



UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

1. **Course: BIOLOGY 505 – MEDICINAL PLANT BIOCHEMISTRY**

Lecture Sections: L01 MWF 12:00-12:50 SS 209 WINTER 2017

Course Coordinator: Dr. P. Facchini

Instructor(s): Dr. P. Facchini BI 396 220-7651 pfacchin@ucalgary.ca
Dr. D-K. Ro BI 393 220-7099 daekyun.ro@ucalgary.ca

D2L Course Website: BIOL 505 L01 (Winter 2017) – Medicinal Plant Biochemistry
Biological Sciences Department BI 186; (403) 220-3140; biosci@ucalgary.ca

2. **PREREQUISITE(S):** Biology 331 and Biochemistry 393

ANTIREQUISITE(S): Credit for both Biology 505 and Botany 503 will not be allowed.
See section 3.5.C in the Faculty of Science section of the online Calendar
(<http://www.ucalgary.ca/pubs/calendar/current/sc-3-5.html>)

3. **Grading:** The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Midterm Exam	30 %	In-Class February 27, 2017
Seminar	20 %	
Term Paper	20 %	
Final Exam	30 %	

There will be a final exam scheduled by the Registrar's office.

A passing grade is required for the final examination and laboratory reports. Each piece of work (term paper, seminar, midterm test or final examination) submitted by the student will be assigned a percentage score. The student's average percentage score for the various components listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

4. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in [Section 3.6](#). It is the student's responsibility to familiarize himself/herself with these regulations. See also [Section E.3](#) of the University Calendar

5. **Scheduled out-of-class activities:** Dates and times of approved class activities held outside of class hours. N/A

REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY. If you have a clash with this out-of-class-time-activity, please inform your instructor as soon as possible so that alternative arrangements may be made for you.

6. **Course Materials:** Text: Recommended: Plant Biochemistry and Molecular Biology. Hans-Walter Heldt., Oxford University Press, 1997.

Biochemistry & Molecular Biology of Plants. Buchanan, B., W. Gruissem & R. Jones, American Society of Plant Physiologists, 2000.

7. **Examination Policy:** No aids (e.g. calculators) are allowed in the examinations. Students should also read the Calendar, [Section G](#), on Examinations.

8. **Writing across the curriculum statement:** In this course, the quality of the student's writing in assignments will be a factor in the evaluation of this component. See also [Section E.2](#) of the University Calendar.

9. **Human studies statement:** Students in the course are not expected to participate as subjects or researchers. See also [Section E.5](#) of the University Calendar.

STUDIES IN THE BIOLOGICAL SCIENCES INVOLVE THE USE OF LIVING AND DEAD ORGANISMS. Students are expected to be familiar with <http://www.ucalgary.ca/pubs/calendar/current/sc-5-1.html> of the on-line calendar.

See also <http://www.ucalgary.ca/pubs/calendar/current/e-5.html>.

10. OTHER IMPORTANT INFORMATION FOR STUDENTS:

- (a) **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties.
- (b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- (c) **Student Accommodations:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf.
- Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Biological Sciences, Dr. H. Addy by email addy@ucalgary.ca or phone 403 220-3140.
- (d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- (e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPPA). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also <http://www.ucalgary.ca/secretariat/privacy>.
- (f) **Student Union Information:** VP Academic Phone: 403 220-3911 Email: suvpaca@ucalgary.ca
SU Faculty Rep. Phone: 403 220-3913 Email: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca;
Student Ombuds Office: 403 220-6420 Email: ombuds@ucalgary.ca; <http://ucalgary.ca/provost/students/ombuds>
- (g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.
- (h) **U.S.R.I.:** At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference - please participate in USRI Surveys.

LEARNING OUTCOMES

- Describe the general chemical structure, distribution in nature, and biosynthesis in plants of benzyloquinoline alkaloids
- Describe the general chemical structure, distribution in nature, and biosynthesis in plants of monoterpenoid indole alkaloids
- Describe the general chemical structure, distribution in nature, and biosynthesis in plants of tropane alkaloids, calystigines and nicotine
- Describe the general chemical structure, distribution in nature, and biosynthesis in plants of glucosinolates and cyanogenic glycosides
- Define the current state of research on the biochemistry, cell biology and biotechnology of plant specialized metabolites
- Describe the general chemical structure, distribution in nature, and biosynthesis in plants of terpenoids
- Describe the general chemical structure, distribution in nature, and biosynthesis in plants of phenylpropanoids
- Define the basic strategies for the metabolic engineering of plant biosynthetic pathways.
- Describe the contribution of natural products in pharmaceutical industries.

TENTATIVE LECTURE SCHEDULE

<u>Date</u>	<u>Topic</u>	<u>Instructor</u>
January 9	Introduction of natural products	DKR
January 11	Bioactive natural products	DKR
January 13	Terpenoid principle and history	DKR
January 16	Terpene mechanism	DKR
January 18	Terpene synthase gene family	DKR
January 20	Terpene precursor biosynthesis I	DKR
January 23	Terpene precursor biosynthesis II	DKR
January 25	Terpenoid biotechnology	DKR
January 27	Research tools in plant metabolism study	DKR
January 30	Carotenoid principle	DKR
February 1	Carotenoid metabolism I	DKR
February 3	Carotenoid metabolism II	DKR
February 6	Carotenoid application	DKR
February 8	Introduction of phenylpropanoid	DKR
February 10	Phenylpropanoid metabolism I	DKR
February 13	Phenylpropanoid metabolism II	DKR
February 15	Bioactive phenylpropanoid	DKR
February 17	Review	DKR
February 20-24	READING WEEK	
February 27	MIDTERM EXAM – in class	
March 1	Terpenophenolics	PJF
March 3	Benzyloisoquinoline alkaloids I	PJF
March 6	Benzyloisoquinoline alkaloids II	PJF
March 8	Benzyloisoquinoline alkaloids III	PJF
March 10	Monoterpenoid indole alkaloids I	PJF
March 13	Monoterpenoid indole alkaloids II	PJF
March 15	Monoterpenoid indole alkaloids III	PJF
March 17	Tropane alkaloids and nicotine I	PJF
March 20	Tropane alkaloids and nicotine II	PJF
March 22	Purine alkaloids I	PJF
March 24	Purine alkaloids II	PJF
March 27	Pyrolizidine alkaloids	PJF
March 29	Cellular compartmentalization of alkaloid metabolism I	PJF
March 31	Cellular compartmentalization of alkaloid metabolism II	PJF
April 3	Glucosinolates I	PJF
April 5	Glucosinolates II	PJF
April 6	Cyanogenic glucosides I	PJF
April 10	Cyanogenic glucosides II	PJF
April 12	Review	PJF

GRADING SCALE

A+	>90%
A	85%
A-	80%
B+	77%
B	73%
B-	70%
C+	67%
C	63%
C-	60%
D+	55%
D	50%
F	<50%