BIOLOGY 458: PLANT BIOCHEMISTRY AND BIOCHEMICAL ECOLOGY

Fall term 2021/22 Mon/Thurs 10:00 - 11:20 CLE C115

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

COURSE OBJECTIVES:

You will learn about natural plant chemicals, their role in the plant and ecosystem, and the biochemical basis of plant adaptation to the environment. Our focus will be on plant-specific biochemical pathways and processes, their regulation and molecular biology. The course is divided into primary metabolism (storage carbohydrates, cell wall biosynthesis, lipid metabolism, nitrogen fixation and assimilation) and special metabolism (biochemistry and ecology of secondary plant metabolites such as isoprenoids, phenolics and alkaloids, and their roles in plant-animal and plant-environment interactions). Students will become familiar with the diversity of plant metabolites, and impacts on health and the environment.

WEB-ACCESSIBLE / ADDITIONAL MATERIAL:

Lecture materials will available be prior to the lecture on Brightspace. **Please be aware that my notes are brief, and it is imperative that you attend the lectures.** Recordings will (hopefully) be available but are no substitute for in-person attendance.

EVALUATION:

Mid-term examination (**Oct 25, 2021**)	20%
Annotated Bibliography (due **Nov 12)**	5%
Term Paper Final Draft (due **Nov 27**)	25%
Assignments (Questions on assigned readings)	10%
Final exam (cumulative): December 2021	40%
Total	100%

Grading system: Percentages converted to letter grades

A+ 90-100	**A** 85-89.5	**A-** 80-84.5	
B+ 77-79.5	**B** 73-76.5	**B-** 70-72.5	
C+ 65-69.5	**C** 60-64.5	**D** 50-59.5	**F** 0-49.5

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, even if you miss the midterm for a medical reason.

Last day for adding courses: **Sept 24**
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. (https://www.uvic.ca/library/help/citation/documents/avoiding plagiarism guide).

Exam time can be very stressful. Try to avoid last minute studying, review the material every week, and

discuss it with your classmates. Stay healthy, and talk to me if you have any concerns. UVic Counselling Services is free and can help if you feel overwhelmed: https://www.uvic.ca/services/counselling/

LECTURE TOPICS:	**Text Readings (Heldt ed. 4th)**	**Lecture Period #**	**Dates**
Introductory lecture			
• Importance of plant biochemistry & biochemical ecology		1	Sept 9
Part A. Primary Metabolism (Carbon and Nitrogen)			
• Tree Walk on campus. Enzymes review		2	Sept 13
• Calvin cycle & overview of metabolism		3	Sept 16
• Carbohydrates: starch, sucrose, fructans, & other sugars	pp. 241-268	4-5	Sept 20, 23
• Structure and function of the cell wall	pp. 4-9, 268-270	6-7	Sept 27, Oct 4*
National Day for Truth & Reconciliation	***no lecture***		**Sept 30**
• Fatty acid biosynthesis; plant oils & biotechnological applications	pp. 359-378, 385-387	8-9	Oct 7, 14
Thanksgiving Monday (Oct 12)	***no lecture***		
• Nitrogen assimilation	pp. 273-288	10	Oct 18*
• Nitrogen fixation amino acid synthesis	pp. 307-318	11	Oct 21
MIDTERM EXAM		***12***	**Oct 25**
• Shikimate pathway, aromatic amino acids, herbicides	pp. 297-300	13	Oct 28
• Phenylpropanoid pathway & lignin biosynthesis	pp. 431-440	14	Nov 1*
Part B. Secondary Metabolism & Chemical Ecology			
• Phenolics: biosynthesis and ecological functions	pp. 399-402, 431-440	15	Nov 4
• Flavonoids and their diverse functions	pp. 442- 449	16	Nov 8
TERM PAPER BIBLIOGRAPHIES DUE			**Nov 12**
Fall Reading Break (Nov 10-12)	***no lecture Nov 11th***		
• Isoprenoids I - plant volatiles and signals	pp. 409-424	17	Nov 15
• Isoprenoids II - carotenoids, toxins, rubber		18	Nov 18*
• Alkaloids & medicinal plants	pp. 402-404	19-20	Nov 22, 25
• Glucosinolates and cyanogenic glycosides	pp. 404-407	21	Nov 29
FINAL TERM PAPERS DUE			**Nov 26**
• Cannabis and terpenophenolics		22	Dec 2*
• Special Topics & Review		23	Dec 6

NB: Textbook Heldt 3rd edition page numbers will be slightly different
** Reading summaries due date. These will be assigned at least one week before.*

We acknowledge and respect the lək̓ʷəŋən peoples on whose traditional territory the university stands and the Songhees, Esquimalt and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day.