

BIOLOGY 458

PLANT BIOCHEMISTRY AND BIOCHEMICAL ECOLOGY

Fall term 2018/19

Mon/Thurs 10:00 - 11:20 ECS130

INSTRUCTOR: Dr. Peter Constabel
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Cun 147a
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TEXTBOOK: none required. Optional textbook (Heldt, "*Plant Biochemistry*", 3rd or 4th edition) will be on reserve at the library and should be consulted to reinforce lectures. Some material is covered by Taiz and Zeiger's "*Plant Physiology*", also on Reserve. **Readings from the primary literature will be assigned every other week (5 in total).** You will be asked to do brief summaries of these readings to be handed in, followed by discussion in class.

COURSE OBJECTIVES:

To provide an introduction to plant chemicals, their role in the plant and ecosystem, and the biochemical basis of plant adaptation. Emphasis will be on plant-specific biochemical pathways and processes, and their regulation and molecular biology. Topics include: storage carbohydrates, cell wall biosynthesis, lipid metabolism, nitrogen fixation and assimilation; biochemistry and ecology of secondary plant metabolites such as isoprenoids, phenolics and alkaloids, and their roles in plant-animal and plant-environment interactions.

WEB-ACCESSIBLE / ADDITIONAL MATERIAL:

Lecture materials will available be prior to the lecture on CourseSpaces. **Please be aware that these are abbreviated notes. It is therefore imperative that you attend lectures.**

EVALUATION:	Mid-term examination (Oct 18, 2018)	20%
	Annotated Bibliography (for term paper)	5%
	Term Paper Final Draft	25%
	Assignments (brief questions on readings)	10%
	Final exam (cumulative): December 2018	40%
	Total	100%

Grading system: Percentages converted to letter grades

A+ 90-100	A 85-89.9	A- 80-84.9	
B+ 77-79	B 73-76	B- 70-72	
C+ 65-69	C 60-64	D 50-59	F 0-49.9

There will be no supplemental exam. Make-up final exams will only be considered if a Request for Academic Concession is provided. There will be no make-up midterm exams; if you miss a midterm, you must provide a **documented medical** reason.

Last day for adding courses: Sept 21.

Last day for dropping courses without penalty of failure: Oct 31

<u>LECTURE TOPICS:</u>	<u>Text Readings (Heldt ed. 4th)</u>	<u>Lecture Period #</u>	<u>Dates</u>
<u>Introductory lecture</u>			
• Importance of plant biochemistry & biochemical ecology		1	Sept 6
<u>Part A. Primary Metabolism (Carbon and Nitrogen)</u>			
• Tree Walk (weather permitting); review		2	Sept 10
• Carbohydrates: starch, sucrose, fructans, & other sugars	pp. 241-268	3-4	Sept 13, 17
• Structure and function of the cell wall	pp. 4-9, 268-270	5-6	Sept 20*, 24
• Fatty acid biosynthesis; plant oils & genetic engineering	pp. 359-378, 385-387	7-8	Sept 27, Oct 1
• Nitrogen assimilation	pp. 273-288	9	Oct 4*
Thanksgiving Monday		no lecture Oct 8th	
• Nitrogen fixation amino acid synthesis	pp. 307-318	10	Oct 11
• Shikimate pathway, aromatic amino acids, herbicides	pp. 297-300	11	Oct 15
MIDTERM EXAM		12	Oct 18
• Phenylpropanoid pathway & lignin biosynthesis	pp. 431-440	13	Oct 22*
<u>Part B. Secondary Metabolism & Chemical Ecology</u>			
• Phenolics: biosynthesis and ecological functions	pp. 399-402, 431-440	14	Oct 25
• Flavonoids and their diverse functions	pp. 442- 449	15-16	Oct 29, Nov 1
• Isoprenoids I - plant volatiles and signals	pp. 409-424	17	Nov 5
Term paper bibliographies due			Nov 5**
• Isoprenoids II - carotenoids, toxins, rubber		18	Nov 8*
Fall Reading Break (Nov 13-15)		no lecture Nov 13th	
• Alkaloids & medicinal plants	pp. 402-404	19-20	Nov 15, 19
• Glucosinolates and cyanogenic glycosides	pp. 404-407	21	Nov 22
FINAL TERM PAPERS DUE			Nov 24**
• Cannabis and hops phytochemistry		22	Nov 26*
• Special Topics & Review		23	Nov 29, Dec 3

NB: Textbook Heldt 3rd edition page numbers will be slightly different

* Reading summaries due date. These will be assigned at least one week before.

** Term paper/bibliography due dates