UNIVERSITY
Ontario Universities Program in Field Biology

Course Title:	**Aquatic Ecology and Experimental Limnology**
Instructor(s):	Dr. Michael Rennie, mrennie@lakeheadu.ca Kristi Dysievick, kedysiev@lakeheadu.ca
Dates:	Sunday August 18th to Friday August 30th, 2019
Location:	The IISD-Experimental Lakes Area, Northwestern Ontario (1-807-226-5162). Students are responsible for arranging travel to and from ELA. IISD-ELA shuttle may be available from either Winnipeg or carpooling from Thunder Bay, please contact the course instructor for details.
Cost:	$1625*** ($350 deposit to home university, $1275 balance due Aug. 1, 2019 to Lakehead University). Cost includes accommodation, meals, use of boats, research facilities and supplies. NOTE: Up to six (6) academic/needs-based bursaries are available to Lakehead University students to help cover $500 towards course fees. Please contact the instructor for details.
Prerequisites:	All registrants in the course must be able to swim, be physically fit for hiking and possibly overnight camping. Previous courses in ecology and statistical analysis will be an asset. Students with a Pleasure Craft Operator's Card may be asked to operate boats with outboard motors.
Enrolment*:	12 (2)
Course Description (brief):	This two-week field course provides a general background in limnology and aquatic ecology, and emphasizes the application of experimental ecology in helping address environmental issues related to water and aquatic resource management. Students will be introduced to common limnological sampling techniques, including sampling for basic parameters including temperature and oxygen; methods for collecting water at discrete depths for chemical analysis; collection and preservation methods for phytoplankton, zooplankton, invertebrates and fishes; organism identification, and capture- mark-recapture methods for estimating fish abundance. Students will be exposed first-hand to experimental methods in ecology, including whole- lake experiments and the opportunity to work with data from past experiments as part of their independent research projects. During the first day of the course, students will present a 20-minute seminar and provide a brief written summary on a pre-assigned topic in applied aquatic ecology, and propose an experimental approach that could effectively addresses the topic. Students will be assigned to research teams to conduct field experiments or comparative studies to address significant ecological questions. Each student must submit a scientific manuscript based on the data collected by the research team, one month after the course is completed.
Evaluation:	Presentation at beginning of course: 15% Field notebook: 15% Course/project participation: 20% Final presentation: 10% Write up of field research project: 30% Animal Care approval and certification: 5% Quiz during field course: 5%

*** No refunds on course fees if dropped after August 1, 2019. Cancellation insurance for flight-based travel is recommended.

An Average Day – What to Expect

(a) Daily timeline	Breakfast, 7-8 am; field work or class work, 8-noon; lunch, noon-1; field or class work, 1-5:30; Dinner, 5:30-7; Evening classes, 7-10 pm. Field work is conducted rain or shine. Typically Saturday evening is a 'free night' socializing at a campfire. First week is largely intensive with group-based data collection, analysis and lectures; second week is less structured but focused on individual student projects.
(b) Work habitat & Physical exertion	Field work will typically consist of 2 to 15 minute hikes on trails between portages in 1 to 3 open boats with outboard motors to access lakes. Students may be required to help pack in field gear in back packs. Typical field excursions last 2-3 hours, returning between meal times; field lunches will be packed and prepared by students for longer excursions if required. Environments accessed by students as part of individual research projects will vary based on topics chosen. Long days due to evening classes should or individual based research should be expected.
(c) Common activities	common activities are boat travel over lakes in open boats, hiking through potentially wet/muddy forest on well travelled trails, long days sitting in the open rain or cold or heat as the case may be. associated risks include capsizes, twisted ankles, fatigue. These risks are mitigated through training for students and vessel operation by experienced operators, careful and aware walking in new environments, regular consumption of water and wearing of weather-appropriate clothing.
(d) Weather, dehydration, & biting insects	For the time of year, temperatures range between 10 to 30 degrees; rain may be encountered. Insects are typically lower in density at this time of year but may include mosquitoes (evening typically), and horseflies/stable flies in the day.
(e) Toxic/poisonous, wildlife/ plants	Lyme disease is known in the area, but ticks are very uncommon at this time of year. Mitigation is through daily tick checks and tucking pants into socks. Blastomycosis is also known in the area. Mitigation is through avoiding exposure with a weakened immune system. Bears are sighted uncommonly. Mitigation is through travelling loudly and avoiding bears with cubs.
(f) Sleeping, washroom & laundry facilities	Sleeping is dorm style in a room shared with 1-3 additional students in gender-specific arrangements. Buildings are heated but not air conditioned. Linens and pillows are provided but a sleeping bag is recommended for cool evenings. Washroom facilities are modern (flush toilets) and throughout camp. Showers are private with hot and cold running water, and laundry facilities are available on site.
(g) Meal plans & food allergies	Students should inform the coordinator of allergies and accommodations (e.g., gluten free, vegetarian, etc) prior to arrival. Weekday meals are prepared by staff, students cook communally with instructors on weekend.
(h) Non-academic responsibilities	Bunk houses are cleaned weekly and students are expected to assist with these duties. Hungry hall (kitchen) is cleaned Sunday evening and students are expected to participate.
(i) Degree of isolation	Power is available at camp. Internet is over wifi, but bandwidth is limited- video conferencing with your significant other each night is not going to happen. Cell service is available at the top of the ridge- save your calls and video chats for there. Meals are provided but snacks are not- if you are snacky, bring your own but keep your room free of crumbs and refuse. A stocked first aid room is on site with AED, epipen and all necessary requirements for immediate treatment; closest emergency rooms are in Dryden or Kenora (1 hour 30 mins away drive).
(j) Alcohol & drugs	Alcohol consumption is permitted as per the IISD-ELA alcohol regulations which will be made available to students.
(k) Vaccinations/ Insurances	Vaccinations are not required. Insurance is through home institution, though travel insurance in case of flight cancellation etc. is recommended.
(l) Social Situations	The IISD-ELA fosters a highly collaborative working environment; people work together and play together. This is also the home to many students who will at this stage have been at the station all summer whom you will be sharing staff house with- please respect their space and understand they are sharing it with you for the field course. Students will likely work together on data collection and field work but are expected to write research reports independently. Swimming at the beach on Lake 240 is something you will likely find time for should the weather permit.
(m) Final comments	Despite long days and potential for inclement weather, this is a fun course! You will build good friendships and have opportunities to work at a world-renowned research station with exciting ongoing whole-lake experiments, and rub shoulders with world-class researchers over meals and in classes; one of them might just turn out to be your graduate supervisor or next employer!

ELA Lakehead OUPFB field course 2019

Instructors:

Dr. Michael Rennie, Lakehead University, IISD-ELA, University of Manitoba

Kristi Dysievick, Lakehead University

Dr. Michael Paterson, IISD-ELA, University of Manitoba, University of Winnipeg

Dr. Scott Higgins, IISD-ELA, University of Manitoba, University of Winnipeg

Dr. Vince Palace, IISD-ELA, University of Manitoba

Lauren Hayhurst, IISD-ELA

Ken Sandilands, IISD-ELA

TA: Andrew Milling, Lakehead University

Meals: in hungry hall. Breakfast 7-7:45am, Lunch 12-12:45pm, dinner, 5:30-6:15 pm.

Lectures in classroom at back of chem lab unless otherwise noted

Sunday Aug 18th

2:00: Arrive at ELA; get settled in cabins

2:30: Orientation, presentation on ELA safety, ELA history (Simone & Mike)

3:00: Kitchen orientation, tour of facilities

5:00: dinner (barbecue)

6:30-10:00: student presentations (10 mins each, 5 mins for questions; strict time limit! We need to go to bed at some point!!)

Groups

Group 1	**Group 2**
Lydia Johnston	Melanie Hatzidemetriou
Feras Albadri	Sarah Qureshi
Jacqueline Krzywania	Danielle Gartshore
Nadine Elmehriki	Matthew Roberts
Colin St. James	Emily Meek
Tyler Ripku (Grad student)	Tim Hollinger (Grad student)

	Group 1	Group 2
Monday Aug 19th		
8:00 am	*Lecture: Physical limnology* (Mike Rennie)	
9:15 am *(lake sampling 260,373,442)*	Lab: Determining lake area, volume (Mike R)	Water Sampling, secchi, light, temp, DO, water, lake 239, 240 (Kristi, Andrew)
Pm	Zooplankton (S/P traps, vertical hauls), L239, 240 (Mike & Andrew)	Lab: Oxygen, Ammonia, spec (Kristi)
evening	*Lecture: Nutrients* (Mike R, 6:30)	
evening	Night sampling, L239, 240; S/P traps, vertical hauls; 9:30 (Mike & Andrew)	Spectrophotometry for ammonia samples (Kristi)
Tuesday Aug 20th		
Am *(LS 227, 239 streams)*	Water sampling, lake 227, 305 (Kristi, Andrew)	Lab: Determining lake area, volume (Mike R)
Pm	Lab: Oxygen, Ammonia, spec (Kristi)	Zooplankton (S/P traps, vertical hauls) L227, 305 (Mike & Andrew)
evening	Lecture: *zooplankton and pelagic food webs* (Mike Paterson, 6:30)	
Evening (8:30)	Spectrophotometry for ammonia samples (Kristi)	Night sampling L305, 227; S/P traps, vertical hauls; 9:30 (Mike & Andrew)
Wed Aug 21st		
Am *(LS 239, 114)*	Sorting zoops (Mike)	Benthic invertebrate sampling (Eckman, Ponar, kick and sweep) (L239, 240) (Kristi & Andrew)
Pm 4:30	Benthic invertebrate sampling (eckman, ponar, kick and sweep) (L305, 227) (Kristi & Andrew)	Sorting zoops, benthos (Mike)
Evening	*Lecture: Benthic invertebrates* (Mike R, 6:30)	
Evening	Sort benthos and zoops… and start thinking about potential projects ;)	

Thurs Aug 22	**Start thinking about projects!!!!!**	
Am	Sort zooplankton, benthos	Sort zooplankton, benthos
	Review water chemistry data (11:00)	
1 pm	Lecture: *ecological modeling* (Scott Higgins)	
3 pm	Sort zooplankton	Sort benthos, zooplankton
pm	Keep thinking about projects!!	
evening	**Variety night!!!**	
Fri Aug 23		
8-9	Lecture: *fish* (Mike R)	
9-10:30	Beach Seine, L240 (Mike, Andrew)	Lab: dissect fish, Prep. age structures (Lauren, Kristi)
10:30-12	Lab: dissect fish, Prep. age structures (Lauren, Kristi)	Beach Seine, L240 (Mike, Andrew)
1:00 Pm	Lecture: *Benthic-pelagic coupling* (Mike R)	
Pm	Sort remaining benthic/zoop samples	
evening	Sort remaining samples, get feedback on project ideas	
Sat Aug 24	**Time to decide on a project!!!**	
Am	**Project proposal brainstorm 9:00 am**	
Am	Grad Lecture: Tim 10:00 am	
	Grad lecture: Tyler 10:30 am	
Pm	Review benthic, zooplankton data (11:00 am)	
Pm	Read age structures	
Pm	**Group meeting: proposals/ proposal approval / field work begins**	
evening	Fire	
Sun Aug 25	**proposal approval/ field work begins**	
Am		
pm		
evening		
Mon Aug 26	**Project field/lab work continues** (coordinate with boats available)	
Am *LS 442*		
Pm	Hydrology demonstration (1:00 pm, Ken Sandilands, 240 outflow)	
evening	Hydrology lecture, exercise; Mike (6:30 pm)	

Tuesday Aug 27	**Last day for project field collection/lab work;** working up data
Am *LS 227, 239 streams, 223, 224, 305*	
Pm	
Evening	Lecture: *Vince- toxicology* 6:30 pm

Wed Aug 28	**8 am- review benthos, zoops, fish; quiz; ageing**
Am *LS 378, 626*	**Work up data; work on presentations**
Pm	
Evening	Fall Feast (Dinner @ Beach) Science Seminar- Sonya Michaleski- 7:30 pm
Thurs Aug 29	
Am	**Finish presentations!!!**
Pm	Presentations
Evening	Finish presentations… and relax!
Friday Aug 30	Debrief after breakfast; course feedback; pack; leave after lunch

ELA field course final report guidelines

From how hard I saw you all work and the high quality of the presentations last week, I can say without hesitation that you all did a fantastic job on your projects. The research you did in just a few days was worthy of a manuscript fit for publication, so I you should write it as one (say what? Keep reading…)

To that end, I've provided you with a condensed version of the "Instructions for authors" for the journal "the Canadian Journal for Fisheries and Aquatic Sciences" which will provide you with some guidance on how to prepare your final papers. In addition to this information, please also consider the following:

1. **Length.** The paper should not exceed 10 pages of typed text for the body (double spaced, 1-inch margins, 12-pt font Times New Roman; not including title page, figures, tables or references). If you can effectively communicate the importance of your project and it's findings in fewer than this, I encourage you to do so, but 10 seems like a reasonable top-end. Each figure and table should appear on it's own page, after the text, as per the Instructions to Authors (attached).

2. **Abstract.** The "Instructions to Authors" attached outline the length limits on two important sections of your papers- the abstract (175 words), and the introduction. They give the length of the introduction as a word count, *but I would say that it should be NO LONGER than 3 pages (double spaced).* This should be enough room for you to let us know how your study fits into the body of existing literature that's out there, why your study makes an important contribution, and what your objectives are.

3. **Statistics.** The use of statistical analyses for your results is not required, but encouraged, commensurate with your experience. If you have taken a stats course (or two), you should be able to identify and appropriate analysis for your data (given your study design). If you have not taken any courses in statistical analysis, please indicate so when you submit the report. Either way, it is important to remember that **one does not do statistics simply for the sake of doing them**, but rather to help you find or report pattern in your data that helps you to make discoveries and draw conclusions. Many times this can be achieved through clearly presented plots of data in figures and comparisons of means and error estimates around those means.

4. **Practice good scientific writing.** The instructions to authors makes mention of "topic sentences", and I would strongly encourage you all to consider writing in this manner. What does that mean? It's a style of writing that is very effective in the sciences. Below is the structure of a paragraph written with a topic sentence:

The first sentence in your paragraph clearly states your main point. Everything else that follows simply supports that main point. Many studies have found that this main point is supported under these conditions (references). And so on and so on.

For example:

"Despite the widespread use of nanosilver in consumer products, very little is known about how it interacts with aquatic communities in a natural setting." Every sentence after this now discusses what little might be known about those interactions, and what gaps in knowledge might exist (making a good segue to your objectives, perhaps).

This is how many students (including myself when I started writing) like to structure their paragraphs:

Some piece of information about something. However, some other piece of information that contradicts that something. Some other piece of information. Therefore, I have left my topic sentence to the end of the paragraph, supported by everything that came before it, which is a terrible idea.

Don't do that. Not only does it make it difficult for the reader to understand, but most people read scientific papers very quickly at first- if you managed to catch their attention with the abstract, they might look at the rest of it- when they do, you need to snag the reader with that topic sentence- if they have to dig for it, they'll move on to the next paper (assuming you make it past peer review).

The best way to figure out if you're using topic sentences is to do some writing, then go back, and read what you've written. If it's not clear in the first sentence what you're trying to say in that paragraph, then you need to edit it. I still do this for all the writing I do.

5. **Due date: Monday, September 30th, 8:00 am.** You can, of course, submit it any time between now and then. **There is no late assignment, only an on-time assignment.** In the words of Yoda, "Do, or do not. There is no try." Only those assignments submitted on or before the due date will receive a grade. This gives you all 4 weeks to write the report, and you have all your data in hand and a good idea of what to do already from your presentations, so I think this is a fair shake. ***Please let me know immediately if you forsee any significant challenges completing the paper by this deadline.***

6. **What to submit.** Your final submission should include:

    1. **A brief (4-5 sentence) statement** in your e-mail submitting the work, acting as a cover letter, which indicates the general importance of the manuscript, it's novelty, and confirming that you were the author of the manuscript;
    2. **The manuscript itself**, corresponding to the guidelines to authors (and notes above), in electronic format (either as a word document, libre office or .pdf)
    3. **An electronic copy of your data** (e.g., excel or libre office spreadsheet) that was collected during your project. If your project uses historic ELA data, new data vs. historical information should be clearly indicated in your data files, either with a date stamp or some other indicator.