



UNIVERSITY OF
CALGARY

DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

1. **Course: ECOLOGY 417 – AQUATIC COMMUNITIES AND ECOSYSTEMS**

Lecture Section	L01	MWF	11:00-11:50	SB 148	Fall 2016
LABS:	01	R	09:00	BI 236	
	02	R	12:00	BI 236	
	03	R	15:00	BI 236	
	04	T	09:00	BI 236	
Course Coordinator:	Dr. J.R. Post		BI262	220-6937	jrpost@ucalgary.ca
Instructor(s):	A. Cantin		BI 253	220-6937	acantin@ucalgary.ca
	Dr. J.W. Fox		BI 260	220-5275	jefox@ucalgary.ca
Lab Coordinator:	Louise Hahn		BI264	220-5280	lhahn@ucalgary.ca

All laboratory materials including the lab manual, schedule of labs and assignments, class data, assignments etc.) will be located on D2L.

Course website: Desire2Learn: ECOL 417 L01 - (Fall 2016) - Aquatic Communities & Ecosystems
(<https://d2l.ucalgary.ca/d2l/home/106385>)

Biological Sciences Department BI 186 403-220-3140 biosci@ucalgary.ca

2. **Prerequisites: Biology 313, and one of Biology 315 or Environmental Sciences (ENSC) 401.**

See section 3.5.C in the Faculty of Science section of the online Calendar
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:

In-class activities	5%
Midterm Exam (In-Class-Oct 31)	25%
Laboratory Assignments	40%
Final Written Exam	30%

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

Each piece of work (assignment, laboratory report, midterm test or final examination) will be assigned a percentage score. The student's average percentage score for the various components listed above will be combined 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.

September 17 and 18 (Sat/Sun): Weekend field trip mandatory (see Laboratory Schedule)

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:

TEXTS: Required: Ecology 417 Laboratory Manual.
Optional: Lampert, W., and U. Sommer. 2007. Limnoecology, 2nd Ed. Oxford University Press, Oxford.
Horne, A.J., and C.R. Goldman. 1994. Limnology, 2nd Ed. McGraw Hill, Toronto.
Wetzel, R.G. 2001. Limnology, 3rd Ed. Academic Press, San Diego, California.

RESERVE READING Published to D2L

7. **Examination Policy:** No electronic or written aids (eg. cell phones, tablets, computers, PDAs, notes, textbooks) will be allowed during writing of any exams. Non-programmable calculators will be permitted to answer quantitative questions on exams, if applicable, and permission to do this will be clearly indicated on the examination paper. 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 laboratory reports will be a factor in the evaluation of those reports. See also Section E.2 of the University Calendar.

9. ETHICS STATEMENT

Ethics of Human Studies

If you consent, **your course work may be used for research purposes once the course is over.** Your responses will remain anonymous and confidential. Grouped data (no individual responses) may be used in academic presentations and publications. Participation in such research is voluntary and will not influence grades in this course. Students' signed consent forms will be withheld from instructors until after final grades are submitted. More information will be provided at the time student participation is requested. See also Section E.5 of the University Calendar.

Ethics in the Biological Sciences

Studies in the Biological Sciences involve the use of living and dead organisms. Students taking laboratory- and field-based courses in these disciplines can expect involvement with and experimentation on such materials. Students perform dissections on dead or preserved organisms in some courses. In particular courses, students experiment on living organisms, their tissues, cells, or molecules. Sometimes field work requires students to collect a variety of living materials by many methods, including humane trapping. All work on humans and other animals conforms to the Helsinki Declaration and to the regulations of the Canadian Council on Animal Care. The Department strives for the highest ethical standards consistent with stewardship of the environment for organisms whose use is not governed by statutory authority. Individuals contemplating taking courses or majoring in one of the fields of study offered by the Department of Biological Sciences should ensure that they have fully considered these issues before enrolling. Students are advised to discuss any concern they might have with the Undergraduate Program Director of the Department.

10. OTHER IMPORTANT INFORMATION FOR STUDENTS:

(a) **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 (FOIPP). 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) 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.

Department Approval _____ ORIGINAL SIGNED _____ Date _____

Associate Dean's Approval
for out of regular class-time activity: ORIGINAL SIGNED _____ Date: _____
E417 F16; 8/10/2016 8:53 AM

COURSE OUTCOMES

As a result of participating in *ECOL 417 – Aquatic Communities and Ecosystems*, students should understand physical, chemical and biological building blocks (elements of aquatic ecosystem structure) and integrate the building blocks through the interpretation of figures and writing essays to explain patterns and processes of aquatic populations (elements of aquatic ecosystem function). A successful student will be able to:

- **Explain the key abiotic drivers of biological patterns and processes in aquatic systems.**
- **Explain the key biotic interactions that affect patterns and processes in aquatic systems.**
- **Use graphical representations (i.e., figures) to explain key patterns and processes in aquatic systems.**
- **Generate and evaluate alternative hypotheses regarding patterns and processes in aquatic systems.**

CLASSROOM EXPECTATIONS:

What you should do:

1. Be Respectful – this means more than no talking once the lecture begins or doing something during the lecture that your fellow students find distracting. Respect your classmates in your words and actions. Listen to others' questions. Class time is for class activities.
2. Be Informed – being informed is more than having homework completed; it includes doing the "over a cup of coffee" mini homework assignments and classroom awareness (what are we doing, and where are we in the grand scheme of things).
3. Be Prepared – just like the Boy Scouts. Being prepared means regularly checking where we are in the topic list and where we are going. It also means giving a little thought to how the pieces are fitting together.
4. Participate – if you have a question, then please ask it. You can raise your hand, or if there is a pause you can simply ask it. We will answer clarification questions right away. Other question will either be answered on the spot, or placed in a "parking lot" for a later time depending on the question and where we are in the lecture. You also participate effectively by paying attention, and giving some thought to the questions I often ask the class during lecture. Finally, make an effort to integrate the laboratory material with the lecture material – they have been designed to reinforce one another.

What you should not do:

Your cell phone should be turned off during lecture and communication with other individuals via laptop computer or any other device connected to the internet is not allowed during class time. In addition, to provide a positive and distraction free learning environment for all students, conversations that do not directly involve the material that is being covered should not occur.

GRADING SCALE

Grade	
A	≥ 90
A-	≥ 85
B+	≥ 81
B	≥ 77
B-	≥ 73
C+	≥ 69
C	≥ 65
C-	≥ 61
D+	≥ 57
D	≥ 50
F	< 50

Tentative Lecture Topics and Sequence

1. Course Introduction & Overview/Administrative dreck/Basic concepts
2. Origin, Morphometry & hydrology of lakes
3. Thermal properties of water & stratification
4. Light & Colour
5. Water Movement
6. Overview of Lake Chemistry
7. Oxygen
8. Inorganic Carbon
9. pH & acidification
10. Phosphorus
11. Nitrogen
12. Bacteria
13. Phytoplankton
14. Evolutionary Ecology of Zooplankton
15. Community Ecology of lakes: patterns and dynamics
16. Applied issues

Midterm Exam In-class October 31

Tentative SCHEDULE OF LABORATORIES

Lab Schedule:

Week 1: Sept 12-16	Introduction to Aquatic Systems, Aquatic Sampling Devices and Sampling Design
Sept 17+18	WEEKEND FIELD TRIP ☺
Week 2: Sept 19-23	Physical Limnology I: Physical Properties of Water
Week 3: Sept 26-30	Physical Limnology II: Lake Morphometry/Scientific Writing
Week 4: Oct 3-7	Chemical Limnology: Nitrogen, Phosphorus, Bacteria and Biological Oxygen Demand (BOD)
Week 5: Oct 10-14	Primary Production
Week 6: Oct 17-21	Introduction to Data Analysis
Week 7: Oct 24-28	Floating Week (help prep for midterm exam)
Week 8: Oct 31- Nov 4	Aquatic Communities I
Week 9: Nov 7-11	READING BREAK: NO LABS ☺ TAs available for help with Assignment 4
Week 10: Nov 14-18	Aquatic Communities II
Week 11: Nov 21-25	SimBio: Top-down Control
Week 12: Nov 28-Dec 2	Peer Review of Term Paper
Week 13: Dec 5-9	OPEN LABS: Assignment 5 due Fri. Dec. 9 @4pm

Assignment Schedule:

Assignment 1:	<i>Read a journal article and answer a set of questions.</i> Assigned Monday Sept 12 (during first week of lectures). Due Friday Sept 16 by 4pm (Week 1). Value = 2%.
Assignment 2:	<i>Preliminary methods and materials.</i> Assigned Sept 27, 29 (Week 3). Due Oct 11, 13 (Week 5). Value = 5%
Assignment 3:	<i>Data analysis methods and preliminary results section of term paper.</i> Assigned Oct 18, 20 (Week 6). Due Friday Nov.4 @ 4pm (Week 8). Value = 6%. This will include figures and tables, statistical comparisons and a text section.
Assignment 4:	<i>Preliminary introduction and topic proposal for term paper.</i> Assigned Nov. 1, 3 (Week 8). Due Nov 15, 17 (Week 10). Value = 8%. Students will be required to have their term project topic approved before handing this assignment in. This will be an opportunity to research the literature.
Assignment 5:	<i>Final draft of term paper.</i> Assigned Nov 15, 17 (Week 10). Due Friday Dec. 9 by 4 pm (Week 13). Value = 14%. The format and content of the paper will be discussed numerous times throughout the semester. Students are to choose their own topic as the focus of their paper. Students are given several assignments associated with the term paper in order to provide instruction and feedback from their TA. The final draft will be a collection and revision of these assignments, with the addition of a discussion and abstract.
Participation:	Value = 5%. Students are expected to be prepared for labs, and to participate fully in all labs. This means having read the lab manual before coming to lab, being on time, being able to answer pre-lab questions, completing pre-lab assignments, and attending all labs. Labs that are missed for invalid reasons will result in lost participation marks.

Weekly Detail:

Week 1: Sept 12-16

Introduction to Aquatic Systems, Aquatic Sampling Devices and Sampling Design

- Introduction to Ecology 417 labs and class discussion
- Prepare for weekend field trip (introduction to the lakes, determine sampling strategy, examine equipment to be used, examine common inverts we will see)
- **Assignment 1: Assigned Monday September 12 (during first lecture). Due Friday Sept 16 by 4pm (Week 1). Value = 2%. Email assignment to your TA.**

Sept 17+18

WEEKEND FIELD TRIP ☺

- Students will attend 1 day of field sampling at 1 of the lakes
- Physical, chemical and biological data and samples will be taken

Week 2: Sept 19-23

Physical Limnology I: Physical Properties of Water

- Class discussion/sharing of lake information
- Examine models of lakes
- Filter lake water samples for dissolved nutrients and algal biomass determination
- Prepare GPP assay (24 hours...Winkler titration)
- **Assignment 1 returned**

Week 3: Sept 26-30

Physical Limnology II: Lake Morphometry/Scientific Writing

- Class discussion
- Review of scientific writing
- Use different tools to determine morphometric characteristics of the 2 lakes
- set up BOD7 assay (*fresh lake water*)
- set up bacterial abundance assay (*fresh lake water*)
- **Assignment 2: Preliminary methods and materials section of term paper. Due Oct 11, 13 (Week 5). Value = 5%.**

Week 4: Oct 3-7

Nitrogen, Phosphorus, Bacteria and Biological Oxygen Demand (BOD)

- Intro material/class discussion
- Perform assays to determine TP, SRP, dissolved nitrate and ammonium
- Calcium, sodium, magnesium assay (flame photometry/fresh lake water)
- Complete BOD7 assay (Winkler titration)
- Complete bacterial abundance assay (count plates)

Week 5: Oct 10-14

Primary Production

- examine GPP data
- Chla extractions to determine algal biomass
- Examine aquatic plant biomass and diversity data (*new*)
- Aquatic plant ID
- **Assignment 2 due**

Week 6: Oct 17-21

Introduction to Data Analysis

- Review of data analysis: examining data, testing assumptions, transformations, and analyses
- **Assignment 3: Data analysis methods and preliminary results section of term paper. Due Friday Nov. 4 by 4pm (Week 8). Value = 6%. (due date to help with midterm)**

Week 7: Oct 24-28

Floating Week:

- In-lab time for help with Assignment 3
- **Assignment 2 returned**

Week 8: Oct 31-Nov 4

Aquatic Communities I

- Class discussion/Question Formulation Technique
- In-class activity: community diversity analyses
- Begin identifying all invertebrates from all samples collected on the field trip
- **Assignment 4: Preliminary introduction and topic proposal for term paper. Due Nov 17, 19 (Week 10). Value = 8%.**
- **Assignment 3 due Friday Nov. 4 by 4pm**

Week 9: Nov 7-11

NO LABS SCHEDULED READING BREAK (NOV. 10 and 11) ☺

Week 10: Nov 14-18

Aquatic Communities II

- Finish identifying invertebrates
- **Assignment 3 returned**
- **Assignment 4 due/peer review (due 24 hrs later)**
- **Assignment 5: Final draft of term paper. Due Friday Dec. 9 @ 4 pm (Week 13). Value = 14%.**

Week 11: Nov 21-25

SimBio: Top-down Control

- A computer-based interactive and inquiry-based in-class activity aimed at helping students understand the principle of trophic cascades in lakes and their effect on the entire aquatic community and ecosystem function
- **Assignment 4 returned**

Week 12: Nov 28-Dec 2

OPEN LABS

- In-class time for help with Assignment 5

Week 13:

Peer Review of Assignment 5

- In-class activity: students will review their own, and each other's work
 - o Where could I improve and how will I do it?
 - o Students read each other's work and provide feedback for improvement
- Students should bring all marked assignments and use them to edit/improve their final paper
- **Assignment 5 due by Friday Dec 9 @ 4pm (email to your TA or hand in to Louise, Bi 264)**

NOTE

Laboratory reports must be handed in at the **start** of laboratory sessions on the due dates. Late laboratory reports will **not** be accepted unless for reasons outlined under Deferral of Term Work, 2016 - 2017 Calendar.

DEPARTMENT OF BIOLOGICAL SCIENCES

Policy on the Use of World Wide Web Material
in Term Papers, Lab Reports and Assignments

It is becoming increasingly feasible and popular to search the World Wide Web for information pertinent to term papers and assignments. As with other, more traditional, sources of material, this must be fully and accurately cited. As with all other sources, students must take responsibility for the quality, accuracy and verifiability of material that they cite. Because web sites may be transient, the following must be done if web sites are cited:

- (i) A full web site address must be provided.
- (ii) A print out of the home page of the web site, and the page on which the particular information begins, must be included as appendix material for the term paper, lab report or assignment.