

Concepts of Biology: Plants and People (BIOL 101); Fall 2010
Lectures: TTh 8:10 – 9 AM, DWR10; Lab: Th 1:10 – 4:00 PM, DWR 203

Instructor: Ann Willyard

Email: willyard@hendrix.edu

Office: 316 DWR; Phone: 501-450-1376; Office Hours: Tues 2 - 4 PM; Fri. 9:30 - 11 AM

Required Texts:

Levetin and McMahon 2008. *Plants and Society*, Fifth Ed. (ebook option)

Pollan 2001. *Botany of Desire*

Levetin, McMahon, and Reinsvold 2002. *Laboratory Manual for Applied Botany*

Lecture

Dates	Wk#	Lecture Topic	Text	Other reading
8/24, 8/26	1	Science; Plant Cells	Ch 1-2	Evert2005_EvilMice
8/31, 9/2	2	Tissues & Organs	Ch 3	Millus2002_wood
9/7, 9/9	3	Quiz #1; Plant Physiology	Ch 4	Long2006_CO2
9/14, 9/16	4	Diversity & Life Cycles	Ch 9	Zhou2003; LeBars1997_Ginkgo
9/21, 9/23	5	Exam #1; Flowers	Ch 5	BOD Intro & Ch 2 Tulip
9/28, 9/30	6	Fruit	Ch 6	BOD Ch1 Apple
10/5, 10/7	7	Quiz #2; Genetics	Ch 7	Whitt2002_maize
10/12	8	Systematics	Ch 8	Yoon2009; Jiao2009_taxonomy
10/19, 10/21	9	Evolution; Agriculture	Ch 8; 11	Diamond2002_domestic
10/26, 10/28	10	Exam #2; Nitrogen	Ch 13	Niklas2007_papaya
11/2, 11/4	11	Starches; Feed World	Ch 14-15	Potrykus2010; Paine2005_Golden Rice
11/9, 11/11	12	Quiz #3; Spices; Fiber	Ch 17-18	BOD Ch 4 Potato & Fungus
11/16, 11/18	13	Stimulate; Psychoactive	Ch 16, 20	Clark1985_starling
11/23	14	Quiz #4; Poisonous Plants	Ch 21	BOD Ch 3 Marijuana
11/30, 12/2	15	Medicinal; Exam #3	Ch 19	n/a

Comprehensive Final Exam Wednesday, 12/8; 2:00-5:00 PM

Lecture Learning Goals:

1. Students will gain an understanding of the scientific method, including the formulation of testable hypotheses, the interpretation of experimental results, and the peer-review process used in the publication of scientific findings. They will become more effective citizens by learning how to assess the scientific support for conclusions that support policy decisions.
2. Students will recognize basic plant morphological and anatomical characteristics and the major features of prokaryotic and eukaryotic cells and be able to describe their main functions.
3. Students will appreciate the general principles of genetic inheritance and be able to describe the genetic implications for various modes of natural and artificial plant reproduction. They will know how the theory of evolution is supported by plant breeding experiments and vice versa.
4. Students will be aware of several important overarching themes concerning the interactions of plants and people, including the world's oxygen, carbon, and nitrogen cycles. They will appreciate the major ecological, social, and political processes that are driven by the domestication of plants for food, medicine, fiber, and energy production.

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Lecture Grading:

3 Midterm Exams @ 100	300
4 Quizzes @ 50	200
Final Exam	<u>200</u>
	700

Lecture Quizzes and Exams:

Four quizzes (**9 September, 5 October, 9 November, 23 November**) will provide 15-minute opportunities to write a short essay demonstrating a general understanding of outside readings assigned to date. Three midterm exams (**21 September, 26 October, and 22 November**) and the final exam (cumulative) will cover **all** assigned readings **and** all material presented in lecture.

Lab

<u>Date</u>	<u>Lab #, Theme</u>	<u>Exercises (LT, Lab Topic: Levetin et al. 2002)</u>
8/26	#1 Microscopy & Cells	1) Safety rules 2) Microscope exercise 3) LT1B: Cell Components (Onion) 4) Plant <i>Brassica rapa</i> 5) Nurture <i>B. rapa</i> daily
9/2	#2 Growth & Reproduction	1) Continue nurturing <i>B. rapa</i> 2) LT2A: Scope: <i>Allium</i> mitosis 3) LT2C: GH: Cloning from cuttings 4) Seed germination: <i>Phaseolus</i> sp.; <i>Zea mays</i>
9/9	#3 Tissues	1) LT8C: Hairy: hypothesis; count/cull <i>B. rapa</i> → Pollinate <i>B. rapa</i> : Sept. 10, 11, 12 2) LT3A: Scopes: Tissues 3) LT3B: Economic Fibers; Identify unknown
9/16	#4 Morphology	1) LT4A: Roots 2) LT4B: Scope: Stems 3) LT4C: Leaves; Intro to Keying 4) LT4E: Supermarket Botany
9/23	#5 Tree ID	1) Moore (2007) <i>Trees of Arkansas</i> - Campus Arboretum
9/30	#6 Physiology	1) Harvest <i>B. rapa</i> pods 2) LT5B: Starch test 3) LT5C: Transpiration 4) Start <i>Pleurotus ostreatus</i>
10/7	Lab Exam #1; turn in lab assignments #1-#6 for grading	

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10/14	Fall Break (no lab)	
10/21	#7 Flowers & Fruit	1) LT6A: Flower structure 2) LT7A: Fruit structure 3) LT7B: Supermarket Fruits 4) Plant <i>B. rapa</i> F ₁ 's 5) Nurture <i>B. rapa</i> daily
10/28	#8 Genetics	1) Continue nurturing <i>B. rapa</i> F ₁ 's 2) Probability: coin toss 3) Corn Dihybrid
11/4	#9 Algae	1) LT8C: Count <i>B. rapa</i> & analyze class data 2) LT9A: Algal Diversity 3) LT9C: Palmer Algal Pollution Index
11/11	#10 Fungi	1) LT11B: Botany of Baking (SLTC 107) 2) LT18A: Fungal Diversity 3) <i>P. ostreatus</i> Harvest → Hairy Results Due
11/18	#11 Bioactives	LT17A: <i>Lumbriculus variegatus</i> : tobacco/coffee/chill pill LT14C – Scoville Test → Species List & Botanical Dictionary Due
11/28	Thanksgiving (no lab)	

December

12/2 **Lab Exam #2; turn in lab assignments #7-#11 for grading**

Learning Goals for Laboratory:

1. Students will gain an understanding of the scientific method, including the formulation of testable hypotheses and the interpretation of experimental results.
2. Students will acquire skills in microscopy, plant identification, and plant propagation, and will understand how plants grow.
3. Students will be able to interpret botanical nomenclature, distinguishing family, species, and cultivar names.
4. Students will appreciate the general principles of genetic inheritance and be able to describe the long-term implications for various modes of natural and artificial plant reproduction. They will know how the theory of evolution is supported by plant breeding experiments and vice versa.
5. Students will increase their understanding of where our food comes from and will explore some of the world's diversity of foods derived directly from plants.

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Pre-Lab Reading:

Laboratory activities will be conducted with the expectation that each student will be prepared by **reading the** the background, then the exercise(s) for each lab. For complicated exercises or for techniques that are unfamiliar, rereading is advised. Readings not labeled 'LT' will be available on Educator.

Laboratory Grading:

2 Lab Exams @ 40	80
11 lab assignments @ 15	165
Hairy's Inheritance Results	25
Species List	15
Botanical Dictionary	<u>15</u>
	300

Hairy's Inheritance Results (25 pts)

You will create a chart and supporting text to present class results of our two-generation experiment in the inheritance of hairiness in a population of *Brassica rapa* plants.

Species List (15 pts)

We will encounter a large number of plant species in this laboratory. In order to become familiar with these species and with botanical nomenclature, each student will create their own species list. Each week, add all new plant names to your growing list, which should be sorted alphabetically, and should include all information shown below. Either MS Word or MS Excel work well; correct spelling is vital!

Family; Species (genus + epithet); Cultivar (if applicable); Common name(s); Notes

Botanical Dictionary (15 pts)

Develop a list of terms and their definitions. At a minimum, include **all bolded terms** in the lab manual for **each assigned exercise**, as well as terms used in each **lab introduction**. Your final list can be sorted alphabetically by term or you may sort the terms within categories that you find useful (e.g. Anatomy; Cell; Morphology; etc.). Ideally, you should create the definition in your own words. Word **derivations** are optional, but very helpful. For example, for 'chromoplast', you might include 'chromo=color' and 'plast=an organized unit of living matter, from plastos=molded'. MS Word or MS Excel work well for this assignment also.

Course Grading and Conduct

Grading:

Grades will be based on the total number of points earned in the class:

90-100% = A

80-89% = B

70-79% = C

69-69% = D

Laboratory grades, will count for 30% of the total. **No makeup examinations** and **no extra credit** will be given. If you miss a midterm or laboratory examination for a legitimate reason (e.g., an illness documented by a note from a doctor), the weight of your final examination will be increased. **Missing the final examination** will

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result in a zero for the final. Documentation of a legitimate reason for missing the final examination will be required to receive an “incomplete” for the course.

Attendance and Preparation:

This will be a challenging course that introduces a number of techniques that are likely to be unfamiliar to most students. Regular attendance is crucial. Students missing **two or more** classes before the deadline to add a course **will be dropped**. Pursuant to the policies in the Hendrix Catalog, absences will be excused for observance of religious holidays, illness, emergency, and for sanctioned school functions. You must provide me with appropriate documentation for excused absences. Please notify me of any circumstances requiring absence from the class, preferably in advance of the absence. Further, **late arrivals** are disruptive to the class. **Students who arrive late more than four times may be dropped from this course.**

Academic Integrity:

Students in this class will be expected to uphold high standards of honesty and fairness in academic pursuits. Please review the Hendrix Catalog regarding academic integrity. During examinations, each student is responsible for insuring that other students do not see his or her answers. **Passive cooperation** will be considered academic dishonesty. **All** instances of alleged academic dishonesty (plagiarism, cheating, stealing, collusion, or passive cooperation) in this class **will be reported** to the Committee on Academic Integrity.

Students with Disabilities:

“It is the policy of Hendrix College to accommodate students with disabilities, pursuant to federal and state law. Any student who needs accommodation in relation to a recognized disability should inform the instructor at the beginning of the course. In order to receive accommodations, students with disabilities are directed to contact Julie Brown in Academic Support Services at 505-2954.”

Conduct in Class:

Please refer to the standards of student conduct in the Hendrix Catalog. Students are expected to **not disrupt** the lab. A student who is asked to leave for disrupting the lab may be dropped from the class. **Text messaging, including reading incoming messages, is strictly prohibited in lab. If you choose to bring a phone, do not set it to notify you of incoming calls, and do not check the phone.**

In particular, students must abide by all laboratory safety rules. Each member of a lab team is responsible for cleaning and organizing their work area at the end of each lab and for leaving other areas they have used safe and tidy for the next worker. **Safety violations, careless handling of equipment, and/or neglect of clean-up protocols will result in points deducted for lab misconduct!**