Course Syllabus-2017
Biology 3475A Chemical Ecology

Course Information

Instructor: Prof. Jeremy N. McNeil
Department of Biology: Room 3066, Biology & Geology
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Prerequisite(s): Biology 2483A, Chemistry 1301A/B and 1302A/B or the former Chemistry 1100A/B and 1200B.

Course description: This course will examine how plants and animals use chemical cues to find essential resources, defend against natural enemies, locate suitable mates, and maintain social systems. How chemical ecology may be used to elucidate basic ecological problems and to provide more environmentally friendly pest management practices will also be discussed.

Time and location: Friday from 13:30–16:20 (with breaks!!) in NCB 114.

Contact Information

Office Hours: I have no specific office hours. Students may set up appointments (in class or by email) at mutually acceptable times to discuss the material. I will also be happy to answer questions immediately before or after lectures.

Please note that I **will not** answer questions in the 24 h preceding an exam.

Email policy

1. When communicating with professors (and TAs) use your UWO email account only**. We will not respond to emails originating from non-UWO email accounts.** Make sure, at all times, that your uwo account doesn't go over quota as you may not be able to receive any messages or responses from us. **Not checking your UWO account is not a valid excuse for missing essential communication**.

2. **Include "3475A" in the subject of any emails that you send.** Emails containing unsolicited attachments will be automatically deleted.

3. All emails will be responded to within 48 hours during weekdays (not including weekends and holidays). Emails will usually be addressed during regular work hours (9–5). We may choose, at our discretion, to respond outside these hours, depending on availability.

Required Course Material

Textbook: There is no official textbook. However, you will be provided a list of general reference books at the beginning of the course.

Lectures: PDF files of PowerPoint presentations for each module will be posted on the course **website** no later than 8:30 a.m., on the Friday that a specific module will be discussed for the first time in class. Note that at the end of the PDF there will be a list of references, representing the primary literature from

which specific examples were taken.

You should download the PDFs and use them to take notes during the lectures.

Course Communications: Students must check OWL (http://owl.uwo.ca) and their uwo.ca email on a regular basis. This is the primary method by which information will be disseminated to all students in the class. The missing of critical information due to your failure to check OWL or email cannot be used as a basis for appeal.

Course Content

Lectures may only be recorded with permission of the professor.

General Introduction
In this section we will examine (i) what exactly do we mean by the term chemical ecology, (ii) what are the important chemical parameters of infochemicals that one must consider (i.e. stereochemistry, blends, concentrations), (iii) the structure and function of peripheral receptors and the integration of messages within the CNS, and (iv) the chemical, physiological and behavioural techniques used in laboratory and field studies relating to chemical ecology.

Chemical ecology and food acquisition
It is evident that organisms differ in their food requirements and in this section we will examine the importance of infochemicals in the acquisition of food. Examples will include carnivorous plants, herbivorous and carnivorous insects (including the choice of oviposition sites), starfish, reptiles and mammals.

Chemical ecology with respect to intraspecific and interspecific competition, aggregation, and territoriality
Infochemicals often play an important role in reducing the effects of intra and/or interspecific competition for important resources. We will look at examples in plants (allelopathy) and animals (trail pheromones, marking pheromones).

Chemical ecology and defence
We will first examine the defence mechanisms of plants against herbivory and attack from disease. This will not only include a discussion of the types of compounds used for defence, but also how defence systems differ depending on ecological conditions (i.e. high and low light intensity, nutrient availability, temperate versus tropical), as well as the induction of defence systems in response to attack. In the case of animals we will examine a variety of examples of chemically mediated defence in a variety of organisms, including insects, fish, frogs, birds and mammals.

Chemical ecology and reproduction
Chemical signals play an important role in mate acquisition in many species, and may serve as reproductive isolating mechanisms. We will discuss mating systems involving infochemicals in a number of plants, insects, fish, reptiles, and mammals (including *Homo sapiens).*

Chemical ecology and social systems
In this section we will look at the importance of chemical signals in two different social contexts. In the first case we will look at the role of chemical ecology in the functioning of a honeybee colony, and in the second the role of infochemicals in the reproductive biology of certain social mammals.

Chemical Ecology in an applied context
We will examine how a basic understanding of the ways in which infochemicals modify the behaviour of organisms (as discussed in previous lectures) may be used to control populations of plant and animal pests, as well as to increase the beneficial impact of pollinators and other beneficial insects. In addition we will consider at least two examples where a chemical ecology approach has been used to help elucidate basic questions relating to the seasonal migratory behaviour of a butterfly (the monarch) and a moth (the common armyworm).

Evaluation/Grading and Final exam

There will be two exams, each consisting of 5 essay-development questions.

Midterm exam: Sat., 28 Oct. 2017, 2:00–5:00 p.m. (worth 35% of the final grade)
Room(s): TBA

The Midterm exam will cover the material from the start of the course (8th Sept., 2017) up to the end of lectures on October 20th, 2017.

No electronic aids are allowed for exams and answers are to be written in pen.

Final exam: Date and room to be announced (worth 35% of the final grade)

The final exam will include all material from October 27th, 2017 until the end of classes.

Two Assignments: On 24th November there is no lecture, however, at the end of the day (18:00) on the 22nd November, a text will be posted on the course website. You are to write a 1–2 page evaluation of the work with respect to its scientific merit (considering aspects such as…is there a clear objective? are the experiments carried out reasonable? Is the text well written) as a study in chemical ecology. Basically, it is a "I think it is good for the following reasons" or "I did not think it was good because…".

I require a hard copy to be handed in **to Rm. 301 NCB by 16:45** and an identical electronic copy submitted to Turnitin by **17:00** on OWL (Sakai) on November 24th. The evaluation will be worth 5% of the final grade.

You also have to write a 1000±100 word essay (not including the references, which should include at least five papers from the primary literature) on **"The effects of climate change and/or pollution on intra- and/or inter-specific chemical communication"**. Thus you have a choice with respect to how you approach the assignment. For example you could write a paper using *a series of articles that deal with the effect of pollution on the chemical ecology of a single species*, or you could do it using *examples that show climate change has influences the chemical ecology of a number of species*. Basically, the approach you take is up to you.

I will grade the paper based on your ability to synthesize the literature you have selected; marks will be deducted for poor grammar, incorrect spelling and incomplete references. Note that you may use any acceptable form of referencing you like, as long as you are consistent throughout the text.

Remember **plagiarism**, as defined in the UWO academic calendar, is a scholastic offence and will be dealt with accordingly. You will find all of the necessary information relating to cheating, plagiarism and other scholastic offences on the website of the Western Ombudsperson under the section undergraduate guides at ***http://www.uwo.ca/ombuds/***

The deadline for this assignment (worth 25% of the final grade) is November 10th, 2017.

I require a hard copy to be handed in **to Rm. 301 NCB by 16:45** and an identical electronic copy submitted to Turnitin by **17:00** on OWL (Sakai).

Course Learning Outcomes

As a result of attending lectures students should be able to:

- Discuss the different forms of intra and interspecific communication modulated by naturally occurring chemicals.
- Understand how both abiotic and biotic factors may influence the outcome of such communication systems.
- Apply the principles of chemical ecology presented in class to develop possible solutions to scenario based problems.
- Critique scientific text and synthesize information from primary articles.

Course Policies

1. Examinations are compulsory.

2. ***Late assignments will receive 0.***

3. It is Faculty of Science policy that a student who chooses to write a test or exam deems themselves fit enough to do so, and the student must accept the mark obtained. Claims of medical, physical, or emotional distress after the fact will not be considered.

4. If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the academic counsellors in your Dean's Office as soon as possible and **contact me immediately**. It is the student's responsibility to make **alternative arrangements with me** if the request for accommodation has been approved, and I have been informed that this is the case by the academic counsellors in your Dean's Office.

5. **Course materials:** (i.e. lecture slides, videos, and other supplementary material posted on OWL) are the intellectual property of your instructor and are made available to you for your personal use in this course. Sharing, posting or using this material outside of your personal use in this course is considered an infringement of intellectual property rights.

6. **Make-up exams:** As part of university policy, students that have been granted permission by the academic counsellors in your Dean's Office to write the make-up examination will write the exam at a time scheduled by the professor. There will be one written make-up examination given within two weeks of the originally scheduled exam that was missed. Arrangements may be made for students that have valid reasons for missing this make-up; however the format and timing of any additional make-ups, are at the discretion of the professor…. for example, it could be an oral exam or taking the exam the next time the course is taught.

7. **Returning Mid-term Exam and assignments:** You will be notified by email when they have been marked and the results tabulated. We will go over the mid-term exam in class...but you must return the copies to me. Please note that as I mark all the exams myself the turnaround time is longer than if it was a multiple-choice exam corrected by computer.

8. If you miss the Final Exam, please contact your faculty's Academic Counselling Office as soon as you are able to do so. They will assess your eligibility to write the Special Exam (the name given by the university to a makeup Final Exam).
   You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" ***(see http://www.registrar.uwo.ca/examinations/exam_schedule.html).***

9. No special rounding rules (e.g. to meet GPA cut-offs, minimal requirements for programs, etc.) are applied in this course when calculating final course grades. Course components will not be re-weighted, nor will additional assignments be accepted, to accommodate perceived poor performance on any assessment, or for any unaccommodated absence during a graded component of this course.

Additional Information

1. **Accessibility**-Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661–2111 ext. 82147 for any specific question regarding an accommodation.

2. A student requiring academic **accommodation due to illness** must use the Student Medical Certificate when visiting an off-campus medical facility or request a Records Release Form (located in the Dean's Office) for visits to Student Health Services.
   The form can be found here: ***https://studentservices.uwo.ca/secure/medical_document.pdf***
   For further information, please consult the university's medical illness policy at ***http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf***.

3. Students who are in emotional/mental distress should refer to Mental Health@Western ***http://www.uwo.ca/uwocom/mentalhealth/*** for a complete list of options about how to obtain help. Additional student-run support services are offered by the USC, ***http://westernusc.ca/services***.

4. **Academic Offences**-Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site ***http://www.uwo.ca/univsec/handbook/appeals/scholoff.pdf***

5. **Academic Accommodations for Religious Holidays**-The Faculty of Science strictly adheres to the University policy on accommodation for students based upon conflicts with religious holidays. Accommodation will only be granted for the specified date of the religious holiday. Only holidays appearing on the University-approved list of dates will be accommodated. See the academic counsellors in the Office of your Dean for the list of approved dates. Students requesting accommodation must do so, in writing, to the academic counsellors in the Office of your Dean at least one month before the scheduled exams/assignments.

   In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the academic counsellors in your Dean's Office immediately.

6. **SDC's Learning Skills Services**, Rm 4100 WSS, ***www.sdc.uwo.ca/learning.*** LS counsellors are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

7. **Code of Student Conduct**-To foster a supportive and enriching academic environment that is conducive to learning and free inquiry, Western has a Code of Student Conduct (available in the Administration folder on OWL) ***(http://www.uwo.ca/univsec/pdf/board/code.pdf)***

8. If you are a science student, the Academic Counselling Office of the Faculty of Science is located in WSC 140, and can be contacted at 519–661–3040. Their website is ***http://www.uwo.ca/sci/undergrad/academic_counselling/index.html.***

9. The website for Registrarial Services is ***http://www.registrar.uwo.ca.***