-seniors are eligible.

**Goals:** We will examine these many facets of plants and by the end of the course, you should be able to

1) list the distinctive features of plants

2) describe and understand how a typical plant is constructed

3) describe how plants photosynthesize and generate energy

4) discuss aspects of structure and function that makes up the diversity of plants present in the world

5) describe and understand the various ways plants live and reproduce, how they maintain or promote variation, and ways they are adapted to particular environments

6) know important facts about how to grow plants and what their nutritional requirements are

7) recognize the major groups of plants and assess their relationships

8) know several ways plants are used by people

**Lectures** will be designed to facilitate these objectives; you are strongly encouraged to take an active part in discussions during lecture. To prepare, you should read the assigned reading BEFORE the given lecture, look up unfamiliar terms, and consider any questions that have been posed. At times you may be asked to prepare an assigned reading, which will allow you to solve problems during the class hour that illustrate important points. I will ask questions during class, or arrange other means of active involvement. I encourage you to study in small groups and to share information with each other prior to an exam or during projects.

**Labs** are designed to illustrate topics covered in lecture- and usually occur after the topic is presented in lecture. A separate syllabus will be provided for the lab.

Read lab handouts BEFORE the laboratory itself and prepare by referring to text or notes about that particular topic. Some labs involve exploring plant structure through dissection, hand-sectioning, observing prepared slides; others explore functions or processes via experiments or **field trips**. Field trips are to the Botanical Garden, accessible by certain buses from campus. You may be asked to questions about your field experience. Several lab quizzes, which count towards the final grade, will be given and discussed further in the lab syllabus.

**Text: *Raven’s* *Biology of Plants*, R. Evert, and S. Eichorn. 2013. 8th edition. Freeman and Worth, publishers. A few, hopefully short, extra reading assignments may be given to supplement the text, especially in areas of ongoing research. These will be posted as pdfs.**

**Lab guide is available through Student Stores**

**To obtain the correct course materials for class, use this to order the text from UNC textbook dept if that is where you plan to purchase it. It definitely is the only source for the lab guide**

[**https://tinyurl.com/biol-271-001-unc-w19**](https://tinyurl.com/biol-271-001-unc-w19)

**Expectations:** I expect that you will attend class; although formal attendance will not be recorded, the class is small enough that your absence will be noted. You should be prepared for lectures by having done the assigned reading or exercise. You should participate in class, ask questions when you don’t understand a concept, and work towards applying concepts or tying together different topics.

**Projects:** There will be two formal projects during the semester, each worth 25 points: 1) human uses of plants (during February) and 2) a case study of plant pollinator interactions (March-April). Both will require research, either independently or in teams, presentation of results- for the first project, as a poster, and for the second project, either that or a brief oral presentation, and a brief, but comprehensive and thoughtful report. More information will be provided in class about these. Resources for these projects include library, internet, and materials posted by the professor. Students can work together in groups of two.

**Exams and Grading:** There will be two full period closed-book lecture exams, each worth 70 points and one final exam worth 75 points. The final exam will be cumulative. I plan to give a short quiz in class **during any class** that covers the material we have discussed that week. I also will assign 1-2 writing projects. These will collectively= a total of 40 points- the lowest grade will be dropped. Also, lab quizzes will be given at times indicated by the TA. The lowest lab quiz grade will be dropped, so lab quizzes will total 100 pts. The projects total 40 points.

Total points to be earned from lecture tests: 140

Total points to be earned on quizzes 40

Projects 50

Total points possible 230

The Honor Code pledge will be a part of each exam.

Your final grade will be determined as the points earned out of 230. A letter grade will be based on the following APPROXIMATE scale: A= 90-100%, B= 80-90%, C= 70-80%, D= 60-70%, F= less than 60 %. I usually end up scaling the grades at least a little.

Students are encouraged not to miss an exam; formal excuses for illness or sport-related trips are accepted (for the latter, preferably in advance) and a makeup exam then will be scheduled. There is no make-up for missing a quiz.

If you wish to meet with Dr. Gensel or the TA, please make an appointment; we are happy to arrange a time!

Materials will be posted either via Sakai, or on a course website

“The professor reserves to right to make changes to the syllabus, including project due dates and test dates (excluding the officially scheduled final examination), when unforeseen circumstances occur. These changes will be announced as early as possible so that students can adjust their schedules.”

The Department of Biology values the perspectives of individuals from all backgrounds reflecting the diversity of our students. We broadly define diversity to include race, gender identity, national origin, ethnicity, religion, social class, age, sexual orientation, political background, and physical and learning ability. We strive to make this classroom and this department an inclusive space for all students.

See next page for schedule of topics in lecture

##  Biology 271: Introduction to Plant Biology

#  Lecture schedule, Spring 2019

#### Date Topic Assigned Reading

Th, Jan.10 General Introduction, what is a plant? Basic plant groups Ch. 1, Ch. 12

 Recognizing and describing plants

### Tu, Jan. 15 Plant organization: plant cells, cell walls Ch. 3

*What features or structures are unique to plant cells?*

 *What is endosymbiosis?*

 *How does the cell wall allow materials to move in and out of cells?*

### Th, Jan. 17 Cell connections; Chemistry of cells; Ch. 2 plus p. 497-8

###  *1)Are plants aggregations of cells or simply one much-* Ch. 4 – 82-90

###  *compartmentalized cell?*

###  *2) what are the major compounds found in plants;*

### *3) distinguish primary from secondary metabolites,*

### *4) what are the functions of these compounds?*

 *5) what is co-evolution?*

**Introduce Project I- Plant products and impact on people**

Tu, Jan. 22 Mitosis and cytokinesis in plants; start QUIZ Ch. 3- pp. 62-74

Movement across membranes Ch. 4, to p. 80

*Assignment: review mitosis and determine: 1) 2-3 ways plant cells*

*differ from animal cells, in structure or process during mitosis*

Th, Jan 24 Turgor and cell elongation, cell differentiation Ch. 4; ch. 23

  *Why is turgor so important in plants? Plasmodesmata?*

 *What happens when a plant wilts?* Ch. 23

 Stages in plant growth- seed to seedling Ch. 22 plus

Tu, Jan. 29 Seed to seedling, contd. Primary tissues as above

### Th, Jan 31 Building a plant/ how plants work: QUIZ Ch. 24

 The primary plant body-roots, start shoots

 *For this and next topic, what are the major cells and*

 *tissues in a root, a shoot, a leaf? How do they differ?*

Tu, Feb 5 The primary plant body- shoots, start leaves Ch. 25 to p. 590

 *Is a tree trunk a shoot?*

Th, Feb 7 Leaves and reproductive structures Ch. 25 plus p. 460-

 BRING IN ONE OR TWO FLOWERS IF POSSIBLE 465

Tu, Feb.12 Secondary growth in plants Ch. 26

 *When does secondary growth occur? Where in the plant does*

 *it occur? What tissues are produced? Of what significance to*

 *plants, to humans, is the production of these tissues?*

Th, Feb. 14 1) Transport of water and photosynthate in plants Ch. 30

*How do materials move around in plants?*

**2) START Growth and development**: hormones. Part 1 Ch. 27

*What is a hormone/plant growth regulator? Do plants have*

 *glands? What are some of the main controls of growth and*

 *development in plants?*

Tu, Feb.19 **EXAM 1: INTRODUCTION through SECONDARY GROWTH**

Th, Feb. 21Growth regulators, part 2, Light induced reactions QUIZ Ch. 28

 *Arrive in class with definition of tropism, circadian rhythm,*

 *Day-neutral; What is the ABCDE model of flowering?* plus p. 604-

Tu, Feb. 26 POSTER SESSION I

Th, Feb 28 POSTER SESSION 2

Tu, Mar 5 Growth regulators, part 3

Th, Mar 7 **Growing plants well:** plant nutrition and soils Ch. 29

*Why is it so important to have the correct type of soil*

*when growing plants?*

**Mar 8-17 Spring Break**

Tu, Mar. 19 **Metabolism: Plants’ major contribution to the** Ch. 5, 7

 **biosphere: photosynthesis** *(*end of light-independent

*How do plants counteract the tendency towards entropy/*  reactions)

 *What is/are the essence of the photosynthetic processes?*

Th, Mar 21 Photosynthesis-C4, CAM, adaptations Ch. 7, p. 138-end *These appear to be adaptations- to what, how?*

T, Mar 26 **Sexual reproduction:** Meiosis, genetic variation, life cycles Ch. 8

 *Review meiosis; bring questions about it*

 *What is meant by alternation of generations*

**Start How to recognize the major groups of plants**, life cycles p. 345- 347

Non-vascular plants 353-358, ch. 16

**Introduce Project 2- a pollination biology study**

Th, Mar 28 Continue: Spore producing plants: bryophytes (cont’d), ferns, Ch. 16, 17

 lycopsids *Which of these lack vascular tissues? What is free-sporing*

 *reproduction?*

**Tu Apr 2 Exam 2: TRANSPORT through sexual reproduction**

 **and the basic plant life cycle**

Th, Apr 4 Major plant types: heterospory, the seed habit, gymnosperms Ch. 18

 *What is a seed? What are the distinguishing features of*

 *Gymnosperms?*

Tu, Apr. 9 Flowering plants- Angiosperms basic features Ch 19, 20

 *How are flowering plants different?*

Th, Apr. 11 Genetic variation and speciation; breeding systems Ch. 11

###  *How can plants best adapt to their environment in regard to*

 *reproducing. Breeding systems in plants*

T, Apr. 16 Plant defenses Assigned reading

Th, Apr. 18 Pollination reports

T, Apr 22 Pollination reports

Th, Apr. 24 Summary, review

**FINAL EXAM, Friday, May 3, 8 AM**