BIOLOGY 458

PLANT BIOCHEMISTRY AND BIOCHEMICAL ECOLOGY

Fall term 2020/21
Mon/Thurs 10:00 - 11:20 (on-line)

INSTRUCTOR: Dr. Peter Constabel
Cun 147a
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Ph: 472-5140

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 be available prior to the lecture on Brightspace. **Please be aware that my notes are typically outlines, and it is therefore imperative that you listen to the lectures.**

EVALUATION:

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>Weightage</th>
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<tbody>
<tr>
<td>Mid-term examination (Oct 22, 2019)</td>
<td>15%</td>
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<tr>
<td>Annotated Bibliography (due Nov 5)</td>
<td>5%</td>
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<tr>
<td>Term Paper Final Draft (due Nov 27)</td>
<td>25%</td>
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<tr>
<td>Assignments (Questions on assigned readings)</td>
<td>10%</td>
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<td>Quizzes (bi-weekly)</td>
<td>10%</td>
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<td>Final exam (cumulative): December 2020</td>
<td>35%</td>
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<td>Total</td>
<td>100%</td>
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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 25
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).
# LECTURE TOPICS:

<table>
<thead>
<tr>
<th>Text Readings (Heldt ed. 4th)</th>
<th>Lecture Period #</th>
<th>Dates</th>
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<tbody>
<tr>
<td><strong>Introductory lecture</strong></td>
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<tr>
<td>• Importance of plant biochemistry &amp; biochemical ecology</td>
<td>1</td>
<td>Sept 10</td>
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## Part A. Primary Metabolism (Carbon and Nitrogen)

- Tree Walk (tentative); enzymes review
- Calvin cycle & overview of metabolism
- Carbohydrates: starch, sucrose, fructans, & other sugars
- Structure and function of the cell wall
- Fatty acid biosynthesis; plant oils & genetic engineering
- **Thanksgiving Monday (Oct 12)**
  - no lecture
- Nitrogen assimilation
- Nitrogen fixation amino acid synthesis

### MIDTERM EXAM

**12**

- Shikimate pathway, aromatic amino acids, herbicides
- Phenylpropanoid pathway & lignin biosynthesis
- pp. 297-300
- pp. 431-440

## Part B. Secondary Metabolism & Chemical Ecology

- Phenolics: biosynthesis and ecological functions
- Flavonoids and their diverse functions
- pp. 399-402, 431-440
- pp. 442-449

### TERM PAPER BIBLIOGRAPHIES DUE

**Nov 12**

- Fall Reading Break (Nov 13-15)
  - no lecture Nov 9th
- Isoprenoids I - plant volatiles and signals
- Isoprenoids II - carotenoids, toxins, rubber
- Alkaloids & medicinal plants
- Glucosinolates and cyanogenic glycosides
- Cannabis and terpenophenolics
- Special Topics & Review

### FINAL TERM PAPERS DUE

**Nov 26**

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

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

**Mini-quiz on preceding section**