

# **BIO 266/366: Chemical Ecology**

## **Spring 2020 Tentative Syllabus**

### **Course Time: M 2:50-5:50PM**

**Instructor:** Kate Mathis (KMathis@clarku.edu)

**Room:** Lasry 355 (Lecture)

**Office Hours:** (Kate) Thursday 1:15-2:15 or by appointment, in Biology 234

## **I. Course description:**

**Course description:** This course explores the role of chemical compounds in mediating interactions between organisms. Through a mixture of lectures, labs and discussions, we will examine the diversity of species interactions, the structure and function of chemical compounds that mediate these interactions, and the methods used to detect these compounds. Examples will include defensive and offensive chemistry mediating antagonistic interactions in plants, insects and microorganisms; the evolution of defenses; chemicals mediating mutualisms, competition, sociality, and sexual selection; and how chemical ecology affects humans. This course will include paper discussions of relevant recent literature, exposure to laboratory techniques in chemical ecology, and a final project on a chemically mediated interaction.

### **LEEP Learning Outcomes**

This course will provide the students with a broad conceptual background in Chemical Ecology, seen in the following learning outcomes of this course:

- Explore the process by which two species interact via chemicals
- Demonstrate the ability to describe the structure and function of major classes of biochemicals
- Describe how structure and function are related
- Become familiar with biochemical synthesis and reception
- Describe themes in the ecology and evolution of chemically mediated interactions

This course will provide students with technical and analytical skills used in modern biological research, seen in the following learning outcome of this course:

- Become familiar with methods of extraction and analysis of biological compounds

This course will provide students with the ability to effectively communicate the findings of biological research and incorporate these findings into the existing body of knowledge in biology, seen in the following learning outcomes of this course:

- Learn how to read and critically interpret primary literature
- Demonstrate the ability to communicate original ecological research in an oral presentation and poster

## II. Assignments and grading

**1. Grading overview:** You will be able to earn a total of 1000 points, which will come from the following activities:

Activity	Points possible	Percentage of total points
Lab Activities	200	20% (5% each)
Discussion Activities	400	40%
Final Project	400	40%
Total	1000	100%

**Final Grade:**

A	= 94 - 100%	= 940 - 1000 points
A-	= 90 - 93%	= 900 - 930 points
B+	= 87 - 89%	= 800 - 899 points
B	= 84 - 86%	= 800 - 899 points
B-	= 80 - 83%	= 800 - 899 points
C+	= 77 - 79%	= 700 - 799 points
C	= 74 - 76%	= 700 - 799 points
C-	= 70 - 73%	= 700 - 799 points
D+	= 67 - 69%	= 600 - 699 points
D	= 64 - 66%	= 600 - 699 points
D-	= 60 - 64%	= 600 - 699 points
F	= Below 60%	= 000 - 599 points

- 2. Labs:** One of the requirements of this course is the completion of a group project over four lab sessions where students will analyze data collected in the labs and create a class poster of their findings.
- 3. Discussion:** There are 9 discussion sessions during the semester where we will discuss research papers in the current scientific literature relevant to the lecture topics. At the beginning of the semester students will sign up to provide a short summary of the paper to be discussed. All students will need to write submit questions and/or comments about the readings prior to the discussion section each week. Participation in all discussion sections is required.
- 4. Final Paper:** Each student will write a review paper on a chemically mediated interaction of their choice. You'll receive a great deal more information on the projects later in the semester.
- 5. Attendance and participation:** You are expected to arrive to class on time and actively participate each class period. Complete attendance is mandatory during all student presentations; otherwise presentation points will be forfeited. If for whatever reason you need to miss a class, please email me beforehand. Attendance in the labs is required and will be taken. If you miss a lab, you will receive a zero for your lab activities for that lab. Only two excused absences from lecture are permitted, for every additional absence you will lose a full letter grade.
- 5. Graduate Level Students:** Graduate students will be responsible for leading one class discussion during the course in addition to the other course assignments. Graduate student lab projects involve the graduate student working alone or with other graduate students on a chemical ecology experiment during the course. Graduate students will also write a grant proposal using their findings as pilot data.

### III. Policies

#### What you will need:

1) **You will need access to a computer.** If you do not have one, you can arrange to check out one of the department laptops in Lasry (they must be kept within the building). The computer you use in lab should have wireless access to the web.

#### 2) **What to bring for all labs/discussions:**

- Computer and/or lab handout
- A copy of the primary literature being discussed that day

**Make-up and Late Work Policy:** In general, make-ups and late work are not accepted. Likewise, assignments are due at the beginning of class unless otherwise noted, and no make-ups or late work are accepted unless otherwise stated (see grading rubrics). However, most work may be turned in early when you know you have to miss a class. I suggest emailing your work to me early enough to receive a confirmation email from me.

**Rebuttal System:** If you think you were graded unfairly (or erroneously) on an assignment, please turn in a written explanation (rebuttal) with your graded assignment to me within one week of getting your graded assignment back from me. I will write a response and return it to you. We can set up an appointment if you disagree with my response.

**Classroom Etiquette:** I expect you to treat other students with courtesy and respect at all times. This includes treating your fellow students' viewpoints with respect, refraining from talking or causing distractions during a lecture or while another student is talking, and doing your share in all group activities.

**Time/Workload:** It is expected that you will spend at least 180 hours working on this course. Only 42 hours of this time will be spent in class and lab, therefore the majority of the work you will be doing will be when we are not together. This will involve spending additional time working on your final project, spree day poster, completing labs, reading primary literature as well as reviewing the material learned in class.

Activity	Hours/Week	Total Hours
In class time	3	42
Reading Primary Literature and Reviewing Lectures	5	70
Preparing discussion questions	1	14
Completion of Labs	4 (4 labs)	16
Preparing Poster	-	22
Completing Final Project	-	22
<b>Total</b>		<b>186</b>

**Academic Dishonesty:** Any effort to circumvent the evaluation procedures of the course to improve the grade for yourself or other students (aka "cheating") is considered academic dishonesty. This includes, but is not limited to, misrepresentation of the cause for an absence during a class or laboratory, submitting the work of another (partially or entirely) as one's own, altering a problem set or lab answer to be submitted for regrading. You are encouraged to report academic dishonesty and anonymity will be protected if requested. If we believe that academic dishonesty has occurred and we have supporting evidence, we will report the case to the College Board immediately after informing the student that we are doing so, and why. Please read Clark's academic dishonesty policy at CUWeb (<http://www2.clarku.edu/offices/aac/integrity.cfm>). If you are uncertain about these guidelines, please consult with us.

**Student/Accessibility:** Students with learning differences or in need of accommodations of any sort should consult with Student Accessibility Services, [accessibilityservices@clarku.edu](mailto:accessibilityservices@clarku.edu) or (508)-798-4368.

**Notice to students: Faculty Members are “Responsible Employees”:** This notice is to inform you that the Faculty member(s) and Teaching Assistant(s) associated with this course are considered “Responsible Employees” by Clark University. As such, they are required to report all alleged sexual offenses to the University’s Title IX Coordinator, Lynn Levey, [llevey@clarku.edu](mailto:llevey@clarku.edu). The only exceptions to this reporting responsibility are the community members who have been designated and/or trained as “Confidential” Sources. This includes the professional staff in Clark’s Center for Counseling and Personal Growth and the medical providers at the Health Center, as well as other individuals listed at <http://bit.ly/2eUOGGx>

**Disclaimer:** The instructor reserves the right to make changes to any information contained in this syllabus at any time during the semester. Changes will be announced, and an updated version of the syllabus will be posted on Moodle and/or distributed to students.

## Tentative Schedule

Week	Day	Date	Lectures/Lab	Discussion Papers	Assignment Due
1	M	1/13	Intro to Chemical Ecology		
2	M	1/20	MLK DAY – NO CLASS		
3	M	1/27	What are Secondary Metabolites and Semiochemicals?	Discussion	Discussion Questions 1
4	M	2/03	Defensive Chemistry – Plants and Animals	Discussion	Discussion Questions 2
5	M	2/10	Chemistry of Sexual Selection	Discussion	Discussion Questions 3
6	M	2/17	Social Insect Communication	Discussion	Discussion Questions 4
7	M	2/24	Methods in Chemical Ecology	Discussion	Discussion Questions 5
8	M	3/2	SPRING BREAK – NO CLASS		
9	M	3/09	Lab 1: Experiment Design		
10	M	3/17	Lab 2: Data Collection		Lab 1: Methods
11	M	3/23	Lab 3: Data Collection		Lab 2: Project Data spreadsheet online + Paper Outline
	M	3/30	Lab 4: Data analysis	Discussion: What makes a good	Lab 3: Project Data spreadsheet complete

12				scientific poster and presentation?	
13	M	4/07	Plant Communication/ Multitrophic Signaling	Discussion	Discussion Questions 5 + Rough Draft
14	M	4/13	Eavesdropping/Alarm/Deceit	Discussion	Poster Submission + Discussion Questions 7
15	M	4/20	Feeding Preferences of mammals including humans	Discussion	Discussion Questions 8 + Final Draft
16	M	4/27	Presentations		Presentation Questions