

LIMNOLOGY
FW 472
Spring
Course Syllabus and Schedule

Meeting Time: Tuesday & Thursday 12:40-2:00 PM

Location: 315 Ernst Bessey Hall

Instructor: Dr. Patricia Soranno

Office: 334 Natural Resources

E-mail:

Office Hours: Tues/Thurs 2-3 PM

Classroom Assistant:

Course Description

Limnology is the study of inland lakes, rivers and wetlands as systems, including their physical, chemical, and biological components. This is an upper division course for biology/ecology students. To avoid significant overlap with other MSU courses, we will focus on freshwater lakes. The course is interdisciplinary and students enroll from a variety of colleges, including the Colleges of Natural Science, Agriculture and Natural Resources, and Engineering.

Course Learning Goals

1. To understand concepts in limnology (*i.e.*, the physics, chemistry, and biology of lakes)
2. To analyze and evaluate scientific data and knowledge to develop a deeper understanding of important concepts in limnology
3. To apply scientific knowledge and data to solve environmental problems related to lakes
4. To learn and practice how to effectively collaborate within a team

In the process of meeting these course-specific goals, students will also meet several of MSU's Liberal Learning Goals (<http://undergrad.msu.edu/learning>):

Analytical Thinking: *e.g.*, acquire, analyze, and evaluate information from multiple sources; synthesize and apply information within and across disciplines.

Effective Communication: *e.g.*, use a variety of media to communicate effectively with diverse audiences and engage in effective communication practices in a variety of situations and with a variety of media.

Effective Citizenship: *e.g.*, understand the structures of local, national and global governance systems and apply knowledge to solve societal problems in ethical ways.

Expectations for work inside and outside the classroom

Students will be divided into teams of 4-5 that will work together on in-class activities and team projects. You will be in your team for the entire semester. One of the four course learning goals is related to teamwork, and there are points associated with your team activities. Refer to the separate handout on teamwork.

Expected hours inside the classroom: Across the semester, there is a total of 39 hours of in-classroom time for which you are expected to be present. For each week in class (two 80-minute class periods), you can expect the following activities (on average):

- **60 minutes:** material from online lectures, small team activities related to content, etc.
- **10 minutes:** teamwork functioning/management and assessment
- **90 minutes:** team projects

Expected hours outside the classroom: Across the semester, there is a total of ~90 hours outside of the classroom that is expected of your time in this course. This breaks down to be approximately 6 hours/week (*i.e.*, 2 hours per credit hour). Note this is a university guideline established by MSU for all courses. A student who is under-performing in the course will need to put in additional time. However, if you find that you are spending well over 6 hours per week on this course, please let me know. For each week outside of class, you can expect the following activities (on average):

- **3 hours:** Interacting with online course content: watching short video-lectures, reading course materials, and answering pre-class content questions.
***Important Note:** “Interacting” includes viewing, taking notes, pausing, re-playing, reflecting, completing pre-class questions during breaks, etc. Online content is absolutely critical to your success in the course; this is how you will acquire the foundational knowledge required to master concepts and complete group activities/projects. We will spend most of our time in class applying and putting this knowledge into practice, not reviewing it.
- **3 hours:** Working on team projects. This might occur through face-to-face meetings with your group, online meetings, or individually.

Required Supplies

Excel Software: It is expected that you have either version 2010 or 2013 on your laptop. These are also the versions that MSU computer labs have. I will provide information on how to use these versions in the Excel manual (see below). Please check your software soon and, if needed, upgrade at the MSU computer store by the end of the first week of class.

Readings

Excel manual: We will be making extensive use of Excel in this course. Since I find students have varied experience using Excel, I am providing an Excel Manual (posted on D2L) that provides instructions for common Excel tasks and functions that you will likely use during the course. I hope you will use it as needed; students with all levels of experience with Excel can learn something new.

Primary literature: Periodically, you will be assigned to read short primary scientific papers (posted on D2L) that are germane to current course material or group activities (see schedule), as I think it is important that students interact with the primary literature in an upper-division course. These reading assignments should be completed in advance, and will always be featured in pre-class content questions and in-class activities.

Textbook: No textbook is required for this course. For students that prefer to have a companion text, I recommend the following: *Kalff, Jacob. 2002. Limnology. Prentice Hall, New Jersey, NJ*

(1st edition). Course content will closely parallel Kalff's text. However, this edition is currently out of print. Used copies can be purchased on Amazon for ~\$55.

Assignments

- **Course content activity and exams (independent work):** this relates to understanding concepts in limnology
 - Interact with course content before each meeting
 - Complete pre-class content questions
 - Demonstrate concept mastery on midterm and final exams
- **In class activities and team projects (group work):** this relates to analyzing, evaluating and applying scientific data
 - Write a proposal describing an intended project
 - Analyze data provided to you
 - Conduct small-scale field research
 - Present data in a scientific presentation
 - Critique other presentations
 - Write a scientific paper
- **Team skills, in class activities, and team projects (independent and group work):** this relates to effective collaboration in teams
 - Take CATME and teamwork surveys to reflect upon and monitor progress
 - Write a team contract
 - Complete delegated team tasks collaboratively and independently

Grading

Course grades are based on each student's cumulative performance in the course for the following activities:

Course Activity	TOTAL	Course Percent	Indiv. pts	Team pts	Pts	Activity
PRE-CLASS ASSIGNMENTS	60	16%	60		60	Pre-class assignments*
IN-CLASS ACTIVITIES	40	11%		40	10	In class activity 1 (will take top 4 grades)**
					10	In class activity 2
					10	In class activity 3
					10	In class activity 4
					10	In class activity 5
TEAM PROJECT 1	60	16%		20	20	Proposal
				20	20	Presentation
			20		20	Vote and analysis (individual)
TEAM PROJECT 2	60	16%	8	2	10	References list
				5	5	Figures & Figure Legends
				15	15	Detailed outline
				30	30	Scientific paper
TEAM SURVEYS & REFLECTION	60	16%	4		4	CATME team-builder survey
			6		6	Pre and post-teamwork surveys
			10		10	Team contract
			20		20	CATME online assessments (2)
			10		10	CATME reflections (2)
			10		10	Final reflection
MIDTERM & FINAL	90	24%	90		90	Midterm & final exams (45 pts ea)
TOTALS:	370	100%	238	132	370	
<i>Percent of total:</i>			64%	36%		

*There are 24 short pre-class assignments during the semester (one per online lecture). These are scored pass-fail. To earn the full 60 points for the semester in this category, you must received a "pass" on 20 of the 24 assignments.

**There are five in class activities that are relatively major and will be graded. You must be present to receive credit for them! I will take your top four grades for these, so you can have one unexcused or excused absence and still receive full credit for the in class activities. Shorter, daily activities are for you to practice and learn material, but are not necessarily graded.

Final grades will be awarded as follows:

<u>% of Total Points:</u>	<u>Final grade point:</u>
90.0 – 100	4.0
85.0 – 89.9	3.5
80.0 – 84.9	3.0
75.0 – 79.9	2.5
70.0 – 74.9	2.0
65.0 – 69.9	1.5
60.0 – 64.9	1.0
< 60.0	0.0

Course Policies

Classroom behavior: You will be working collaboratively within teams as well as among teams. I expect every student to show exceptional civility at all times. It goes without saying that I expect respectful consideration of each other's perspectives and open-mindedness. Each team may choose to develop additional, specific expectations for behavior and put these in their team contract.

Attendance: Obviously, you need to come to class in order to work with your teammates, to do much of the learning, and to interact with the instructor! Each team will determine the ground rules for attendance for its members, assuming that the rules are consistent with course policies and MSU's attendance policy in general (<https://www.msu.edu/~ombud/classroom-policies/index.html>). Each team will create a contract for all team members to sign that includes a statement about attendance. It is better to arrive late than not at all. However, please try to be on time, as announcements will occur right away. Attendance is not explicitly graded, although your grade will undoubtedly suffer as a result of poor attendance, given the format of the course.

Use of electronic devices in class: Bring them and use them! It is best if every student has a laptop and brings it to class. I encourage you to bring any devices that you might use to interact, obtain information, engage with the outside world, and collaborate with your classmates and teammates. You and your team will establish ground-rules for the use of such devices during class. Often, you will be connecting your computer to a display screen; to do so, you will need a VGA or HDMI port on your computer or device.

That being said, do not allow these devices to become tools of disrespect or distracting impediments to learning (yours or your peers').

- Cell phones should always be on silent and put away, unless it is for course-related use.
- Devices should be used for course-related activities during class time only.
- I expect your undivided attention to be directed to the instructor, classroom assistant, or your classmates whenever any of the above is speaking, presenting, or engaged with you in collaborative work (e.g., no texting during these times). Otherwise, the message you send is one of disregard and disrespect, violating the "classroom behavior" policy. You will be asked to leave if this occurs.

Given the interactive and technology-centric nature of this course, I am giving you (as responsible adults) great freedom to utilize devices that many other instructors ban from their classrooms. Please do not abuse the privilege.

Access to the internet: You will have wireless internet access during class. It is expected that you have access to the internet outside of class.

Electronic communication, inside and outside of class:

General announcements/information to students: I will use email as the primary means of communication outside of the classroom and expect all students to check and use their MSU email account on a daily basis. You are responsible for all information and announcements that are disseminated via email.

Course management system: We will use D2L in this course for general course functions (access to PowerPoints, handouts, readings, etc.). However, we will use a variety of additional online collaborative environments.

Sharing team files: teams will set up a "cloud-based" GoogleDrive to use GoogleDocs in which only the teammates have access to the files. Final assignments will be individually shared with the instructor.

Other: Teams are free to use additional online collaborative environments and technology as long as all team-members agree and the team informs the instructor.

Late assignments: Late assignments will not be accepted and students will receive a score of zero for the assignment. If there are extenuating circumstances that prevent you from meeting a deadline, you must contact me before the deadline and I will evaluate your case. I am reasonable and understand that you all have personal and professional lives outside of the classroom. To emphasize, however, I cannot help you if you do not contact me with reasonable advanced notice before the assignment is due. It is simply not fair to the other students.

Return of assignments: I will grade and return assignments in a timely manner so you can continue to work and learn in the course. If you feel that you need assignments returned more promptly, please let me know.

Course feedback and evaluation: I will do my best to create a positive learning environment. However, because learning styles differ among individual students, I may do some things that are not optimal for you. If this happens, you can let me know through email or written comments handed in at the end of the class period, or during office hours. I do not necessarily know if things are not going well for you if you don't tell me! Because I need to keep the interest of all students in mind, I cannot promise that I will change the course, but I do promise to listen and consider your suggestions.

Academic honesty: Article 2.III.B.2 of the Academic Freedom Report states: "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." I adhere to the policies on academic honesty specified in General Student Regulation 1.0, Protection of Scholarship and Grades; the all-University Policy on Integrity of Scholarship and Grades; and Ordinance 17.00, Examinations. Therefore, unless authorized by the instructor, you are expected to complete all course assignments, including homework, in-class activities, team projects, and individual exams without assistance from any source. You are expected to develop original work for this course; therefore, you may not submit course work you completed for another course to satisfy the requirements for this course. You may not use the www.allmsu.com website (or any other course materials-sharing websites) to complete any work in this course. Students who violate these or other MSU regulations on Protection of Scholarship and Grades will receive a non-negotiable failing grade for the assignment, the course, or both.

I have a zero-tolerance policy for cheating. Cheating is not fair to yourself or to your peers. It violates student-peer and student-instructor trust, defames your character, and undermines the institution of higher education. Of course, you also learn nothing by cheating, and therefore I cannot certify (e.g., with a grade) that you have learned the material. "Cheating" is broadly defined and includes attempting to pass off someone else's work as your own (plagiarism), using course materials-sharing websites, or providing exam answers to others. If you are not sure which specific activities constitute cheating, please ask. Students who cheat will receive a non-negotiable failing grade for the assignment, the course, or both.

Accommodations for disabilities: If you have a disability or special need that requires accommodation, please inform me immediately so that I can work with you. If you have not yet contacted the Resource Center for People with Disabilities, please call 517-884-7273 (voice) to make an appointment with a counselor.

Course Schedule (subject to change with advanced notice)

Date	Day	Unit	Course topic (lecture number)	To Do Before Class	To Do During Class	Due Today
Tue, Jan 12th	1	I. Introduction	1) Introduction: what is limnology?	Take CATME survey	Syllabus, course overview, technology	CATME team building survey (via CATME)
Thur, Jan 14th	2		2) Approaches used in limnology: teamwork	View lecture, pre-class questions, read Smith 2007	Teamwork assignments, conflict management, start team contract	Teamwork pre-survey (D2L)
Tue, Jan 19th	3	II. Physical limnology	3) Light	View lecture, pre-class questions	Excel crash-course I, Team contract	
Thur, Jan 21st	4		4) Temperature and thermal stratification	View lecture, pre-class questions	Excel crash-course II, Team contract	
Tue, Jan 26th	5		5) Dissolved Oxygen	View lecture, pre-class questions	In class activity 1: climate change	Team contract due for feedback at end of class
Thur, Jan 28th	6		6) Human impacts: climate change	View lecture, pre-class questions	In class activity 1: climate change	Final team contracts at beginning of class
Tue, Feb 2nd	7		8) Dissolved inorganic carbon and pH, acid deposition (Lecture 7 is not required)	View lecture, pre-class questions, read Magnuson et al. 2000	In class activity 1: climate change	In class activity 1 (by end of class)
Thur, Feb 4th	8	III. Chemical Limnology	9) Dissolved organic carbon (DOC) and UV radiation	View lecture, pre-class questions	Team project 1A: introduce proposals	
Tue, Feb 9th	9		10) Phosphorus (P) cycle	View lecture, pre-class questions	Team project 1A: proposals	Team project 1 proposals (by end of class)
Thur, Feb 11th	10		11) Nitrogen (N) cycle	View lecture, pre-class questions	Team project 1B: data analysis	Team project 1 proposals (by start of class)
Tue, Feb 16th	11		12) Vertical nutrient gradients	View lecture, pre-class questions	Team project 1B: data analysis	CATME team assessment 1
Thur, Feb 18th	12		13) Human impacts: eutrophication	View lecture, pre-class questions, read Conley et al 2009, Schindler et al 2008	In class activity 2: eutrophication debate	
Tue, Feb 23rd	13		--	Work on project	Team project 1B: work on presentations	
Thur, Feb 25th	14		--		Give & watch presentations for team project 1	Team project 1 presentations
Tue, Mar 1st	15		--	Prepare questions about course content	Take practice exam, discuss in teams	Team project 1c (individual)
Thur, 3rd	16		--	Study for midterm	Midterm exam	
SPRING BREAK (NO CLASSES MARCH 7-11)						
Tue, Mar 15th	17	IV. Biological limnology	14) Phytoplankton and zooplankton	View lecture, pre-class questions	In class activity 3: Pelagic organisms, Introduce Team Project 2	In class activity 3
Thur, Mar 17th	18		15) Fishes	View lecture, pre-class questions	Team project 2a: select topic, begin to gather sources	Team project 2 topic, teamwork reflection
Tue, Mar 22nd	19			Work on project	Team project 2a: gather and annotate sources	
Thur, Mar 24th	20		16) Biological Interactions	View lecture, pre-class questions, read Brooks & Dodson 1965	Team project 2a: gather and annotate sources	Team project 2a: annotated reference list
Tue, Mar 29th	21		17) Bacteria, the microbial loop, and lake metabolism	View lecture, pre-class questions	Team project 2b: data analysis	
Thur, Mar 31st	22		18) Foodweb (top-down) and nutrient (bottom-up) paradigms	View lecture, pre-class questions, read Carpenter et al 1985	In class activity 4: Jeopardy!	In class activity 4
Tue, April 5th	23		19) Macrophytes	View lecture, pre-class questions	Team project 2b: data analysis, start outline	Team project 2b: Figures and figure legends
Thur, April 7th	24		20) Littoral zone foodwebs	View lecture, pre-class questions	Team project 2c: outline	
Tue, April 12th	25		21) Human impacts: Non-native and invasive species	View lecture, pre-class questions	Team project 2c: outline	Team project 2c: outline (by midnight), CATME assessment 2
Thur, April 14th	26		22) Human impacts: Emerging contaminants	View lecture, pre-class questions	Team project 2d: write paper	
Tue, April 19th	27	V. Other Lakes	23) Shallow lakes	View lecture, pre-class questions	Team project 2d: write paper	CATME teamwork reflection 2
Thur, April 21st	28		24) Reservoirs, tropical lakes, high altitude/latitude lakes	View lecture, pre-class questions	Work on paper, prep for field work	
Tue, April 26th	29	VI. Landscape Limnology	Field trip		In class activity 5: MEET OFF SITE: field lab	Team project 2d: scientific paper (beginning of class)
Thur, April 28th	30		25) Lakes in the landscape, Teamwork, Review	Bring questions to class	In class activity 5: discuss results, work on write-up	In class activity 5, D2L teamwork post survey
FINAL EXAM: Monday, May 2nd 2016, 12:45-2:45 PM in 315 Bessey						