

# BIOLOGY 458

## PLANT BIOCHEMISTRY AND BIOCHEMICAL ECOLOGY

Fall term 2019/20

Mon/Thurs 10:00 - 11:20 Ell 160

**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.**

<b>EVALUATION:</b>	Mid-term examination ( <b>Oct 17, 2019</b> )	20%
	Annotated Bibliography (due <b>Nov 7</b> )	5%
	Term Paper Final Draft (due <b>Nov 25</b> )	25%
	Assignments (Questions on assigned readings)	10%
	Final exam ( <u>cumulative</u> ): December 2019	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 20.

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

Please be aware the University deals harshly with plagiarism. See UVic's guidelines on how to avoid it. (<http://library.uvic.ca/instruction/cite/plagiarism.html>).

<b><u>LECTURE TOPICS:</u></b>	<b><u>Text Readings (Heldt ed. 4th)</u></b>	<b><u>Lecture Period #</u></b>	<b><u>Dates</u></b>
<u>Introductory lecture</u>			
• Importance of plant biochemistry & biochemical ecology		1	Sept 5
<b><u>Part A. Primary Metabolism (Carbon and Nitrogen)</u></b>			
• Tree Walk (weather permitting); enzymes		2	Sept 9
• Calvin cycle and overview of metabolism		3	Sept 12
• Carbohydrates: starch, sucrose, fructans, & other sugars	pp. 241-268	4-5	Sept 16, 19
• Structure and function of the cell wall	pp. 4-9, 268-270	6-7	Sept 23*, 26
• Fatty acid biosynthesis; plant oils & genetic engineering	pp. 359-378, 385-387	8-9	Sept 30, Oct 3
• Nitrogen assimilation	pp. 273-288	10	Oct 7*
• Nitrogen fixation amino acid synthesis	pp. 307-318	11	Oct 10
<b>Thanksgiving Monday (Oct 14th)</b>	<b>no lecture</b>		
<b>MIDTERM EXAM</b>		<b>12</b>	<b>Oct 17</b>
• Shikimate pathway, aromatic amino acids, herbicides	pp. 297-300	13	Oct 21
• Phenylpropanoid pathway & lignin biosynthesis	pp. 431-440	14	Oct 24*
<b><u>Part B. Secondary Metabolism &amp; Chemical Ecology</u></b>			
• Phenolics: biosynthesis and ecological functions	pp. 399-402, 431-440	15	Oct 28
• Flavonoids and their diverse functions	pp. 442- 449	16	Oct 31, Nov 4
• Isoprenoids I - plant volatiles and signals	pp. 409-424	17	Nov 7
<b>Term paper bibliographies due</b>			<b>Nov 7**</b>
• Isoprenoids II - carotenoids, toxins, rubber		18	Nov 14*
<b>Fall Reading Break (Nov 13-15)</b>	<b>no lecture Nov 11th</b>		
• Alkaloids & medicinal plants	pp. 402-404	19-20	Nov 18, 21
• Glucosinolates and cyanogenic glycosides	pp. 404-407	21	Nov 25
<b>FINAL TERM PAPERS DUE</b>			<b>Nov 25**</b>
• Cannabis phytochemistry		22	Nov 28*
• Special Topics & Review		23	Dec 2

*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*