Ontario Universities Program in Field Biology

(OUPFB)

Field Modules 2020

University of Waterloo (OUPFB Module 1.)

Course Title:	**Belize: Rainforest and Reef**
Instructor(s):	Dr. Marcel Pinheiro (marcel.pinheiro@uwaterloo.ca), Dr. Hugh Broders
Dates:	April 26 – May 9, 2020 (14 days)
Location:	Belize
Cost:	Estimated $3,500 ($350 deposit to home university; $3,150 balance). **Includes:** airfares from Toronto, accommodation, surface transportation, meals. **Balance:** required by **March 11, 2020**; payment can be made electronically through shop.uwaterloo.ca under Field Trips & Course Fees.
Prerequisites:	Completion of second year biology program and a credit in an introductory course in ecology. **NOTE: Students must be prepared for outdoor physical activities including ocean snorkelling and hiking in rainforest and mountains.**
Enrolment*:	16(4) ; minimum 12
Course Description (brief):	An introduction to neotropical ecology. The main purpose of the course is to gain some familiarity with major neotropical terrestrial and marine ecosystems in Belize, evaluate conservation efforts to preserve habitats and biodiversity, and learn techniques of ecological observation. Upon arriving in Belize, we transfer to the Toucan Ridge Ecology & Education Society (T.R.E.E.S.) site in the Stann Creek district of Belize. Here we will spend time learning bird-banding, insect collecting, and mist-netting techniques, and exploring the jungle trails. Students will also design and begin work on their projects. From here we transfer to Billy Hawk marine station to spend time snorkelling on the barrier and patch reef of the area. As we return inland, we visit Cockscomb Jaguar Preserve to spot the elusive big cats of Belize. By day we will hike the waterfall trails and river tube/snorkel the area, and by night we will have guided hikes. Finally we explore the impacts of ecotourism at well-travelled Lamanai Mayan ruins archaeological site and the Belize zoo where we consider the impacts of these attractions on the local ecology. Travel will be by minibus with accommodation in well-run (though basic) field stations. An experienced bilingual naturalist / guide will accompany us throughout the trip. Students will keep a natural history journal describing the ecosystems visited and detailing the diversity in flora and fauna. At T.R.E.E.S., we will conduct mini-research projects, mainly on terrestrial ecology and biota. The itinerary and details of evaluation may be subject to change. ****NOTE: Air travel will include a stopover in the United States; non-Canadian students must allow sufficient time to secure any required additional travel documents before enrolling in this course.**
Evaluation:	Natural History Journal (30%) Quizzes (5%) Keystone species presentation (10%) Mini-research project (25%) Essay on neotropical ecology or biology (due June 15, 2020; 20%) Participation (10%)

An Average Day – What to Expect

(a) Daily timeline	Daily schedules will fluctuate, and students must be flexible in their daily routines. All activities occur regardless of weather, and students should be prepared for rain and some cooler early morning or late evening temperatures. Early morning (before 7 am) activities may occur on several days. Generally breakfast is between 7-8am. Activities or fieldwork typically follows until lunch (typically ~12 pm), and often continues after lunch. (Some students may choose to conduct supervised fieldwork at night.) Late afternoon activities may be scheduled. Dinner times fluctuate between ~5:30-6:30pm). Activities, work on field books, or work on projects may continue into the evening. Particularly when designing group projects, it can be a late night and students may become frustrated as they tire. Near the end of the trip, student groups will present their projects orally. Instructors are on hand to help with design, but students are in control of their projects. A few evening/night trips are planned that would require students to stay up later than usual. Late evening/early morning snorkelling may be planned, as per weather. All activities are considered mandatory, unless students have spoken with instructors.
(b) Work habitat & Physical exertion	Conditions are rustic in the field station, but otherwise comfortable. Expect warm/humid temperatures. WiFi availability is often poor. At our main station, WiFi bandwidth is limited and students should consider it for essential services and contact with home using voice, primarily. Video/Skype/FaceTime or similar will not be permitted. Moderate to intense physical activity can be expected most days, including hiking or snorkelling. Students should have water containers to remain hydrated, and dress appropriately for hikes when necessary (i.e. appropriate hiking shoes, light daypack, rain jacket, water bottle, etc.). Hikes are at fair pace, sometimes at steep inclines or at high elevation, with water breaks. Insects are common and students will encounter them. Sunscreen is required. In-water activities are guided and students must be diligent to listen to instructions, as conditions vary depending on animals present.
(c) Common activities	Expect to walk/hike at different times of day, light and dark conditions, at various inclines, in fluctuating temperatures, and on paved and unpaved trails. Good hiking shoes are strongly recommended. Students may encounter mud. We will be visiting an island, which will require open-ocean travel by boat, and we may travel on a river by boat. Students may wish to have sea sickness medication. Snorkelling occurs in the ocean – life preservers available. Lycra skinsuits may be desired to avoid sun and small stinging animals, but is not required. Travel between destinations may require long hours on a bus, with occasional bio-breaks. Often, local stores may be available to purchase personal snacks as required.
(d) Weather, dehydration, & biting insects	Expect warm/hot/humid/rainy conditions. Strong sun at times. Sunscreen and regular drinks of water recommended. Monitor international weather reports for average temperatures. As we are in the neotropics, biting insects, spiders, scorpions, ticks or other invertebrates, bats, snakes, etc. can be expected. Lyme disease is not currently reported to be a concern in Belize at this time, but long clothing is generally a good idea to prevent exposure. At times when insects (mosquitos, black fly, etc.) are particularly bad, thin clothing that covers arms and legs (i.e. light pants and shirts) may be advisable. Bug repellent with DEET is highly recommended. Local guides are well versed in local fauna and capable of insuring our safety during our stay.

(e) Toxic/poisonous, wildlife/ plants	Along with the usual mosquitos, black fly, "no-see-ums" and ticks, Belize is host to a wide range of animals that require your attention and respect. Both on land and in the sea, care must be taken to be alert, listen to the instructions of the guides and instructors, and travel only where instructed. Staying on marked trails is a requirement to avoid potentially dangerous encounters. In the sea, fire coral is a nuisance but easily avoided, while Scorpionfish, Stonefish and Portuguese man-of-war also require diligence. A more complete list is available at: http://www.guidetobelize.info/en_dangerous.html
(f) Sleeping, washroom & laundry facilities	Accommodations are rustic lodgings and hotels, where students can expect to share a room (3-6 per room) of the same gender. Bathrooms may be communal. Showers will have warm-hot water, but supply may be limited (particularly on island stays), and short showers may be necessary. In more rustic settings, mosquito nets may be necessary. At times, insects may enter the room. Linens/sheets are provided at accommodations and cleaned regularly.
(g) Meal plans & food allergies	Meals are typical of local cuisine, although instructors and providers will work to accommodate food allergies or preferences. Water will at times need to be purchased locally. Instructors/guides will be always ready to answer student concerns over meals/water.
(h) Non-academic responsibilities	Food is provided, but clearing of tables is required at some destinations. Students are expected to keep their living spaces tidy. Travel between destinations may require bags of communal gear to be packed for travel.
(i) Degree of isolation	T.R.E.E.S. and marine stations are regularly attended by staff and researchers. T.R.E.E.S. is not far off of the main highway, but is located in the jungle. Lamani is well travelled by tourists. Electricity is mostly available. Internet/WiFi is typical of Central America, and not regularly available in some places. Low bandwidth caps at T.R.E.E.S. will likely result in poor internet/cellular service during these times. Students making use of Office 360, where an internet connection is always required, may choose to download offline office software to continue group work while away from internet access.
(j) Alcohol & drugs	Students are expected to follow all local drug and alcohol laws and remain responsible throughout the duration of the trip. As we are travelling through the U.S., all cannabis-containing products/marijuana should not be travelled with.
(k) Vaccinations/ Insurances	The Government of Canada has listed Zika as a disease of concern during travel in Belize. Travel Insurance may also be considered. More Canadian Travel Advisory information available at: https://travel.gc.ca/destinations/belize
(l) Social Situations	Students will routinely share a room with other students of the same gender. Students are expected to work in groups throughout the duration of the course.
(m) Final comments	Despite the advisories above, this course offers the opportunity to explore the neotropical ecology of one of the world's biodiversity hotspots. Seeing the flora and fauna of the neotropics in their natural setting has been a transformative experience for past students.

University of Western Ontario (OUPFB Module 2.)

Course Title:	**Tropical Marine Environments**
Instructor(s):	Dr. Graeme M. Taylor (gtaylor8@uwo.ca) Admin. Brenda Beretta(bberetta@uwo.ca)
Dates:	Saturday April 27th to Thursday May 9th ,2020
Location:	Belize Marine Studies Field Camp at Lighthouse Reef Atoll, Belize
Cost:	Approximately $2750 ($350 deposit to home university; $2400 balance) plus tuition payable at your home institution. A non-refundable $350 deposit is due to your home university upon registration. Instructions for providing the balance ($2400), due by March 6th, will be provided after registration. Covering transportation within Belize, park fees (e.g. Blue Hole), room/board at field/base camp and 3 Belizean guides. Fee does not cover: flight to & from Belize, personal travel, travel medical insurance, food on mainland (two days), snorkel gear and personal equipment, such as field clothing and waterproof watch (price varies & you will need to do your own estimate). Cancellation and refund policy: Enrolment is confirmed when full payment is received by Tuesday March 6th. Payment has to be made by this date as we need to secure our position at the base camp on Halfmoon Cay (Belize). After March 6th anyone in arrears will be automatically removed from the course roster. Cancellations must be received, in writing, by the 9th of March. After March 9th we retain your full payment, as the monies are used at this time to reserve the base camp at Halfmoon Cay and hire the camp crew. No exceptions are provided for these procedures. Should UWO need to cancel the course for any reason, you will receive a full refund. The student is responsible for all fees incurred by the home or host university due to any bounced cheque.
Prerequisites:	Students must be entering the 3rd or 4th year of a Biology Honors program (or Environmental Sciences), with 2 ecology & 1 statistical course completed. As a minimum, you must have the ability to continuously swim 600 m. This is for your safety, as we will swim this distance in open seas. Medical travel insurance, trip cancellation insurance, a current tetanus inoculation and a valid passport are mandatory. Students with non-Canadian passports must determine visa requirements for Belize.
Enrolment*:	20 students (7 reserved for Western)
Course Description (brief):	This course is an introduction to tropical marine environments. We will immerse ourselves in the diversity of habitats at Belize's most spectacular atoll — Lighthouse Reef. We will be based on a remote 40-acre tropical island, 90 km offshore of the Belize mainland, within the Half Moon Cay Marine Reserve. The atoll is surrounded by a fringing reef rising virtually to the surface. Inside this reef is a lagoon speckled with hundreds of coral patches. The reef is highlighted for its density and diversity of both corals and fish. We will literally be surrounded by marine life. Much of our time will be spent exploring by kayak and snorkeling. We will learn to be field biologists, to document and to interpret what we observe, and to develop scientific questions from our observations. From your observations, you and a partner will develop a research project. Our endeavors will be facilitated by Island Expeditions who have over 20 years of experience operating field camps in Belize. (www.islandexpeditions.com)
Evaluation:	First Quiz 15% given on arrival in Belize or day following Field Journal 20% (due in Belize) Science blog (x2) based on your field journal 20% (due June 16) Participation, Leadership and Professionalism 10% (starts on signing up for the course) Research project & paper 35% (Due June 16)

An Average Day – What to Expect

(a) Daily timeline	We start our day at 6 am with the rise of the sun and before our breakfast is served at 8 am. The morning activity involves either a hike to the bird colony or similar shoreline activity. Some days will include going out on the water (kayak or motorboat) before breakfast but usually does not involve snorkelling. Our cooks provide breakfast at 8 am, we eat and help with clean up. During breakfast and lunch, we are having informal lectures covering biological topics and logistics. There are two snorkels/dives (referred to as dives but we do not use SCUBA, only mask and fins) in an average day, one after breakfast and one after lunch (12 pm), and sometimes after dinner. Logbook activities take place after each dive and after dinner, at about 6 pm. Lectures and guest speaker (e.g. Belize Audubon Society, and MarAlliance) will take place after dinner and clean up, but most students work on their journals to 9 pm. We get to bed shortly after 9 pm, as these work days are both physically and mentally exhausting.
(b) Work habitat & Physical exertion	For each snorkel/dive we spend about 1.5 to 2 hours in the water, thus being able to swim and being in good shape is essential. Furthermore, seas can be turbulent with large waves, swells and currents, making dives more physically demanding. Several times throughout the field course we will also go on a night dive and hikes. Waters are usually calm, but visibility is limited to the area of your dive light (equipment provided), and this can be stressful for some students.
(c) Common activities	• common activities (e.g., boat travel over open ocean, kayaking over the atoll, night snorkelling from shore) • associated risks (e.g., seasickness, capsizes, getting lost, fatigue, blisters from sandals and fins, heat exhaustion, sunburns, cuts from rock-coral in the sand, and jellyfish (and other animals) stings). We do our best to minimize the risks involved.
(d) Weather, dehydration, & biting insects	• Weather conditions likely to be encountered are typically tropical, and these can involve the following: 21 to 40 degrees, intense sun, high UV, high humidity, heavy rain, high winds, and lightning storms. Students need to be aware of avoiding dehydration, sunburns, heat shock, hypothermia. • Insects, though not abundant on the island, are present and these are mosquitoes, no-see-ums and scorpions. We will be sleeping in tents, and these arthropods can gain access. Detailed dress codes will be provided but in short, cover up and have insecticide sprays available.
(e) Toxic/poisonous, wildlife/ plants	Natural hazards in the work/living environment are potentially not limited to those mentioned here, but include the possibility of: jaguars, mosquitoes & malaria, stinging bees/wasps/fire ants, poisonous snakes, centipedes, sharks, scorpionfish, lionfish, fire coral, fire sponge & jellyfish. Risks are common, but with good sense and planning, they are minimised. Only a medical doctor can provide a risk assessment of pathogens for those travelling abroad. I encourage all students to visit a medical travel clinic for a full assessment and the latest pathogenic risks for any given country.
(f) Sleeping, washroom & laundry facilities	• Sleeping accommodations are shared tents, and each tent has between two and three students per tent. Males and females do not share tents. Sleeping gear is provided (e.g., tents, sheets, pillows, no-see-um screens). If you are extra sensitive to bug-bits and scorpions, bring a sleep bug-net. • Washroom facilities are communal, outhouse non-flush toilets; toilet paper is provided. • We have cold showers, and no laundry facilities.
(g) Meal plans & food allergies	All meals are provided, and cooks do the needed preparation. Cooks do their best to accommodate student-specific meal plans and allergies, however, risks to an individual having an allergic reaction are highly amplified as we are potentially ***8 hours away from a hospital.***
(h) Non-academic responsibilities	Students are encouraged to help our guides/staff with non-academic responsibilities like general camp, cooking/cleaning/sweeping, organizing books and equipment, and washroom cleaning.
(i) Degree of isolation	We are very isolated from any service you might take for granted as an urban dweller. • We have limited hydro for recharging cameras and laptops. To do so, a generator runs for a few hours a day. • We have no communication (no internet, no phone) with the "plugged-in world." • There are no stores to access for personal hygiene needs, missing/forgotten equipment • Bring your medical supplies. We do provide back-up in an emergency.
(j) Alcohol & drugs	No alcohol or recreational marijuana permitted
(k) Vaccinations/ Insurances	Students must have travel insurance and consult with a medical doctor as to their needed vaccinations.
(l) Social Situations	Students need to have an open mind, and be respectful of others, as we are living in close quarters, and we share the campsite with our Belizean hosts. Students are expected to act professionally, be respectful of the local culture, and to view this opportunity as a working academic endeavour 24/7.
(m) Final comments	Few students, if any, have regrets, and find their time in Belize and on this course a life-changing experience. If desired, and still find yourself 'sitting on the fence' speak with past students by joining our Facebook group.

Brock University (OUPFB Module 3.)

Course Title:	**Aquatic Insect Behavioural Ecology**
Instructor(s):	Dr. Fiona F. Hunter and TBD, Department of Biological Sciences, Brock University, Tel 905-688-5550- ext. 3394 fhunter@brocku.ca
Dates:	Sunday, May 3rd – Saturday, May 16th, 2020
Location:	Wildlife Research Station on Lake Sasajewun, Algonquin Provincial Park
Cost:	Total cost: $1850. $350 payable to your home University with your application. $1500 balance (payable to Brock University) due by April 20th, 2020. This course fee covers all equipment and consumables required for student projects and food and accommodation for 13 days. Students are responsible for their own transportation to and from the field station. In the past, students have been able to arrange car pools with students from other Universities.
Prerequisites:	Second-year general ecology course or animal behaviour course. Experience in experimental design is recommended.
Enrolment:	20 (4 reserved for Brock University)
Description:	Course topics will include aquatic insect collection techniques, identification of aquatic insects in the laboratory, the habitat associations of different groups of insects, and ecological interactions of common species encountered. Students will work in groups of two and carry out an independent research project on the behavioural ecology of an aquatic insect of their choice and write up a report to be handed in after completing the course. Students will also keep notes on their field observations in a field book, which will also be submitted after the field course for grading. It is expected that students will gain an appreciation of the diversity of aquatic insects in Ontario and understand the ecological roles of each of the major insect groups that have aquatic life stages.
Evaluation:	Participation in fieldwork: 10% Participation in class discussions: 10% Insect Identification quiz after Week 1: 10% Individual presentation of assigned readings: 15% Field book – notes and observations: 25% Experimental report: 30%
Website:	Algonquin Wildlife Research Station http://www.algonquinwrs.ca/

Carleton University (OUPFB Module 4.)

Course Title:	**Turtles: Ecology, Behaviour, and Conservation** Website: https://turtlecourse.weebly.com/
Instructor(s):	Grégory Bulté
Dates:	May 3 – May 16, 2020
Location:	Queen's University Biological Station
Cost:	**$1200** includes all accommodations, meals, wi-fi, equipment, and transportation during the course. Payable as **$350 non-refundable deposit** to your home university; and **$850 balance** by cheque (deadline March 22nd, 2020) to: **Carleton University 814308-166-228000** Mail to: Haiyun Bo, Dept. Biology Nesbitt Bldg., Carleton University 1125 Colonel By Dr, Ottawa, ON K1S 5B6. **Excluded**: Students are responsible for travel costs to and from QUBS.
Prerequisites:	• Second year coursework in ecology, conservation biology, or animal behaviour. • Be comfortable with working near, on, and in the water.
Enrolment*:	12 (5)
Course Description (brief):	This course applies concepts and tools commonly used in wildlife ecology, animal behaviour, and conservation biology to the study of freshwater turtles in the field. You will apply different sampling and observational techniques to gather data on the abundance, demography, and behaviour of selected species of turtles. You will use this data as the basis for your final report due one month after the end of the course. You will also have to write a short essay (blog post) on the biology or conservation of freshwater turtles due at the end of the course. Although this field course focuses on turtles, the skills and concepts covered are directly transferable to other groups of animals and field situations. See full details on course website: https://turtlecourse.weebly.com/
Evaluation:	Final report (due one month after the end of the course): 40% Protocol quiz: 10% Final team-based quiz: 10% Outreach project (due one week after the end of the course): 20% Field notebook: 10% Participation: 10%

An Average Day – What to Expect

(a) Daily timeline	The schedule will vary based on weather conditions and the availability of shared equipment and space such as boats and classrooms, but a typical workday will follow this schedule. • 7h30 to 8h30: Breakfast • 9h00 to 10h00: Lecture, workshop, or demonstration • 10h00 - 12h00: Fieldwork, turtle processing, or data entry • 12h00 to 13h00: Lunch • 13h00 to 17h30: Fieldwork • 19h00 to 21h00: Briefing and planning / Independent work Be prepared to work from 9AM to 9PM most days.
(b) Work habitat & Physical exertion	Turtles in Ontario live in lakes and wetlands. Most of the fieldwork will be conducted in chest waders and in canoes or motorboats. Short hikes (< 3Km) with field gear and canoeing may be necessary to reach certain sites. Wading and canoeing are wonderful ways to get close and personal with the aquatic realm but wading in ponds with soft mucky bottoms is strenuous so as paddling in windy conditions. You will have to demonstrate common sense with regards to sun protection, hydration and physical exertion.
(c) Common activities	Common activities will include: • Canoeing to sampling sites • Actively searching for turtles • Setting and checking nets from a boat or in waders • Installing and retrieving data collection devices • Measuring turtles and recording data • Entering and summarizing data • Performing behavioural observations in the field or from videos recorded during the course • Briefings and discussions • Cleaning and organizing field gear • Short lectures and analysis workshops • Independent work • Taking selfies with cute turtles
(d) Weather, dehydration, & biting insects	Weather conditions in early spring are quite variable but the highs are generally around 12 to 20°C and the lows between 3 and 10°C. Be prepared to work in cold and rainy conditions (at least there is no bugs when it is cold and rainy!). The lake temperature is usually around 10 to 15°C so you may get a chill from wading in the lake. Pack clothing for rain, warm, and cold weather as well as sunscreen, and a water bottle. Wetlands are breeding grounds for a number of biting insects and blood donations to the six-legged kind is inevitable. If you strongly react to insects' bites, use insect repellent but care should be exercise with these strong chemicals when handling wildlife.
(e) Toxic/poisonous, wildlife/ plants	While doing fieldwork you may be exposed to poison ivy, wild parsnip, or diseases carrying ticks. Toxic plants are easy to avoid once you know to recognize them. To limit exposure to disease carrying ticks, I strongly recommend to always wear longs pants in the field, and to tuck your pants inside your socks. You should also perform a daily tick check.

(f) Sleeping, washroom & laundry facilities	Your accommodations at QUBS will be one the following two option: • a single or double unheated cabin without a washroom (shared washroom with individual showers stalls are available in the main building); • a shared bedroom in a cottage or dorm house with a washroom. Up to 4 students may share a bedroom. • Sleeping accommodations are not co-ed. You will only find out about your accommodations upon arrival at QUBS so pack as if you will sleep in an unheated cabin (i.e. a warm sleeping bag). Pack earplugs if you are a light sleeper. All showers have hot water. QUBS does not provide bedding. Bring your own sleeping bag and pillow. Coin operated laundry is available on site.
(g) Meal plans & food allergies	QUBS provides 3 meals per day plus snacks (e.g. fruits, bread, cereals) around the clock. The default diet includes meat and dairy but vegetarian and vegan meals are available. The cooking staff can accommodate special dietary requirements such as allergies and intolerances. Any special dietary arrangements (i.e. everything that is not the default diet) must be made in advance and for the duration of the course (not a meal per meal basis). I will provide information regarding dietary accommodations shortly before the beginning of the course.
(h) Non-academic responsibilities	QUBS does not have full time cleaning staff and students and researchers are expected to clean after themselves in both the living and working spaces.
(i) Degree of isolation	QUBS is 45 minutes north of Kingston and has WIFI. Bandwidth is sufficient to check emails and browse but cannot sustain high streaming and downloading demands, so we ask students to refrain from using streaming and downloading platforms. Cell phone reception can be patchy.
(j) Alcohol & drugs	Queen's University and Ministry of Labour regulations prohibit alcoholic beverages in workspaces (Operations Centre, workshop, aquarium or labs). However, alcoholic beverages are permitted in individual residences. Keep bottles and cans out of plain sight. Even a few empties in plain view give the wrong impression to visitors to QUBS. There is zero tolerance for illegal drugs at QUBS or on QUBS properties. Smoking or vaping of cannabis is prohibited unless approved for medical use. It is expected that QUBS users will behave in a sensible and decorous manner at all times.
(k) Vaccinations/ Insurances	General health insurance for Canadian Resident. International students should have travel insurance.
(l) Social Situations	For safety reasons, fieldwork will always be performed at least in pairs. Moreover, you will have to share accommodations (including a bedroom) with other participants in the course. You must therefore be comfortable with teamwork and communal living arrangements. This course is a great opportunity to meet new people and to expand your networks of friends and professional contacts. If you think you may find the social environment of the course challenging, please contact the instructor before signing up.
(m) Final comments	Collecting data on wildlife is essential for monitoring and protecting populations. However, catching and handling wild animals causes stress to the animals. We thus want to make our sampling as meaningful and relevant as possible. I will expect students to maintain high standards when handling and processing turtles as well as when recording and entering data. QUBS is located in one of Canada's biodiversity hotspots and it is an amazing place to meet students and researchers from other institutions.

Carleton University (OUPFB Module 5.)

Course Title:	**Fish Ecology & Fisheries: The Science Behind Conservation and Management**
Instructor(s):	Dr. Chris Elvidge (Carleton University); chris.k.elvidge@gmail.com
Dates:	May 3 – May 16, 2020
Location:	Queen's University Biology Station (north of Kingston, ON: https://qubs.ca)
Cost:	**$1350** includes all accommodations, meals, wi-fi, use of boats and equipment, transportation during the course. Payable as **$350 non-refundable Deposit** to your home university; and **$1000 Balance** by cheque (deadline March 27th, 2020) to: **Carleton University 814308-166-228000** Mail to: Haiyun Bo, Dept. Biology Nesbitt Bldg., Carleton University 1125 Colonel By Dr, Ottawa, ON K1S 5B6. **Excluded**: Students are responsible for travel costs to and from QUBS.
Prerequisites:	Second- or third-year course work in ecology, conservation biology, environmental science, geography, or behavioural science/psychology. **NOTE: Students must be comfortable around water and boats. Approximately half our working time will be spent outdoors under variable weather conditions. All participants MUST, at some point, handle live fish.**
Enrolment*:	12 (3 reserved for Carleton University)
Course Description (brief):	Eastern Ontario is home to a diversity of freshwater ecosystems and fish species, providing an ideal backdrop for a field course examining the ecology, conservation and management of fish and fisheries. The objective of the course is to introduce students to the conceptual foundations of fisheries science and aquatic ecology research while providing them with some of the practical skills needed for experimental design, research execution, data analysis, and communication. Through lectures and hands-on activities students will be exposed to diverse practices in contemporary fish & fisheries research, conservation, and management. Students will work in groups with the guidance of the instructors to execute their own research projects with the aim of generating data to publish in peer reviewed journals. At the conclusion of the course students will be able to collect fish using a variety of gear types (e.g. electrofishing, seine nets, hoop nets, rod and reel), safely handle, and enumerate (e.g. identify, measure, tag) a variety of fish species. Students will also be able to characterize fish habitat (e.g. snorkelling surveys) to gain insight on fish-environment interactions. In addition, students will be exposed to a variety of research tools used to study the behaviour, ecology, and physiology of wild fish potentially including surgical techniques, biotelemetry, archival loggers, respirometers, field physiology sampling kits, and underwater video.
Evaluation:	Oral presentation (20 min + 10 min discussion) 25% Field notebook 5% Participation 5% Quiz 25% Research paper (due on June 15, 2020) 40%

An Average Day – What to Expect

(a) Daily timeline	In general, we will be working around the meal schedule at QUBS. QUBS serves meals three times per day (breakfast at 7:30-8:30, lunch at 12:00-13:00, dinner at 17:30-18:30). A typical day will involve starting in the field or the classroom at 8:30, breaking for lunch, working until dinner, and then reconvening for group or classroom activities from 19:00-21:00. These details may change as opportunities presents themselves, e.g. fishing at 05:00 or night-sampling at 00:00. Replacement sleep/rest time will be allocated as needed.
(b) Work habitat & Physical exertion	We will be working in and around water, and on boats of varying sizes, as well as in a seminar room. Being comfortable around water is a must. Life jackets will be present at all times, and chest waders will be available for shallow-water sampling. Working with animals involves keeping them healthy and in good condition – in the case of fish, this means carrying lots of buckets and coolers full of fresh water. Electrofishing will involve wading in hip-deep water with a heavy backpack for a short period of time.
(c) Common activities	We will be capturing and handling fish, which can involve minor stabbings from hooks, fish spines, and small blades. Boat work always comes with the risks of slipping, docks give splinters, working in water leads to dry skin, etc., so being cognizant of these minor hazards and working to avoid them as much as possible are imperative. In addition, seasickness may be an issue for some students (Opinicon is a small lake, but it is still possible). All students MUST handle live fish at some time, and some fish may be lethally sampled. No one will be required to swim. Activity-specific risks will be covered when relevant.
(d) Weather, dehydration, & biting insects	At this time of year (early May), temperatures can range from lows of 0 at night to highs of 30 during the day, and precipitation can range from light snow and frost to torrential rain. In short, weather can be quite variable so bring a wide range of clothing suitable for working outdoors: everything from rain gear to summer clothes/bathing suits with fall/winter gear as well. Quick-dry clothing (e.g. running or trekking gear) is great for aquatic work - spending a day in wet jeans is no fun at all. In 2017, the course occurred during the Great Flood and the station lost electricity for 3 days during 2018, both of which significantly curtailed our activities. I hope it's hot and sunny, but we won't know until we get there. Biting insects generally are not bad at this time of year, but if you are sensitive to bites, bring some insect repellant. Sunscreen is also highly recommended for when we are working outdoors.
(e) Toxic/poisonous, wildlife/ plants	This area of Ontario has very high abundance of ticks, and Lyme disease infections are reported every year. Students need to visually inspect themselves daily. Most of our activities will be in or on the water, but vigilance is still needed.
(f) Sleeping, washroom & laundry facilities	Accommodations will be shared (2 or more people per room). If this is an issue, let me know ASAP to see if alternate arrangements can be made. Room-mates will be assigned by gender. There are beds with mattresses but you should bring your own pillow(s) and bedding. I tend to bring a set of sheets, pillow and a sleeping bag for myself. Water is hot and potable, and if it is not potable, it will be clearly marked and large blue jugs of drinking water will be available. You will need to bring your own soap and toiletries and you should bring two or more towels (one for showering, one for drying off after lake work). There are kitchen facilities in many of the cabins, including fridge & freezer for personal items. Fridge space may be shared with boxes of worms for fish catching purposes. There are coin-operated laundry facilities, and the kitchen staff can make change during their operating hours. The kitchen staff are also responsible for the sale of QUBS-branded merchandise (hats, shirts, mugs). All washrooms are equipped with running water and flushing toilets. While we are on-land at QUBS, washrooms will always be available and nearby. When we are not at the station, boat excursions will be limited to <4 hours with the option of returning in case of emergencies.
(g) Meal plans & food allergies	QUBS serves three meals per day (7:30-8:30, 12:00-13:00, 17:30-18:30). Outside of meal times, snacks (fruit, bread, jams, peanut butter, cereal and milk) and beverages (tea, coffee, milk, hot chocolate) are available 24 hrs. The kitchen can accommodate most food allergies (dairy, gluten, seafood, nut-free) and requirements (vegan/vegetarian). Note that there is peanut butter present, as are epi-pens, for students with nut allergies. Religious diets (Halal, Kosher) usually default to the vegetarian option when pork is served; strict religious diets (particular foods not cooked in the same facilities) cannot be accommodated.

(h) Non-academic responsibilities	Students are required to keep their living spaces (bedrooms and shared areas like kitchens and living rooms) clean, and to leave these areas clean at the end of the course. Other QUBS users will be present and on their own schedules, so mutually respecting spaces is important. There is no housekeeping service.
(i) Degree of isolation	QUBS has full electricity, potable water, WiFi, and cell coverage (although you might have to stand outside to get good reception). It is less than an hour from Kingston and about 90 minutes from Ottawa. Smith's Falls is about 30 minutes away, so we are not dealing with remote conditions. In fact, the area is very much in the Rideau Lakes cottage country. We are well-connected, professional medical attention is nearby, we are covered by 911 service, and several people on-site will have both basic and wilderness first aid training, but using common sense and not being reckless are always assets. There is a convenience store/LCBO outlet a few kilometers away in Chaffey's Lock, with more grocery options ~15km from the station, if needed. The station is used by researchers from several Canadian and international universities, and often hosts concurrent OUPFB courses. Attendees of this course will likely constitute only a small portion of QUBS residents while we are there.
(j) Alcohol & drugs	QUBS is part of the Queen's University campus, so their policies on alcohol and drugs must be followed. Alcohol is only permitted inside the residences. Smoking (tobacco and cannabis) is not permitted on Queen's property. Students are expected to not be under the influence of any non-prescription substances during course work hours. Missed work, e.g. due to hangovers, will not be able to be made up. Students are further encouraged to conduct themselves responsibly.
(k) Vaccinations/ Insurances	This course is offered on a university campus in Ontario. As such, no special insurance or vaccinations are required. We are within 911 coverage in the case of emergencies. Students are reminded to bring their provincial health care cards.
(l) Social Situations	Students will be spending 2 weeks together in fairly close quarters and working on group research projects. We plan to have access to a firepit at night, and everyone is encouraged to mingle with other QUBS users outside of our active hours. Harassment of, or violence towards, other students or users of the facilities will not be tolerated. Any incidents should be immediately reported to your instructor, another instructor present at QUBS, or the station management, all of whom will be identified to you on the first day of the course. Appropriate actions will be determined by QUBS management to ensure the safety and security of all present.
(m) Final comments	This course has been very well received by past students, and while we do have academic components to cover, we will also spend as much time as possible outside (weather permitting) and students will have the opportunity to develop and perform their own group research projects during the second week based on questions and activities that were of interest. Some of those projects have been published in peer-reviewed journals, so beyond information on fish, this course has the potential to provide students with experience in the full research process (conception-design-execution-analysis-publishing).

Queen's University (OUPFB Module 6.)

Course Title:	**Desert Ecology & Evolution**
Instructor(s):	Dr. Christopher Eckert, Queen's University (chris.eckert@queensu.ca) Regan Cross, Queen's University (17rc28@queensu.ca)
Dates:	3–17 May 2020
Location:	Southern Arizona and California USA
Cost:	• $1000 ($350 deposit + $650 paid later, see below) which covers all costs except airfare (~$700) and food (~$200). • Students arrange their own air travel as long as they make it to LAX by 2 pm, Sunday 3 May. Food will be purchased at several resupply stops throughout the course. • To confirm your enrolment, we must receive the $750 balance (cash or cheque made out to Queen's University) by 25 March 2020. This is a firm date. Failure to pay the balance on time will result in your losing your spot to someone from the waiting list. • To cancel and get your balance back, you must inform us in writing by 1 April 2020. This gives sufficient time to find a replacement for you. If we cannot find a replacement, your deposit is forfeit. • If you cancel after 1 April 2020, we reserve the option of keeping your deposit + balance, but will do so only if we have no alternative. We will try to find a replacement, and if we do, you'll get your money back. You are welcome to find a replacement for yourself, and then we're all happy.
Prerequisites:	Completed 2nd year in a biology program. Introductory ecology, evolution and statistics is helpful but not essential. Valid passport (and VISA if necessary) for travel to the USA. Up to date tetanus shot. Sense of humour and a love of the outdoors.
Enrolment*:	18(5)
Description:	• This course explores the ecology & evolution of plants and animals in the terrific deserts and arid lands of the southwestern USA. Through class exercises and group research projects, we will investigate how geological, climatic, and biotic factors interact to influence the abundance, distribution, life histories, reproductive strategies, and behaviour of desert organisms. • We will meet at Los Angeles International Airport (California, LAX) at 2 pm, Sunday 3 May and will travel from site to site in rented 15-passenger vans, spending 13 days visiting Saguaro National Park, Organ Pipe Nation Monument and Catalina State Park in Arizona plus Anza-Borrego Desert State Park and Joshua Tree National Park in California. • All nights are spent in the field, camping in tents. Each student will need the use of use of a tent, a warm sleeping bag, a sleeping pad and eating tools. Meals will usually be camp-style, with students participating in preparation and clean-up. We will supply stoves, pots and pans. When we are in areas with no ready water supply we rely on packed water, so there will be no luxury water-use (e.g. showering or hair washing). This will require flexibility with respect to personal hygiene.
Evaluation:	(1) Trailside seminar in the field (20% of your total mark) (2) Formal write-up of an independent field research project (40%) (3) Field notebook (15%) (4) Practical hands-on exam conducted in the field (10%) (5) Participation (15%)

An Average Day – What to Expect

(a) Daily timeline	It is most comfortable to work in desert habitat during the early morning and late afternoon/evening, so we are typically up, fed and ready to roll before sunrise, and are hiking and doing field studies during the cooler morning hours. We return to camp at ~11am for lunch and a brief siesta out of the noon sun, and then return to the field ~3pm for afternoon and evening activities until sundown. We return to camp ~8pm for dinner, and students usually socialize until they choose to retire to their tents. The instructors will lead night hikes regularly but these are optional.
(b) Work habitat & physical exertion	To experience the biological diversity of desert habitats, we hike extensively at each of the sites we visit. Students can expect to hike 10–15 km per day through rugged terrain. Everyone carries a backpack with field equipment, changes of clothing and at least 2-4 L of water. Sturdy footwear and decent physical fitness are essential.
(c) Common activities	None of the activities students are required to engage in are risky, but the habitat that we will be working and living in poses challenges described below.
(d) Weather, dehydration & biting insects	The southwestern deserts are renowned for temperature extremes. Some mornings and evenings it may be cold (5–10°C) and windy, whereas afternoons are usually hot and still (30–40°C). Dressing for the weather, shielding skin from the sun and staying well hydrated are extremely important. Although we will observe many wasps, bees, spiders and ants, insects who make a living by biting humans are mercifully absent from most desert habitats.
(e) (Toxic/poisonous, wildlife/plants	Desert plants aggressively protect themselves with spines and thorns so that students quickly learn which ones to avoid. Scorpions are abundant but usually shy and easily avoided by zipping up your tent, keeping shoes inside for the night and not walking around in bare feet. We do encounter rattlesnakes but these animals are not aggressive and we will discuss how to avoid and treat snakebites.
(f) Sleeping, washroom & laundry facilities	We sleep in tents and have access to washroom facilities in state and national parks. These facilities range from modern and clean to charmingly rustic. Students must bring their own sleeping bags and mats. They can also bring a tent and we will have tents for those students who can't borrow or share an appropriate shelter. Because we are working and living in very arid habitats, showers and other ablutions involving profligate use of water will be very infrequent. There will be little or no opportunity to do laundry.
(g) Meal plans & food allergies	Al meals are cooked at campsites on safe, efficient alcohol stoves. We provide stoves and pots, while each student should bring their own cup, dish and utensils. Groups of 4 students that share dietary restrictions and preferences will buy food together, share a camp stove and pots and cook together. We can accommodate all food allergies and dietary restrictions.
(h) Non-academic responsibilities	Students will cooperate in setting up and taking down the field camp as we move from site to site. They will need to keep their camp stove and pot clean and help maintain and keep track of research equipment.
(i) Degree of isolation	Cell service is unlikely at each of our four main study sites, so we will have a satellite phone for emergency contact. We are within 911 coverage in the case of emergencies. Professional medical services are available in communities within a 30–60 minute drive from the main field sites. While travelling from site to site (i.e. every few days), we will make stops for food and other supplies required by individual students as well as opportunities to check email and messages.
(j) Alcohol & drugs	Students are strongly encouraged to behave responsibly and abide by the liquor and drug laws in the states of California and Arizona. In both states, the legal drinking age is 21 and alcohol may be legally consumed only on designated campsites. Cannabis is illegal in Arizona. It is legal in California but cannot be used in public spaces, which includes all state and national park campgrounds. Students are expected to not be under the influence of any non-prescription substances during course work hours. Work missed due to hangovers cannot be made up.
(k) Vaccinations & insurances	All students will require supplementary insurance coverage for medical expenses in the USA and will be asked to provide details of their coverage to the course instructors before departure. Students must bring their health care cards and proof of insurance on the trip. No particular vaccinations are required.
(l) Social situations	Students will spend 2 weeks together in close quarters and working on group field exercises and research projects. There will be plenty of opportunity for socializing during siestas and in the evening. Mutual respect and tolerance are essential components of participation in this course. Harassment of, or violence towards, other students or users of the facilities and areas we visit will not be tolerated. Any incidents should be immediately reported to either of your instructors. Appropriate actions will be determined by your instructors in consultation with Queen's University Emergency Report Centre to ensure the safety and security of all present.
(m) Final comments	The goal of this course is full immersion in the wonderful deserts of the southwest. By hiking, cooking, eating, sleeping and generally hanging out in the desert day and night you can experience the many facets of its beauty and fascinating biological diversity. In the past students have really enjoyed the course and particularly appreciated the opportunity to develop, execute and write-up their own group research projects.

Trent University (OUPFB Module 7.)

Course Title:	**Dolphin & Whale Biology and Conservation in Tropical Asia**
Instructor(s):	**Dr. John Wang** (Trent University & CetAsia Research Group; cetasiajohn@gmail.com) Dr. Bradley White (Trent University; bradley.white@nrdpfc.ca ; 705-748-1011 x7113)
Dates:	May 3rd -May 16th, 2020 (2 weeks)**.** Arrive to meet in Asia on Sunday, May 3 (early am) so depart from Canada on, or before, May 2nd; depart from Taiwan at about noon on May 16th.
Location:	Taiwan (due to continuing civil unrest, the course will not be visiting Hong Kong in 2020)
Cost:	~$2,450 ($350 deposit to home university, $2,100 balance). **Includes:** all domestic ground travel, all accommodations, most meals in Taiwan (except 2-3 days of lunch and dinner, which will be on your own to choose and pay), all field and laboratory expenses, boat charters. **But excludes:** airfare (~$800-1,000); visas (Canadian and US passport holders do not require visas for Taiwan); travel insurance; meals on 2-3 days (student responsibility). **Balance ($2,100):** required by **Monday, March 2, 2020 (and is non-refundable).** (**Note:** the total cost per student (i.e., course fee + flights + meals) for this year's course will be noticeably less than in previous years) because unlike in past years, course fees this year will include most of your meals and flying only to Taiwan.
Prerequisites:	A 2nd year ecology course. Experience with introductory statistics is also recommended.
Enrolment:	A minimum of 15 students and a maximum of 25 (3 reserved for Trent students).
Course Description:	Asia has some of the world's most populated countries that have heavily exploited marine resources and massive industrialization along coastal regions. As a result, Asia is facing some of the worst marine conservation issues in the world. This course will introduce students to many of the main marine conservation issues using a highly visible group of organisms, the cetaceans (whales, dolphins and porpoises). Students will learn the kinds of information that are needed to assess and understand the impacts of human activities on cetaceans (e.g., threats, taxonomy, distribution, population biology) and research methods used to obtain such information. Students will learn hands-on research methods at sea (such as: exploratory surveys, line-transect surveys, mark-recapture using photo-identification data) and will visit coastal regions and fishing ports to experience the local conditions. They will also acquire basic skills and knowledge such as species identification, data collection, general cetacean biology, conducting research projects and critical review of literature.
Evaluation:	Participation & professionalism (begins on the first e-mail contact with professors) 20% Research and presentation of an assigned species 10% Debates 5% Critiques 10% Written final examination 25% Research projects (papers and presentations based on application of learned course material) 30%

For more detailed information, please consult the course website: http://taiwan.nrdpfc.ca/index.htm (**Note:** due to continuing civil unrest, we will not be visiting Hong Kong in 2020).

An Average Day – What to Expect

(a) Daily timeline	We usually aim for a "typical" day to start at about 8am and end before dinner time. However, this is a field course and there may be activities that will require an earlier start in the morning and other days may require evening sessions to keep us on schedule. This is not meant to be a deterrent. On the contrary, it means that we are maximizing your experiences during the course to get the best return for your money, but it also means that you need to be prepared. Such a pace is also an introduction to a little of the demands that field work often involves. In the second half of the course, our schedule eases somewhat with the change in the focus of the course from lectures to research projects but there will still be lectures and field research. Because field work often depends on weather, we are at the mercy of the conditions and are not able to set fixed schedules. Being on a flexible schedule is also a very important experience of field research.
(b) Work habitat & Physical exertion	Although this is an intense course with constant activities, this field course is not overly physically demanding for extended periods of time compared to some other courses. There is some brisk walking (about 2-4 km/day) to get from place to place and there may be a hike up a steep set of steps (about 200m high). Notably, you will be doing this while carrying your equipment (e.g., binoculars, clipboards, notebooks), bottles of water, food (lunches, snacks), sun protection clothing and sunscreen, etc. and in a climate that is often humid and hot (>30oC) and near 100% humidity. However, these activities do not last more than a couple of hours at a time and we try to spread out physical field activities so that they will not last longer than about half a day. Boat trips can be quite long (4 to 8+hours) but you will have time to sit and rest during the boat trips and there are shaded areas on the boats to stay out of the sun. Although we do not usually plan to have boat trips during poor weather conditions (e.g., heavy rain, large swells, etc.) there is always a chance the weather changes. Generally, the climate is warm but being wet (and being blown by the wind) can cause students to feel cold so bringing a light sweater and rain gear can easy remedy this issue. Boat trips can also cause students to feel seasick (motion sickness). Over-the-counter anti-nausea medication (e.g., Gravol) can reduce discomfort. While out in the field, some students have had issues with the heat and sun. Taking simple measures to make sure you are well hydrated and covered up from the sun can prevent such issues. Even though this course may not be as physically demanding as other courses, days can be quite long and for consecutive days so fatigue can occur if students are not mindful of their bodies' needs. Students who are focused on the course and mindful of their time-management time and well-being (e.g., choosing sleep over staying up late for non-course related activities; staying well hydrated and out of the sun during field activities; etc.) can avoid being overly fatigued.
(c) Common activities	For the first few days, we will be travelling in a chartered bus most of the day and sometimes through winding roads as we cross mountain ranges. There will be some field course activities on the bus but we tend to schedule such activities for stretches of flatter, straighter roads. Some students may feel motion sickness during bus travel. Over-the-counter anti-nausea medication (e.g., Gravol) can reduce discomfort. The course has multiple boat trips planned and some trips to land-based observation sites and for other course-related activities. When we are not doing field activities (at nights, during poor weather and during travelling), students have more typical "in-class" activities (such as lectures, student presentations, projects and assignments, etc.). During the second half of the course, students will spend more time conducting their own field research projects (in groups). There will be a number of group projects/assignments for this course, and students are expected to treat each other respectfully and professionally during these activities. Group work is part of doing science, and it is good to get comfortable with this sooner rather than later. There are NO course activities that will require entering the water.

(d) Weather, dehydration, & biting insects	May is a transitional weather month in the region. It can feel like mid-late spring or like the summer heat waves we get in southern Ontario. It is often humid and hot (>30oC and near 100% humidity) with a very strong sun. Wearing clothing (UV shirt, pants, hats, etc.) that protects you from the sun and drinking plenty of fluids (and regularly) will reduce the risk of heat issues. Biting insects are generally not an issue in our field work sites but can be more of any issue when they are allowed to enter student accommodations. Closing doors and having a bed net or using repellents will reduce insect bites.
(e) Toxic/poisonous, wildlife/ plants	Although the probability is very low, we may be in an area where there are venomous snakes so some care is needed when walking around (e.g., avoid walking in tall grass or stepping into areas where you cannot see the ground clearly, etc.).
(f) Sleeping, washroom & laundry facilities	Students will be in shared hotel-type accommodations (2-4 students per room) while we are travelling around but will be in more dormitory style accommodations with simple kitchen appliances when we are more settled. Rooms will be shared with other students and while bathrooms are shared, shower stalls are separated. A light sleeping bag or sleeping bag liner is always good to bring. A mosquito bed net is also useful to have because in some years, even a few biting insects can disrupt sleep. There are coin-operated washer and dryer machines for laundry.
(g) Meal plans & food allergies	Most meals are included in your course fees except for 2-3 days when you will have more freedom to choose (these meals will covered by yourself). Please inform us of any food allergies or issues.
(h) Non-academic responsibilities	It is your responsibility to keep your accommodations clean – no cleaning service is provided.
(i) Degree of isolation	In general, we will be fairly remote by local standards but not remote from people as compared to some other field course sites. You will be able to stay connected through the internet (or cell phone service if you choose to pay for this service) and will have power almost everywhere (except for the short periods when we are in transit or doing field work. We are not very far from a hospital or medical clinic.
(j) Alcohol & drugs	The consumption of alcoholic beverages is not permitted during course time and within the students' accommodations. The same holds true for drugs of any kind (unless prescribed by your medical doctor for a medical condition). Note that some drugs may be illegal to possess or bring into Taiwan so you will need to consult your medical physician for any drugs that you plan to bring with you. Even though the use and possession of marijuana may be legal in Canada, this does not hold true for Taiwan, where marijuana use and possession remains a serious crime (in Taiwan, the possession or trafficking of banned drugs can be punishable by death).
(k) Vaccinations/ Insurances	Tetanus (update if needed) – highly recommended. Hepatitis A&B – highly recommended. There are other diseases that are possible but with low probability (e.g., dengue fever, Japanese encephalitis, etc.). You should consult your physician on what he/she thinks you should be vaccinated against. Some diseases are present but rare and may not be worth the cost or side-effects of the vaccination (again, best to consult your physician). Ultimately, which vaccinations you decide to get is up to you. It is highly recommended that students purchase some kind of travel medical insurance. How much and if you decide to purchase insurance will be ultimately up to you to decide.

(l) Social Situations	For most of the course you will be in close quarters with your fellow classmates so you should be comfortable living in this situation. You are expected to be respectful, polite, relatively clean and hygienic, and friendly with your classmates. In addition to the shared living spaces, much of the course involves group work. Therefore, you are expected to be willing and ready to be a good group member. This means keeping a positive attitude throughout the groups' inevitable "ups and downs", not being too dominating nor too submissive during group interactions, respecting the ideas of others and giving everyone the opportunity to contribute. It also means handling difficult people and situations in a mature and professional manner. The primary language used in Taiwan is Mandarin Chinese. As foreigners, you are likely to attract the attention of locals. There are likely to be people watching you in public even if you don't think people are watching you. However, the locals are very friendly and helpful. The unfamiliar conditions of a field course can sometimes take students out of their comfort zone, to the point where they forget and/or don't know how to best take care of themselves. Students need to be aware of this, and make sure that they act accordingly. This includes things such as physical maintenance (staying hydrated and nourished, getting enough sleep, for example), as well as mental maintenance (staying positive and engaged in the course). It also means all are expected to aid in the maintenance of the functioning of the group (e.g., being accepting of alternative points of views and personalities, and respecting other people and their ideas). Also, remember that as students in a foreign country, you are representing Canada, your University, and your professors. You should choose the way you act accordingly, and always be mindful that you are representing more than just yourself in these locations.
(m) Final Comments	Although this course is intense, almost all students who have taken this course have found it an experience of a lifetime and very worthwhile. This course's longevity and non-stop continuity since it was first offered in 2007 and high-praise and recommendations by former students are testaments of the course. We have a high instructor-to-student ratio and all instructors are very active in dolphin/whale research in various parts of the world. The course often opens the eyes of students to the real world of science and scientists as well as the state of the environment in an area that is geographical distant from, but at the same time closely linked to, Canada. Most students (even if their background is from the region) will see animals and things that they never knew existed, including a good chance of seeing some species that even many dolphin/whale biologists have never seen. A relatively large proportion of the students of this field course have continued on into graduate studies and many in dolphin/whale biology.

Wilfred Laurier University (OUPFB Module 8.)

Course Title:	**Bioacoustics: Field Methods and Applications**
Instructor(s):	Dr Scott M Ramsay
Dates:	3 – 16 May 2020
Location:	Algonquin Wildlife Research Station; Algonquin Park, Ontario
Cost:	$1350 [$350 deposit to home university; balance due to Wilfrid Laurier University by 3 April 2020] includes accommodation, meals and in-course travel. You must arrange your own transportation to and from Algonquin Park, and pay tuition fees to your home university.
Prerequisites:	A university course in animal biology; additional background in animal behaviour, ecology, or statistics would be an asset.
Enrolment*:	12 (3)
Course Description (brief):	Acoustic signalling is used by a wide variety of birds, amphibians and insects in a number of behavioural contexts (eg group cohesion, predation avoidance, mate attraction and repulsion of rivals). In this course we will explore some methods of recording and analysing animal sounds. We will consider some of the functional constraints on the properties of animal sounds and signal transmission that may arise from characteristics of animals themselves (eg size and morphology), the context in which they are used, and the properties of the environment. Finally, we will also consider how animal sounds can be used to answer questions in ecology, evolution and environmental assessment. During the second week students will complete independent or small-group research projects.
Evaluation:	Seminar (based on a pre-assigned article, prepared before course): 20% Participation (seminar discussions, and field activities): 15% Field notebook: 15% Project presentation (oral presentation on the last day of the course): 10% Final written paper (10 – 15 pages; based on independent project; due 4 weeks after course completion): 40%

An Average Day – What to Expect

(a) Daily timeline	5:00 am dawn field work; 7:30 am breakfast; 8:30 am morning field work; 12:00 pm lunch break; 1:00 pm afternoon break; 2:00 pm field work de-brief, notebook updates, data entry; 3:00 pm student seminars; 4:30 pm instructional seminar; 5:30 dinner; 6:30 – 9:30 pm evening field work. In the second week of the course when students are working on projects, more time will be devoted to field work, including time during the afternoon. Because of the long days it is essential to get plenty of sleep during the time that is aside for rest; otherwise it is easy to become exhausted, which can lead to stress.
(b) Work habitat & Physical exertion	Short hikes (most less than 3 km but possibly up to 8 km) over moderately hilly terrain; a variety of habitat including open meadows, heathland and mixed forest. Aside from the personal gear that you bring with you on outings, you will be expected to carry some light-weight equipment and instruments.
(c) Common activities	*Common activities*: driving to remote sites (up to 30 km) in the dark; hiking through wet/muddy habitat; sitting quietly during observation sessions or experiments, which may include periods of cold temperatures and rain. *Associated risks*: collisions (mitigated by driving safely, adjusting to the conditions); twisted ankles, damp feet, blisters from poor footwear (mitigated by wearing appropriate footwear for the conditions, eg good, worn-in hiking boots or rubber boots), fatigue (mitigated by taking rest breaks), hypothermia (mitigated by dressing appropriately for the conditions; going indoors if conditions persist).
(d) Weather, dehydration, & biting insects	Algonquin Park in early May typically experiences cool weather, with daytime highs in the mid-teens, and overnight lows near freezing; rain is likely on at least a few days during the course. If it is a warm spring, we might experience daytime highs into the 20s, which will typically be accompanied by bright sun and high UV. You are likely to experience a 15 – 20 degree change of temperature over the course of a morning. If it is cold and wet, there is a risk of hypothermia, although this can be avoided by dressing appropriately for the conditions (waterproof shell over insulating layers). In a typical year, biting insects are not too abundant during the first half of May, although their numbers will increase over the duration of the course. You are most likely to encounter blackflies and mosquitoes; no-see-ums like cool damp conditions, and can be a nuisance around sunrise and sunset. Unless it is exceptionally warm, you are unlikely to be bothered by deer flies and horse flies. The unpleasant effects of weather and biting insects can be avoided by dressing properly: long sleeves and pant legs; outer layers made of waterproof materials; mid layers made of quick-drying materials; insulating base layers; hats including a toque for cold conditions and a broad-brimmed hat for warm conditions; warm gloves and footwear; rubber boots for days when it is raining. Insect repellents with DEET are effective at repelling mosquitoes and blackflies.
(e) Toxic/poisonous, wildlife/ plants	Wildlife encounters are most likely to involve moose; encounters with black bears and wolves are much less likely. Most wildlife will keep their distance from people; however some animals may charge at a person if they feel threatened. For safety purposes no one will be allowed to work alone in the field. Where groups are scattered we will institute a check-in protocol to make sure everyone stays safe; we will also use the station sign-out board to note our plans each day. We will have a training seminar on working safely in areas with wildlife at the start of the course. Stinging insects (bees and wasps) are not a problem at this time of year. We are unlikely to encounter any plants that are poisonous on contact (e.g. poison ivy).
(f) Sleeping, washroom & laundry facilities	Details about the facilities at Algonquin Wildlife Research Station can be found on their website at https://www.algonquinwrs.ca/index.php/facilities/. Sleeping accommodations will consist of small, electrically heated cabins with bunks for 2 – 6 students; you will be assigned to cabins by gender; the bunks have mattresses; you will need to provide your own bedding, pillows and towels. The station has washroom facilities in one building with separate toilets and showers (with hot running water) for males and females; at some field sites we will have access to Ontario Parks comfort stations; in other places there may be vault toilets; lots of places we visit will have no immediate toilet facilities. The station has laundry facilities including one washer, one dryer and a clothesline; you need to supply your own detergent, and users are expected to pay a small charge per load.

(g) Meal plans & food allergies	The station cooks prepare and serve three meals per day. Meals typically include both meat and vegetarian options. If you submit a request in advance the cooks will do their best to accommodate special dietary requirements.
(h) Non-academic responsibilities	Everyone is expected to clean up after themselves as a matter of routine. In addition, station users are also assigned to dinner dish duty, which includes putting away leftover food, washing dishes and tidying up the dining room. Dish duty is assigned on a rotation, and you can expect to do it three or four times over the course of our stay at the station.
(i) Degree of isolation	You will have access to power to charge electronic devices. Cellphone reception in Algonquin Park is spotty due to two factors: there are few cellphone towers in the park; and the terrain interferes with signal transmission. As a result, you may find there are extended stretches of time when you are unable to receive messages or calls. During the time we are there, the main retail stores (snacks and souvenirs) in Algongquin Park will not be open, however the outfitters in or near the park will be open if you need to buy any items you forgot to pack. There are stores in the communities just outside the park. It is about a 30-minute drive to Whitney where some basic supplies can be obtained. There is a first-aid post in Whitney. It is about a 1-hour drive to Huntsville where there is a greater range of stores, and services including a hospital.
(j) Alcohol & drugs	Alcohol is permitted during off hours. The station has a code of conduct that applies to all users and governs the use of alcohol and drugs on station property. Further, all students are expected to follow the code of conduct at their home university while staying at Algonquin Wildlife Research Station.
(k) Vaccinations/ Insurances	Not required.
(l) Social Situations	You will be sharing sleeping quarters, and washroom facilities with others (students in the class as well as researchers working at the station). You will be expected to work with partners to conduct experiments and collect data for your individual projects. Algonquin Park is a wilderness environment. It is not like a rural community; it is most assuredly not an urban environment. Other than your classmates and others staying at the research station, you are unlikely to encounter many people over the duration of the course. If we are in a public area of the park you may have some contact with park users, but that will be sporadic. Over the span of two weeks you will likely find yourself becoming accustomed to having limited social contact, which can lead to some discomfort with crowds when you return home.
(m) Final comments	This course offers you a chance to experience life at one of the oldest research stations in one of the oldest protected areas in Canada. You will get to meet students from other universities, including your classmates and students working on research projects based at the station.

York University (OUPFB Module 9.)

Course Title:	**Ecological Monitoring in an Urban Ecosystem.**
Instructor(s):	Dr. Laura McKinnon (lmck@glendon.yorku.ca)
Dates:	Monday May 4 to Friday May 15
Location:	Don River Ravine system & surrounding natural areas at Glendon Campus, York University, 2275 Bayview Avenue, Toronto, ON, M4N 3M6
Cost:	$350 deposit payable to home university plus tuition at home institution. While we prefer students to live on-campus at Glendon residence for the duration of the field course, we recognize that this may not be feasible for some students who may wish to live at home. However, some field course days will begin early in the morning (5am) and run late. The course includes the first weekend. The cost of campus accommodation is estimated at $445 for the two-week period. Students should budget approximately $30/day for food if using the campus food services. Please contact the Instructor at least 1 month before the start date to reserve accommodations. Students are responsible for their own transportation costs to and from Glendon Campus and surrounding field sites which will all be located within walking distance of local municipal transportation (TTC).
Prerequisites:	A high level of proficiency in French and a university course in Introductory Biology and Ecology.
Enrolment:	20 (14)
Description:	This field course is based in the secluded Don River setting of Glendon Campus, which is part of Toronto's extensive ravine system. Local wildlife includes white-tailed deer and coyotes. The course combines short in-laboratory instructional sessions (< 2 hours) with daily field excursions to natural areas in the Greater Toronto Area, where students will master ecological sampling techniques. In-class instructional sessions permit students to establish a strong baseline of knowledge in ecological theory, sampling design, data collection and data analysis. The outdoor field component, which will be held mostly on campus and surrounding areas, will permit students to gain hands on experience in ecological field sampling. We will cover a diversity of field techniques such as; nest searching, bird banding, small mammal trapping, amphibian monitoring, botanical surveys, insect sampling, behavioural observations, and water and soil sampling. The students will then apply the techniques learned to a group research project to be completed within three weeks of the end of the course.
Evaluation:	Field exercises (Week 1) (20%) Group Research Proposal and Presentation (Week 2) (20%) Dataset, Analysis (Week 2) (20%) Final Research Paper (Due June 11) (40%)

An Average Day – What to Expect

(a) Daily timeline	• Start times vary based on activities. The first week of the field course is the most intense as students are being training in a variety of field techniques that they will use for their research so a 10-hour day is not unusual. For example, on bird banding days students will be expected to be on site as early as 5am, and the day's activities may not end until 5pm. There will also be some evening surveys (frogs), which may run as late as 11pm. Students will not have time to take another summer course during this two-week period.
(b) Work habitat & Physical exertion	• Students must be in good physical shape. Most activities will include long hikes (up 15km) in parks, wetlands and forested areas where access to facilities will be limited or non-existent. Students are expected to be able to carry all the gear amenities they will need for a full 10 -hour day outside (water, food, change of clothes) with sometimes limited access to facilities.
(c) Common activities	• Prepare for long day hikes, long days collecting data outside in the sun or rain. Risks in the field include; fatigue, blisters from walking, heat exhaustion, sun burn, dehydration and bug bites.
(d) Weather, dehydration, & biting insects	• May in Toronto is variable with temperatures ranging from 10 to 20 degrees. Prepare for cool days on the lakeshore (hat/warm jacket/gloves), rainy days (rain jacket) and hot sunny days in the park with little cover (sunhat/sunblock). Biting bugs are not too much of an issue.
(e) Toxic/poisonous, wildlife/ plants	• The most common hazards are poison ivy, bee stings and tick bites. Most can be avoided by being aware of each of these risks, wearing long pants and proper shoes in the field and bringing an epipen if you are allergic to bee stings.
(f) Sleeping, washroom & laundry facilities	• Co-ed dormitories with shared washrooms are available at Glendon Campus. Linens are provided. Coin mashing/laundry facilities are available on site.
(g) Meal plans & food allergies	• Students are responsible for their own food. The cafeteria is open from 7am to 6pm daily.
(h) Non-academic responsibilities	• None
(i) Degree of isolation	• The field sites are located in urban areas, but amenities (water, food, washrooms) are not always in proximity.
(j) Alcohol & drugs	• No alcohol or drugs permitted during class activities. Campus rules apply otherwise.
(k) Vaccinations/ Insurances	• Students must provide evidence of up to date tetanus vaccinations.
(l) Social Situations	• Students will work closely with each other in small groups.
(m) Final comments	• Early morning starts, long days and blisters are a small price to pay for the amazing experiences this course has to offer!

Laurentian University (OUPFB Module 10.)

Course Title:	**Tropical Forest Ecology & Conservation in Northern Thailand**
Instructor(s):	Dr. Pierre Echaubard, Laurentian University pierre.echaubard@globalhealthasia.com Dr. Frank F. Mallory, Laurentian University fmallory@laurentian.ca
Dates:	2 weeks in May 2020 (i.e. May 5-20, dates may shift slightly to take advantage of better airfare prices)
Location:	Northern Thailand (Chiang Mai & Mae Hong Song province)
Cost:	**2800 CAD** (Deposit 350$ at the time of application, balance due 2 months prior to departure)**. Includes:** accommodation, meals, ground transportation to field sites. **Does not include:** tuition at home university, international flights (approx.1500CAD), travel medical insurances, visa (if needed), required immunizations.
Prerequisites:	University course in one of these areas: Biology, Botany, Ecology, Geography. Additional course(s): Interdisciplinary studies, quantitative ecology and statistics
Enrolment:	20 students (7 students minimum)
Description:	This course provides students with an introduction to Tropical Forest Ecology and conservation in Northern Thailand. Dedicatedly experiential, this course offers field-based seminars, class discussions, guest lectures, hands-on research activities, and service learning opportunities (tree planting, community outreach) to enable first-hand exposure to field research methodologies, highlight tropical forest conservation challenges and provide overviews of the biogeography, geology, natural history and cultural diversity of the mountainous Northern Thailand with its mixed deciduous forest and hill tribes. We will spend 2 weeks in Chiang Mai and Mae Hong song provinces in remote field study sites to learn about different tropical forest types, understand forest regeneration, perform Rapid Site Assessments (RSAs), plan and implement forest restoration using Assisted Natural Regeneration and Framework Species methods, participate in tree nursery maintenance and tree planting sessions with local communities. Wildlife observations (mostly birds, but also elephant, etc.) will be frequently performed to provide data on wildlife-forest functional interactions and further inform reforestation strategies. Several independent research topics will be proposed prior to the start of the course including research focusing on specific tree species biology and ecology to inform restoration methods and strategies, techniques of maintenance and monitoring for tree performance optimization, research on biodiversity recovery, carbon offsetting & financing programs, and more. Using these research topics as guides (a list will be provided), students will submit a short research proposal that will be evaluated by the instructor for feasibility and relevance prior to the start of the course. The research projects can be problem driven and/or with taxonomic focus. We also will provide an introduction to Thai with a handout of useful words and phrases as well as high exposure to local communities for regular informal exchanges.
Evaluation:	• 20 minutes seminar describing research proposals (20%) • Field book including habitat and species descriptions, people and natural resource management profiles & all field data (20%) • Written research report (10-15 pages; written as a journal article) (50%) • Participation in class discussions & field activities (10%) • Blog entries

An Average Day – What to Expect

(a) Daily timeline	• We will cover a lot of topics and methods and explore a diversity of habitats and communities. Consequently, our daily schedule will be relatively dense though time for self-reflection and personal work will be available. • An average work day looks like the following 7:30 breakfast, 8:30 field work rain or shine, 12:00 lunch break, 1:00 continuing field work, 6:00pm dinner, 8:00-11pm class lectures, log books updates, student presentations, brainstorming and next day planning. • There will be longer resting periods at about midway through the course to offer more self reflection time and physical regeneration
(b) Work habitat & Physical exertion	• We will be working in mountainous and forested terrain, accessing remote locations through 4x4 and moderate hiking (2-3h per day). We will sample soil (involve digging) and vegetation as well as perform wildlife observations in sometimes moist conditions. • Most days there will be lunch breaks and dinners back at the field station or nearby natural recreational resting areas for participant to have the opportunity to rest (bring your hammock), discover local landmarks and interact with local communities.
(c) Common activities	• Common activities will include hiking through wet/muddy rainforest, day/night driving on secluded trails/roads, digging, planting, observing quietly. • Common associated risks are blisters from poor footwear, bug bites, motionsickness, twisted ankles, fatigue, and heat exhaustion. All these risks can be easily avoided and mitigated through good planning and preparation, appropriate equipment (long sleeves, pants, hat, personal water bottle with electrolytes), good rest at night and good nutrition (including healthy snack (e.g. nuts and fruits) that we will provide)
(d) Weather, dehydration, & biting insects	• Weather conditions likely to be encountered: The course will take place in May at the onset of the rainy season in continental Southeast Asia. Regular short periods of rain in the evening are to be expected but it will not rain all day long. Strong sun and high UV index are to be expected during the day. Northern Thailand has a tropical/sub-tropical climate with high temperature during the day reaching 30-35C and lows at night in the 22-25C and moderate to high humidity index. • Exposure to mosquitoes during the day will be reasonably low except in the moister groves, which will be only occasionally investigated. Evenings are when most mosquito bites will occur. From our experience, the mosquito harassment index (sort of speak) is much less in Thailand than what you could have in Canadian forests and wetland areas. So we believe that this annoyance won't be too hard to deal with for ecologists and outdoor enthusiast generally. Wearing long sleeves and pant as well as sleeping under mosquito nets will provide the necessary protection and relief.
(e) Toxic/poisonous, wildlife/ plants	• The areas we will be working in are Malaria free. Therefore we do not recommend using prophylactic antimalarial pills, which can have severe side effects. • Dengue is an unlikely issue that mostly arise in urban and peri-urban environments. We will mostly be working in forested or near forested areas with low people densities so Dengue risk will be reduced to the minimum especially because we will be working outside Dengue peak season which occurs in August-September. Wear long sleeves and pants to prevent mosquito bite. In the very unlikely case of Dengue, there is an extensive, modern health care system with health centers and district hospitals less than 45min away that will provide the necessary assistance. Enhanced hydration and rest is enough to cope with most Dengue cases. • There are few venomous snakes in Thailand, including cobras and pit vipers. With the proper behaviour and equipment it is highly unlikely that they will pose a problem. Wearing proper hiking shoes, wearing long sleeves and pant as well as being aware of their potential presence (as well as using a probing stick to clear the way) in dense undisturbed forest before exploring is the best way to stay away from snakes. In the very unlikely occurrence of a bite, all district hospitals (less than 45min away) have anti venom at hand and are trained to efficiently handle the problem.
(f) Sleeping, washroom & laundry facilities	• Accommodations will be basic but comfortable. Students will be sleeping in gendered dormitories or bungalows. AC will be only occasional but fan are generally more than enough or not even required for the cooler nights of Northern Thailand. Students are encouraged to bring their own sleeping bags, inflatable pillows and mosquito nets but in the case this is not possible we will provide them. • Washroom facilities are shared. There is access to flush toilet with toilet paper provided as well as hot showers. • Student can request local maintenance to deal with laundry against a small fee (in the order of 40-50THB , i.e. 1-2CAD).
(g) Meal plans & food allergies	• Food will be provided, including breakfast, lunch and dinner. • Snack including nuts will be also provided throughout the day in reasonable volumes. • Extra snacks and additional needs are on the students. Vegetarian requirements as well as allergy-proof dishes can be planned in advance.
(h) Non-academic responsibilities	• It is strongly encouraged and expected that student take part on the daily non-academic life by sharing roles and responsibilities with regards to assistance with food provisioning (visiting the local markets and buying food with the coordinators), meal preparations (though a chef will be available most times), dishes, common areas cleaning and tidiness, material storage, etc.

(i) Degree of isolation	• While study sites will be remote, field stations where accommodation will be are reasonably connected. It will be possible to recharge cameras, laptops and other electronic devices everyday. • Communication, including the use of wifi and phone signal access is possible but will be sporadic. The purchase of a Thai sim card can be arranged (with 4G access). • Local convenience stores, with limited supplies (including first aid supplies) are within reach by foot or short driving distance • Community health centers are less than 15min driving at any time. Convenience store with basic first aid supplies are less than 10 min driving away. District hospitals are within 30-45min driving at all time.
(j) Alcohol & drugs	• Alcohol consumption is not encouraged. Alcohol abuse (excessive amounts) will be sanctioned if it impacts on the group dynamics and/or impedes the performance of work. • Considering the legal status of marijuana in Thailand and the severe consequences that any type of misbehaviour may incur, we do not permit consumption at all time.
(k) Vaccinations/ Insurances	• Students should consult with the relevant authorities in Canada to be informed of the standard recommendations for travel in Thailand. • Among others, vaccination for all type of Hepatitis and tuberculosis are recommended. • Thailand has a relatively efficient and modern healthcare system and effective treatment of most conditions related to infectious diseases is available throughout the country. However the costs related to treatment can be high and it is highly recommended to subscribe a health insurance that covers hospitalization in case of emergency.
(l) Social Situations	• We will spend 2 weeks almost constantly interacting with each other for both work and extra curricular activities. Strong social and collaborative skills are therefore required. However time for individual self-reflection will be available and if a break from the group work is needed for personal reasons there will be no problem to accommodate this need. • Thailand and its people are very welcoming and smiling. It is extremely rare that foreigners are treated with disrespect and in almost all situations local people will be here to help when necessary. It is important to note however that any kind of unreasonable emotional demonstration including anger and inappropriately loud behaviour are to be avoided. Because of Buddhism and its underlying principles, confronting people to their mistakes or misunderstandings is a big no. When frustration arises the best attitude is to be compassionate and detached. Thai people do not show their body, even when swimming. Although foreigners are not expected to systematically do so, it is culturally respectful to cover shoulders and legs, particularly for girls, especially near religious sites (Buddhist temples).
(m) Final comments	• The above requirements/recommendations/code of conducts, etc, are easily met/applied/achieved. In fact most of what is described above fall under common sense and are the expression of a respectful attitude. • The Thai cultural and religious specificities require you to be a little more vigilant about certain behaviour (overly criticizing, arguing and confronting, nudity, etc.) but your instructors will brief you on the matter and will gently remind you when necessary if your behaviour needs to be adjusted. • This course is a great educational adventure which is intended to provide unique opportunities to discover a new socio-cultural and environmental context, to greatly contribute to self-development and open-mindedness, provide the medium for learning through experience and will help you developing an international network of like minded individuals that will likely open up for future opportunities.

Deadline to apply is Jan 12, 2020. If interested please contact instructor directly and complete and submit application to home university coordinator. Deposit of $350 is due at the time of registration. Tuition at your home institution is *in addition* to any field module costs. Students who drop a field course should not expect a refund of any field course costs. Students are encouraged to purchase cancellation insurance if airline tickets are required. Students are responsible for all fees incurred by the home or host university due to any bounced checks.

McMaster University (OUPFB Module 11.)

Course Title:	**Environment and Biodiversity**
Instructor(s):	Jianping (J-P) Xu (McMaster, 905-525-9140 Ext. 27934, jpxu@mcmaster.ca)
Dates:	May 5-19, 2020
Location:	China: the Taiyuan Metropolitan Area, including the city proper, the Fen River, and the surrounding mountains. They are all within 300km radius of each other
Cost:	$1,850 [$350 deposit to McMaster University at time of registration; $1,500 balance due April 30th, 2020]. The fee covers: transportation within Taiyuan Metropolitan Area, food, lodging, experimental supplies, and park entries, during the entire two weeks of the module from May 5-19, 2020. The fee does not cover tuition at home university nor transportation to Taiyuan (to be arranged by student)
Prerequisites:	Students should be finished with one year of university education and should have taken at least one course in general environmental science or biology. Students should be prepared for moderately strenuous hikes and outdoor activities.
Enrolment*:	10 minimum/20 maximum students [(20 (8): max enrollment of 20; max of 8 for McMaster]
Course Description (brief):	This course has two broad objectives: (a) to gain a first-hand experience and understanding of biodiversity in a continental temperate climate, and (b) to learn and evaluate human effects on ecosystems and the functions and services that ecosystems provide to humans. To achieve the first objective, students will be exposed to the diversity of ecological niches in the continental temperate climate, and the diversity of plants, insects, birds, fish, and fungi. To achieve the second objective, we will use a mixed approach of literature presentations, surveys and field observations, to understand biodiversity assessment, the threats that the biodiversity faces, and how best to maintain their sustainable utilizations. A series of papers relevant to this course will be distributed to students by the end of March 2020 to familiarize students with the background and issues to be discussed. In addition, DNA-based molecular barcodes will be introduced and hands-on molecular biology work will be practiced for identifying (potentially novel) species and populations of plants, insects, birds, fish, and fungi.
Evaluation:	Tentatively consists of the following: (i) A draft ideas/research proposal (5%); (ii) An individual presentation on a paper related to biodiversity and ecosystem function (15%); (iii) Field journal and field records (completeness 5%, neatness and readability 5%, accuracy and scientific value 10%; creativity, application and reflection 10%); (iv) Participation of field work and discussions (15%). (v) A final report based on the field survey data (35%).

An Average Day – What to Expect

(a) Daily timeline	An average work day may look like this: 7:30 breakfast, 8:30 field work rain or shine, 12:00 lunch break, 1:00-4:00pm continuing field work, 4:00-6:00pm class lectures and log books updates; 6:00 dinner, 8:00-9:30pm, student presentations.
(b) Work habitat & Physical exertion	We may walk up to about 10km per day along mostly trails, some of the trails are along steep rocky slopes. There will be water breaks and substantial rest periods to do surveys.
(c) Common activities	Activities: hiking, surveying, boating, class lectures and presentations Associated risks: potential sea sickness, getting lost, twisted ankles, fatigue, blisters from poor footwear, heat exhaustion
(d) Weather, dehydration, & biting insects	Weather conditions likely to be encountered: min./max. temp of 10-25^{o}C. There is potential for strong mid-day sun, high UV, high humidity, heavy rain, and high winds etc. Mosquitoes and house flies may be common in certain areas. Insect repellant will be provided.
(e) Toxic/poisonous, wildlife/ plants	May encounter poisonous snakes
(f) Sleeping, washroom & laundry facilities	Sleeping accommodations: student dorms (up to four in a room and gender specific), no heating/AC, all sleeping gear provided Washroom facilities: may encounter sitting toilets or squat pots at different times, toilet paper provided, private showers and hot water are available, shampoos will be provided Washing/laundry facilities will be available
(g) Meal plans & food allergies	All meals will be provided. However, the selection of food may be limited at times. Vegetarian option available. The locals are known to eat a diversity of food.
(h) Non-academic responsibilities	None
(i) Degree of isolation	Though geographically isolated sometimes, we will have daily access to electricity, wi-fi, and small convenience stores. Please bring electrical outlet adaptors for your electronics. Medical support is available within ~1.5hour drive at any giving time.
(j) Alcohol & drugs	Alcohol (beer) is permitted on-site during meals and evening discussions. Drugs are prohibited.
(k) Vaccinations/ Insurances	There is no travel advisory for Canadians in Shanxi province. However, as a general precaution, students should have vaccines for TB and Hepatitis B and purchase general overseas' travel and health insurance.
(l) Social Situations	Taiyuan is a medium-sized city in China of about 4 million people and there are quite few non-Chinese living and working there. However, if you are a visible minority visiting China, you may occasionally become an object of curiosity, especially in isolated countryside. Don't be scarred, smiling and saying hello is usually sufficient to fend off their curiosity. Students should be respectful of each other and be considerate. I will share some social etiquette after registrations are in.
(m) Final comments	Overall, students have reported that the course provides a great opportunity for personal growth, making new friends with like-mind, unique experiential opportunities to see a different country and culture, and learning about biodiversity and its utilization. Like sites in previous years of this course, Taiyuan and its surroundings has an amazing and highly unique history and culture.

University of Western Ontario (OUPFB Module 12.)

Course Title:	**Adirondack Forest Ecology**
Instructor(s):	Dr. Ben Rubin brubin2@uwo.ca Department of Biology, Western U. 519.661.2111 ext. 87475
Dates:	Tuesday, May 5 – Wednesday, May 20, 2020
Location:	Newcomb Campus, State U of NY College of Environmental Science and Forestry, Newcomb, NY, USA
Cost:	**$1475: Includes transportation** (departing from and returning to London, ON or Hamilton, ON), **lodging, and meals** starting with dinner on May 5 and ending with lunch on May 20. If you wish to arrange your own transportation to the research station you may, but the course fees will not be reduced. To reserve a place in the course, a deposit of $350 is due at registration and the balance ($1125) is due in full on March 23, 2020. **Valid travel documents** for entering the US and returning to Canada (This definitely includes a passport and may include a Visa depending on your Country of citizenship). **It is your responsibility to determine what documents you need and to obtain them.** Proof of **supplementary medical insurance** for travel to the US is required.
Prerequisites:	Two courses in biology
Enrolment:	Maximum: 19 (6 reserved for Western students)
Course Description (brief):	At more than 24,000 km^2, the Adirondack Park is one of the largest protected areas in eastern North America. It is 3.5 times the size of Algonquin Provincial Park with similar forests and more mountainous topography. This course will explore the natural history of environments within the Adirondack Park, including boreal, northern hardwood, upland, lowland and aquatic communities. We will observe the Adirondacks during leaf-out and bird migration in early spring – one of the most dynamic times of year. In order to take full advantage of being in the field, the course will focus on three themes: • Identification of flora and fauna • Field measurement techniques • Natural and human history of the Adirondacks Students will be required to: • Teach themselves about the basic ecology of one common bird species and one common trees species before leaving on the trip and introduce the class to these species upon arrival • Keep a field journal (to be submitted on the last day of the course). • Conduct an independent project including data collection during final third of the course and with a final report to be completed after we return from the Adirondacks **NOTE: This course requires substantial hiking on and off trails in steep, rough, and mountainous terrain. Weather in the Adirondacks in May can be mild or severe, including biting insects, cold temperatures, rain, or even snow. If you wish to avoid these conditions or are not prepared for strenuous activity, please do not sign up for this course.**
Evaluation:	Participation during course* 20% Introducing the class to assigned species (due May 5) 5% Mid-course (field) exam 20% Topic proposal (to be completed in the Adirondacks) 5% Field journal (to be completed in the Adirondacks) 20% Final report* (due June 17) 30% * You must pass this component of the course in order to pass the course.

An Average Day – What to Expect

(a) Daily timeline	We will live at a research station for two weeks. We will sleep in single sex cabins that house 6 to 8 people each on bunk beds. We'll eat breakfast (6:45 am) and dinner (6:00 pm) at a dining hall (a short walk from the cabins) where there is also access to bathrooms, showers, and laundry. At breakfast we will be able to pack a bag lunch. Each day we'll head outside shortly after breakfast and be back by dinner. You should expect to be outdoors all day, rain or shine. Evenings will include time to work on field journals, free time (camp fires, canoeing, cards games), and occasional mandatory or optional class activities.
(b) Work habitat & Physical exertion	We will hike both on and off trails in terrain that varies from flat to quite steep and rugged. Trail conditions are likely to be muddy in many places. Expect to carry a daypack all day through rugged terrain. The most strenuous hike will be on the last day of the course which will be a recreational day hike up and down one of the taller Adirondack peaks (approx. 8 hrs of strenuous hiking). Wearing a good-fitting and sturdy pair of hiking boots and having good raingear with you will help you stay comfortable and safe.
(c) Common activities	Common activities include riding in 11- seat vans on rural mountain roads, hiking (as described above), practicing forest measurement techniques individually and in groups. During free time, there is the opportunity to canoe or swim in a cold lake at the research station. Canoe safety training is provided by the College of Environmental Science and Forestry staff. Swimming is done at students' own risk and must be restricted to daylight hours when others are present.
(d) Weather, dehydration, & biting insects	Weather conditions are highly variable. It is likely that at different points during the course, you will be outside in the rain, be uncomfortably cold, uncomfortably warm, physically fatigued, and annoyed by biting blackflies. Students should carry two litres of drinking water with them each day to remain hydrated. On sunny days, sunscreen is recommended because we will walk through forests before the leaves have completely emerged and so UV exposure can be significant.
(e) Toxic/poisonous, wildlife/ plants	Natural dangers include possible encounters with black bears, poison ivy, ticks carrying Lyme disease, and venomous snakes. All of these are unlikely to be problems. In 10 years of teaching the course, we have encountered a bear once (without incident), seen poison ivy once or twice (no reactions), and never encountered venomous snakes or Lyme's disease. Nevertheless, proper vigilance and regular tick checks are good practice.
(f) Sleeping, washroom & laundry facilities	We live in single sex cabins with 4 bunkbeds each. Depending on the number of male and female participants, cabins may be full or not. Cabins have heat, electricity, and very low bandwidth Wi-Fi but no plumbing. Bedding and towel service are not provided. Showers, flush toilets, and coin laundry are available in a nearby building.
(g) Meal plans & food allergies	Breakfast and dinner are prepared for us in a dining hall. At breakfast time, we have access to food to make sandwiches, fruit, and other snacks to pack our own bag lunch. The kitchen will accommodate most dietary restrictions so long as they are informed in advance.
(h) Non-academic responsibilities	We are collectively responsible for keeping our cabins clean and for leaving the facilities in as good condition as we find them. Some students have attempted to take online courses while taking this field course. Depending on the course in question, this may be technically possible. However, I do not recommend it because free time and internet bandwidth are both limited.

(i) Degree of isolation	From the research station, it is a fifteen-minute drive to the nearest town (Long Lake, NY) which offers a limited selection snacks, souvenirs, and supplies you may have forgotten. At the research station, low bandwidth Wi-Fi (i.e. you can email but not stream videos) is available. Cell service is spotty at best. We have first aid supplies on hand and I will bring some common over-the-counter medicines. There is a defibrillator at the dining hall. If further medical attention is required, there is 911 service and a hospital with emergency medical facilities approximately 1 hour's drive from the research station (Saranac Lake, NY).
(j) Alcohol & drugs	Drinking age in the United States is 21 years and cannabis is illegal there. Students are not allowed to bring alcohol or recreational drugs with them. However, once we arrive in the Adirondacks, students who are of legal age in the US can occasionally buy moderate quantities of alcohol (convenience store in town sells beer) to consume during their free time (some evenings), as long as drinking does not interfere with class activities.
(k) Vaccinations/ Insurances	No vaccinations are recommended beyond Ontario's routine vaccination schedule. Supplementary medical insurance is required.
(l) Social Situations	As described above, this course involves living in close quarters with other students, the instructor, and the TA. We work together, sleep in the same cabins, eat together and often recreate together during free time. It is important to be respectful of each other's needs for quiet, personal space, privacy, etc.
(m) Final comments	In ten years of offering this course, almost all students love the experience and the location, and learn a lot. A few make friendships that will last a lifetime or are inspired to change career goals.

University of Toronto (OUPFB Module 13.)

Course Title:	**Temperate Field Biology**
Instructor(s):	Prof. Art Weis, arthur.weis@utoronto.ca TBA
Dates:	22 May – 4 June 2020
Location:	Koffler Scientific Reserve at Joker's Hill, King City, ON (www.ksr.utoronto.ca)
Cost:	**$800** ($350 deposit to home university; $450 balance by April 15 to host university) includes 13 nights' dormitory accommodation, meals, and transportation to/from the St. George campus.
Prerequisites:	First year biology course; upper year lab course; introductory stats course.
Enrolment*:	16 (14)
Course Description (brief):	Koffler Scientific Reserve at Joker's Hill is a University of Toronto research station atop The Oak Ridges Moraine, 50 km north of Toronto. Our objective in this course is to give you a broad overview of the natural history of south-central Ontario and to introduce you to some of the most commonly used methods in the study of field ecology and evolution. We will study many types of organisms (e.g., plants, insects, birds, mammals) in a wide array of environments. You will experience hands-on learning through informal natural history walks, and group projects. There will be also be instruction on study design and statistical analysis. The course experience culminates in an independent research project. These projects start with an interesting natural history observation the student makes on some particular species or system found at the reserve. Students formulate a hypothesis based on their observation, then design and conduct an experimental test. Results are presented in a symposium, held on the last full day of the course. A written report on the project will be due 6 weeks later. Further details on the course and specifics of what to bring will be sent upon enrolment. *Physical Demands/Risks* Most course activities are held out of doors. Students may encounter black flies, mosquitoes, bees and poison ivy. You must be prepared for contingencies such as extreme temperature (hot or cold) and rain, During the independent project, students will move independently through the property.
Evaluation:	Marks will be based on class performance/participation, performance on guided projects, and on the results of the original project. Each student will give an oral presentation to the class and hand in a written report, which is due at the end of the class. Students are expected to hand in their field notes and data. Grades will be available late August 2020. Oral presentation of a pre-assigned scientific paper: 10% Field notebook: 5% Class performance/participation: 20% Oral presentation on individual project: 30% Written report on individual project: 35%

An Average Day – What to Expect

(a) Daily timeline	For the first week of the course is structured; days begin with breakfast at 7:30 a.m., and end with an after-dinner discussion that typically runs until 9:00 p.m.. Daytime hours will included guided walks and group field projects. The second half of the course is devoted to independent research projects. These tend to require ~10 hours per day in data collection and analysis.
(b) Work habitat & Physical exertion	The Koffler Scientific Reserve has diverse habitats. Expect to guided walks to consume up to 7 hours of the first few days. The terrain is rolling, but not steep. Group projects will entail data collection in an out of doors setting, rain or shine.
(c) Common activities	Describe: • common activities: Hiking, measuring and counting terrestrial plants, insect birds, etc. Sampling aquatic insects. • associated risks: There are the common risks of hiking, such as twisted ankles, fatigue, blisters from poor footwear, heat exhaustion, dehydration, and hypothermia.
(d) Weather, dehydration, & biting insects	Describe: • weather conditions in late May are general pleasant, but occasionally a late snow or early heat wave can occur. Students should bring adequate clothing, sunscreen and insect repellent. • Blackflies and mosquitoes can be expected. Deer ticks, vectors of Lyme's disease, have been recorded from the reserve. Each residence is equipped with a tick-removal kit
(e) Toxic/poisonous, wildlife/ plants	Poison ivy is found in several areas at the reserve. Filed projects will bring students into daily contact with bees and wasps.
(f) Sleeping, washroom & laundry facilities	Describe: • There are several residences on the reserve. Two to four student will share a bedroom/bathroom. • Shared bathrooms have full running water and showers. • Laundry facilities are available in the main residence
(g) Meal plans & food allergies	Meals are taken in the dining hall of the main residence. Vegetarian, vegan, kosher, and halal diets are readily accommodated.
(h) Non-academic responsibilities	Students will be assigned to kitchen clean-up duties for two days of the course. Al students are responsible for the cleanliness of their bedrooms and bathrooms.
(i) Degree of isolation	How isolated are you? How easy/difficult is it for students to: • Most residences and the reserve laboratory have wireless service. • Cell phone coverage is strong at the residences and laboratory, but spotty across the natural areas. • There will be one or two 'town runs' to nearby Newmarket for purchase of personal supplies. • South Lake Hospital, Newmarket, is a 10 min. drive.
(j) Alcohol & drugs	Alcohol is permitted in the residence areas only, and only after 5:00 PM. Cannabis polices are yet to be formulated.
(k) Vaccinations/ Insurances	Standard vaccinations and health insurance are sufficient.
(l) Social Situations	The Koffler Scientific Reserve is a closed campus, meaning that you will encounter only your classmates and the resident research staff and students. Expect the types of social interaction found regularly on a university campus
(m) Final comments	In this course, you will begin the transition from being a science student to being a scientist.

Queen's University (OUPFB Module 14.)

Course Title:	**Biodiversity Conservation in East Africa.**
Instructor(s):	Dr. Stephen C. Lougheed, steve.lougheed@queensu.ca
Dates:	June 6th – June 21st 2020. (Dates may shift slightly to obtain best airfare prices)
Location:	Various sites throughout Kenya potentially including Lake Naivasha, Masai Mara National Reserve, and Mount Kenya
Cost:	Approximately $4,950 (Deposit of $350.00, balance due in month before departure to allow us to cover advance costs of travel and board). This price includes airfare, and all local transportation, and room and board in Kenya – including a dedicated Kenyan staff who will travel with us for the duration. We will seek a group rate on airfare to try to bring down costs. Does not include home university tuition.
Prerequisites:	University course in general biology. Additional course(s) in ecology and biostatistics an asset.
Enrolment:	20.
Course Description (brief):	This course provides students with an introduction to field ecology, biodiversity and conservation in East Africa. Seminars, class discussions, guest lectures, and field exercises provide overviews of the scientific method and field research techniques, the geological and natural history of the area and its biota, an introduction to different habitats and techniques for assessment of biological diversity, an assessment of traditional and emerging land uses and their impacts on ecosystems, and an analysis of contemporary conservation issues, particularly those related to competing land uses, to the expansion of the tourism sector, and to the development aspirations of community stakeholders. Groups of students will undertake field research focused on a major issue in conservation (e.g. human-wildlife conflict, conservation reserve design). We will visit at least 3 locations, potentially including Nairobi National Park, Mount Kenya, Lake Naivasha, and Masai Mara or Amboseli. Each field site serves as a focus for group research projects designed in consultation with the instructor. Class fieldwork provides introductions to some of the typical, rare and endemic flora and fauna of the region. We will undertake many local excursions including 'game drives' to see some of the characteristic savannah and forest fauna. We also will have opportunities to visit local communities engaged in biodiversity conservation, and to visit local universities to learn about local projects and academics in East Africa.
Evaluation:	1) Moderated debate focused on a major wildlife issue (10%) 2) Review of journal article from the peer-reviewed literature (10%) 3) Field book including habitat, species descriptions, insights from visits to field sites and communities & all field data (20%) 4) Paper focused on a major issue in conservation relevant to East Africa combining field data from group projects, observations from guest lectures, and field visits, and literature review (40%) 5) Participation in class discussions & field activities (10%) 6) Blog entries (alternating groups of students write daily entries for a course blog describing field activities and observations; e.g. https://kenya2019.sclougheed.ca or https://kenya2018.sclougheed.ca) (10%)

An Average Day – What to Expect

(a) Daily timeline	Activities vary depending on locale. Here is an example of a day in Masai Mara. Arise at 7:00 am. Breakfast 7:30. 8:30am-10:00am bird hike. 10:00-noon. Game drive. Noon-1:00pm lunch. 1:00-2:30pm free time to work on field books, blog entries and debate. 2:30-4:00 field exercise quantifying local habitat structure. 4:00-6:00pm lecture and class discussion/debrief on local conservation issues. 6:00-7:00pm dinner. 7:00-8:30pm guest lecture on bush meat trade and poaching in East Africa.
(b) Work habitat & Physical exertion	Some field sites that we will visit have rough and steep terrain. We will undertake various hikes and field exercises. While we should be out of the rainy season, sometimes rains do occur and can make conditions very muddy. Temperatures can soar to well above 30 degrees making hiking more arduous. We will avoid the hottest parts of the day and carry lots of water (see below).
(c) Common activities	Much of our work (obviously) will be outdoors and we will do a lot of hiking to explore local habitats and diversity. Terrain can be quite rugged and some hikes might be quite arduous (e.g. vertical climbs of 100s of metres). Hikes in the mountains can be up quite steep grades. We do this slowly and with lots of rests. Temperatures in some cases can exceed 30°C. Without precautions one could get heat stroke. We have participants carry lots of water, and wear sunscreen, wide-brimmed hats, and hiking boots. We also will do some game drives and in these instances must stay in the trucks because of the presence of large predators. Truck travel can sometimes take many hours between locales, although we will stop for snacks and washroom breaks.
(d) Weather, dehydration, & biting insects	Weather is likely to be quite hot and during the day from the upper 20s to the mid30s. Nights in the highlands can be somewhat cool and damp. We will undoubtedly experience intense sun most days. Dehydration can be a risk on longer hikes or during more arduous activities. There will be some biting insects but because this is not the rainy season we do not expect them to be particularly bad.
(e) Toxic/poisonous, wildlife/ plants	**Hazard**: Wild animals. **Risk**: We will be doing some camping and doing game drives in various parks including Nairobi National Park and Masai Mara. There are obviously many large species that can cause grievous injury and even death including large carnivores (e.g. lions, crocodiles), and large herbivores (elephants, hippos). Hippos and baboons cause many human injuries. **Plan**: When travelling in game reserves and parks, we will stay within the vehicles. When camping we will stay within the guarded confines of our compound. We will carry a satellite phone at all times should an emergency occur. We also carry a first aid kit should minor issues arise that require stopgap medical treatment until we can evacuate. **Hazard**: Bee and other insect stings. **Risk**: Bees and wasps and other stinging or biting invertebrates of East Africa, will not have been experienced by North American travelers who have never traveled t this region (i.e. may exhibit allergic reaction despite not showing such sensitivities to North American taxa). The outcome of a sting or bite might span local swelling to anaphylaxis that if left untreated could result in death. **Plan**: Stay on trails and avoid disturbing sites with potential nests. We will carry Benadryl at all times and will treat immediately form minor incidents. If stung and symptoms of anaphylactic shock appear, immediate treatment and evacuation if needed (satellite phone with us at all times). **Hazard**: Extreme sun, heat and humidity. **Risk**: We will be at or near the equator in Kenya and at times in areas not only with intense sun, but also intense heat. Although June through August are the coolest months in for example Masai Mara, there remains the possibility of excessive heat, insolation and humidity, with attendant risks for severe sunburns, heat exhaustion, and dehydration. If ignored or unrecognized, may in extreme circumstances lead to death. **Plan**: Wearing large-brimmed hats, light clothing and high SPF sunscreen. Drinking often and carrying water bottles on all hikes. Avoiding excessive activity in hottest part of the day. **Hazard**: Typhoid. **Risk**: Typhoid fever is a food borne illnesses caused by one species of Salmonella bacteria. *Salmonella* bacteria are often a cause of food poisoning. Onset of typhoid fever is normally gradual, with fever, malaise, chills, headache, and generalized muscle and joint aches. Infection may also cause the spleen to enlarge, the white blood cell count to drop, and small rose-coloured spots to develop on the trunk. Diarrhea occurs infrequently. Vomiting may occur late in the first week following infection, but is usually not severe. Can cause fatality if untreated. Typhoid can be contracted through either contaminated food or water in Kenya. The US Centers for Disease Control and Prevention recommends this vaccine for most travelers, especially if you are staying with friends or relatives, visiting smaller cities

	or rural areas, or if you are an adventurous eater. **Plan**: Our food will be provided by a trusted company with who we have worked previously (Bunduz) or by reputable restaurants associated with hotels; these are hygienic and suited to international travelers and researchers. Food should be thoroughly cooked and served hot, fruits and vegetables peeled by the traveler personally, and beverages and ice that are made from boiled or chlorinated water or that are carbonated are usually safe (see also water potability) Typhoid fever can be effectively treated using antibiotics. The usual case-fatality rate of 10% can be reduced to < 1% if prompt antibiotic treatment is given. The typhoid vaccine can mitigate these risks. Should anyone show symptoms they will be evacuated immediately to a local hospital. **Hazard**: Rabies. **Risk**: Rabies can be found in dogs, bats, and other mammals in Kenya, so the Centres for Disease Control and Prevention recommends this vaccine for "… travelers involved in outdoor and other activities (such as camping, hiking, biking, adventure travel, and caving) that put them at risk for animal bites. People who will be working with or around animals (such as veterinarians, wildlife professionals, and researchers). People who are taking long trips or moving to Kenya Children, because they tend to play with animals, might not report bites, and are more likely to have animal bites on their head and neck. Rabies is sometimes borne by bats (which we may trap) or feral dogs. Caused by a viral infection of animals that can be transmitted to humans. It is caused by a virus of the Rhabdoviridae family, which attacks the central nervous system and eventually affects the brain. The virus is usually found in the saliva of an infected animal. Rabies is almost always fatal once symptoms occur. **Plan**: Vaccination is recommended only for those at high risk for animal bites, such as veterinarians and animal handlers, and for long-term travellers who may have frequent contact with animals and may not have access to medical care. Course participants are at low risk. If someone elects to have the expensive vaccine, the complete pre-exposure series consists of three doses of vaccine injected into the deltoid muscle on days 0, 7, and 21 or 28. Side-effects may include pain at the injection site, headache, nausea, abdominal pain, muscle aches, dizziness, or allergic reactions Any mammal bite or scratch will be thoroughly cleaned with large amounts of soap and water and local health authorities contacted immediately for possible post-exposure treatment, whether or not the person has been immunized against rabies. We carry a satellite phone at all times in case of emergency. **Hazard**: Insect-borne diseases. **Risk**: Malaria is present in all areas (including game parks) at altitudes and other insect-borne diseases are common. **Plan**: All diseases: We will work to minimize insect bites by remaining in screened areas when possible (recognizing that this is an outdoor based field course), wearing light clothing with full-length sleeves, and using DEET based insect repellent (30% recommended). Malaria: Local Plasmodium species are resistant to chloroquine. Malaria species present are: *P. falciparum* >85%, P. vivax 5%–10*%, P. ovale* rare. Recommended chemoprophylaxis for malaria in Kenya: Atovaquone-proguanil, doxycycline, or mefloquine. If symptoms arise – immediate evacuation to appropriate medical facilities (satellite phone is available to call ahead). For dengue from the CDC: "There is no specific medication for treatment of a dengue infection. Persons who think they have dengue should use analgesics (pain relievers) with acetaminophen and avoid those containing ibuprofen, Naproxen, aspirin or aspirin containing drugs. They should also rest, drink plenty of fluids to prevent dehydration, avoid mosquito bites while febrile and consult a physician. As with dengue, there is no specific medication for *Dengue Haemorrhagic Fever* (DHF). If a clinical diagnosis is made early, a health care provider can effectively treat DHF using fluid replacement therapy. Adequately management of DHF generally requires hospitalization." *Leishmaniasis*: No vaccines or drugs to prevent infections by Leishmania parasites. From the World Health Organization: "In visceral leishmaniasis, diagnosis is made by combining clinical signs with parasitological, or serological tests (such as rapid diagnostic tests). In cutaneous and mucocutaneous leishmaniasis serological tests have limited value and clinical manifestation with parasitological tests confirms the diagnosis. The treatment of leishmaniasis depends on several factors including type of disease, concomitant pathologies, parasite species and geographic location. Leishmaniasis is a treatable and curable disease, which requires an immunocompetent system because medicines will not get rid of the parasite from the body, thus the risk of relapse if immunosuppression occurs. All patients diagnosed as with visceral leishmaniasis require prompt and complete treatment." *West Nile*. From the CDC: "No vaccine or specific antiviral treatments for West Nile virus infection are available. Over-the-counter pain relievers can be used to reduce fever and relieve some symptoms In severe cases, patients often need to be hospitalized to receive supportive treatment, such as intravenous fluids, pain medication, and nursing care." Zika: From the CDC "Because Zika virus is primarily spread by mosquitoes, CDC recommends that travelers to Kenya protect themselves from mosquito bites. The mosquitoes that spread Zika usually do not live at elevations above 6,500 feet (2,000

	meters) because of environmental conditions. Travelers whose itineraries are limited to areas above this elevation are at minimal risk of getting Zika from a mosquito. Generally the best way for travellers to prevent infection is to protect themselves from sand fly bites using appropriate protective clothing and repellent. Because Zika can be sexually transmitted use of a condom is recommended.
(f) Sleeping, washroom & laundry facilities	Students typically will stay in communal dorms or hotel rooms with beds. Bedding may be provided. For field camps tents will be provided as well as foam pads, but students should bring sleeping bags rate to zero. We will not have access to washing machines and students should bring a small amount of clothes detergent so that they may do hand washing. Typically we will have access to flush toilets and showers. However, in field camps, we will use 'field toilets' (e.g. holes in the ground with perhaps some amenities for privacy) and field showers.
(g) Meal plans & food allergies	Typically food will be provided by an excursion company that we have worked with many times before, with occasional restaurant visits or opportunities to purchase snacks on the road. Most food needs can be accommodated although for some who have severe food allergies our camp kitchen may not easily be able to accommodate them.
(h) Non-academic responsibilities	Students are responsible for keeping their sleeping and communal areas clean, for assisting with packing up the trucks, for putting up and taking down tents when needed, caring for field equipment and books, and bussing their dishes at the end of each meal.
(i) Degree of isolation	We will always have vehicles in case we need to evacuate. The instructor will carry a large field first aid kit, and bring a satellite phone with him. Cell signal is generally quite good but may be spotty at some sites. Internet, even when available, is usually frustratingly slow and sometimes simply unusable. In most cases, even when we are physically isolated there are small villages or park offices within a short drive.
(j) Alcohol & drugs	Alcohol consumption is discouraged at field stations. There will be some opportunities at local restaurants for responsible consumption of alcoholic beverages. Marijuana is illegal in Kenya. I am told that Kenyan prisons are not for the faint of heart.
(k) Vaccinations/ Insurances	All students should have up-to-date routine vaccinations, including tetanus. Typhoid and hepatitis vaccinations are strongly recommended. Proof of a yellow fever vaccination is required. Malaria prophylaxis is mandatory, and you must decide on which drug to use in consultation with your doctor or medical professional. Rabies vaccines should not be necessary. We will purchase travel medical insurance for all participants.
(l) Social Situations	We will be together for two weeks, living in close quarters most of the time, and working together on group projects and field exercises. We will also work closely with employees of a Kenyan excursion company and enjoy insights from Kenyan students and lecturers. We work to create a safe and respectful environment for all despite differences in personality, background, and culture, and expect this of our students. Many parts of Kenya are culturally conservative and apparel must respect this – with no bare shoulders or midriffs, and skirts and pants that extend past the knees.
(m) Final comments	I have been teaching of field courses in Kenya since the 1990s and it is one of my favourite places in the world - culturally and with respect to its biota. While it has had challenges with such things as poverty, political unrest, and poaching, it is also a wonderfully diverse and welcoming country. Most of the students who have taken courses here consider them to be the pinnacle of their undergraduate careers and in many instances, life changing.

University of Guelph (OUPFB Module 15.)

Course Title:	**Arctic Ecology**
Instructor(s):	**Dr. Sarah Adamowicz**, Associate Professor, Department of Integrative Biology, University of Guelph, Phone: 519-824-4120 ext. 53055, Email: sadamowi@uoguelph.ca. Additional instructor from U. Guelph, TBD.
Dates:	July 9-23, 2020
Location:	Churchill Northern Studies Centre (https://churchillscience.ca/), Churchill, Manitoba
Cost:	$1500 (includes meals and accommodation for 14 nights, airport pick-up and drop-off in Churchill, transport around Churchill region for course activities, research materials; does not include transportation to and from Churchill)
Prerequisites:	University Ecology Course (required) University Statistics Course (required) University Invertebrate Zoology or Entomology Course (recommended) University Course in Plant Ecology or Plant Systematics (helpful but not required) *Note: This course is intended for 3rd or 4th-year students specializing in biology, particularly ecology, biodiversity, environmental studies, evolution, or aquatic biology.*
Enrolment:	20 students (5 for OUPFB; 15 for University of Guelph)
Description:	Churchill is a diverse region for ecological study, being located at the junction of the boreal, tundra, and Hudson Bay biomes. The first week of the course includes exploration of terrestrial, freshwater, and near-shore marine Arctic environments, as well as an overview of both aquatic and terrestrial collecting methods used to survey invertebrate and plant biodiversity in these environments. Two group projects are performed during week 1. Evening tutorials and student presentations provide background on Arctic ecology as well as statistical techniques for studying biodiversity and ecology. Weather permitting, excursions will include kayaking in the estuary and seeing belugas. During week 2, students conduct independent research projects. A major individual research paper and your field journal are due the last Friday of September. This course provides excellent opportunities to visit a spectacular sub-Arctic locality, to learn about Arctic ecology and biodiversity, and to conduct an independent research project with instructor guidance.
Evaluation:	Short presentations 2@5% each Group project 10% Participation 10% Field notebook 20% Individual research paper 50%

An Average Day – What to Expect

(a) Daily timeline	Typical day: 7:00 breakfast. 8:00 meeting to discuss objectives and to organize field gear for the day. 8:30-noon in the field. 12:00-13:00 lunch. We return to the field station for lunch many days, but we will eat a bagged lunch in the field on a couple of days. 13:00-17:30 field work. 17:30-18:30 supper. 19:00-21:00 evening activities (e.g. student presentations, sorting and databasing samples in the lab, data analysis, guest lectures). On a severe weather day, we would sort samples in the lab and also use the time for a tutorial on ecological data analysis.
(b) Work habitat & Physical exertion	This course involves about 7 hours of field work per day. At some locations, we will have a short hike of up to half an hour prior to reaching the research site. On the coastal rock bluffs, we will be climbing over rocks. It is important to have good treads on your footwear. We will spend much time in rubber boots, due to working at the edges of ponds and in water-logged environments (tundra, fen, intertidal).
(c) Common activities	Common activities include collecting samples in the field (e.g. collecting invertebrates) and collecting data in the field (e.g. identifying and recording plant species in quadrats). You will also spend time making your own observations and writing in your field journal. We will have breaks for meals and to consume water. A main risk is slipping and falling (e.g. into a pond). To mitigate this, bring rubber boots with good treads and exercise caution.
(d) Weather, dehydration, & biting insects	The Churchill region in July can experience wide fluctuations in temperature, depending upon the direction of the wind. On a typical day, the temperature is about 20° C. However, temperatures can approach 30° C (which feels extra hot when wearing a bug jacket). On very hot days, we will take extra breaks to consume water. On cold/wet days (<10° C), you could become uncomfortably cold. It is very important to bring warm clothing, which you can wear in layers for flexibility, as well as rain gear. Biting insects (particularly mosquitoes and black flies) are present in extreme abundance at certain sites. It is absolutely essential to bring a high-quality bug jacket as well as pants that insects can't bite through (e.g. field pants with tight weave or breathable rain pants). Some field researchers prefer a hat plus head net.
(e) Toxic/poisonous, wildlife/ plants	Churchill is known as the "Polar Bear Capital of the World". We will be accompanied by a bear guard. In addition, there is safety in numbers, so it is vital to follow instructions and not stray away from the group. We will have safety orientation upon your arrival in Churchill, which will be reinforced throughout the course.
(f) Sleeping, washroom & laundry facilities	Accommodation for this course is very comfortable. Sleeping quarters are in the form of dormitories, with typically 3-4 people per room (2 sets of bunk beds per room). There are modern washroom and laundry facilities (bring $6 in loonies per load). You do not need to bring any of your own sleeping gear.
(g) Meal plans & food allergies	Staff at the CNSC will prepare most of our meals, while each person will prepare their own bagged lunch for a couple of days. Student with dietary restrictions or allergies can be accommodated, but you need to inform the course instructor well in advance.
(h) Non-academic responsibilities	At the CNSC, everyone pitches in with washing dishes. We will have a sign-up sheet for rotations. You are also responsible for following all rules at the field station regarding noise levels, safety protocols, etc.
(i) Degree of isolation	You should be able to recharge your laptop, phone, camera, etc. in the evenings at the CNSC (except in case of an occasional power outage). There is usually internet connectivity, but it is very slow. You are requested not to try to watch videos online, etc. There are pay phones in a hallway, but most people are able to get cell phone reception at least part of the time (but not at all locations in the field – we will have a satellite phone with us for field safety). We will stop in town a couple of times at "The Northern" so that you may purchase personal hygiene supplies or any other forgotten supplies (e.g. basic clothing). There is a medical facility and pharmacy in the town of Churchill. The CNSC is about a half hour drive from town. Please note that Churchill is a remote community. It is essential that you bring a more than adequate supply of any medications that you require.
(j) Alcohol & drugs	For field and lab safety, participants must abstain from alcohol and recreational drug consumption during the hours of our course activities. After hours, consumption of alcohol is permitted in specific areas of the CNSC. Moderation, as well as going to bed at a reasonable time, is necessary for your safety and course performance. The course is intense, and we have a full day of activity every day.
(k) Vaccinations/ Insurances	You should be up to date on the regular course of vaccines recommended for all people living in Canada. No additional special vaccines are required. It is also recommended to purchase cross-province medical insurance in the case of an unforeseen event (e.g. ambulance fees aren't covered through OHIP). Some students already have insurance through their parents' plans (so check), while others can purchase additional insurance through a student travel agency.
(l) Social Situations	The course involves some group work as well as living in close quarters. For refuge, I would recommend to check out the exercise room (usually empty!). As an optional activity, we typically go into town one evening each week for a night off and to engage with members of the local community (e.g. open mic night, trivia night).
(m) Final comments	This course offers the opportunity to conduct field biological studies in a unique setting and to experience part of northern Canada. Highlights often include wildlife sightings (e.g. snowy owl, caribou, belugas, polar bears). This is also an excellent opportunity to develop more general research, analytical, and interpersonal skills.

York University (OUPFB Module 16.)

Course Title:	**Canadian Shield Biodiversity**
Instructor(s):	Alex Mills, York University. Email: ammills@yorku.ca
Dates:	July 18 to August 1, 2020
Location:	Wildlife Research Station, Algonquin Provincial Park
Cost:	$1400 ($350 non-refundable deposit to your home university; $1050 balance to York University). The balance is due by May 31, 2019 payable by cheque to *York University*. The cheques should be mailed to: Avalon Moore, Dept. Biology, York University, 4700 Keele St, Toronto, ON M3J 1P3. Fee includes: all accommodations, meals, use of canoes and equipment, transportation during the course. Excluded: Students are responsible for travel costs to and from the WRS, although arrangements can be made for pick-up (July 18) and return (August 1) at the Huntsville Bus Station. For students interested in car pooling, Professor Mills will try to facilitate communications.
Prerequisites:	First year biology that includes an ecology-evolution component
Enrolment*:	18 (4)
Course Description (brief):	Algonquin Park is Ontario's oldest and most famous provincial park, and the Wildlife Research Station (WRS: https://www.algonquinwrs.ca/) at Lake Sasajewan has just had its 75th anniversary. Hundreds of research papers have resulted from field work at this venerable institution situated in the heart of the park. The objective is to immerse you in a research facility in a great natural environment where you will be introduced to a number of prominent taxonomic groups – birds, dragonflies, nocturnal moths, etc. – and where we will employ some commonly used methods to sample biodiversity – banding birds, netting dragonflies, using UV lights at night, etc. Most of our time will be spent in the field, where students will conduct fieldwork in small teams, generally 3 students each. We will also regroup in the classroom from time-to-time where we will summarize and analyze the data we collect, create presentations, construct identification keys, and enjoy active learning exercises that are also fun. Progress will be assessed with periodic short quizzes and also through one or more select specimen collections. Throughout, you will keep a natural history journal that will form part of your assessment. [Students will encounter biting insects (mostly mosquitoes and deer flies). There is neither poison ivy nor venomous snakes in the area. It is the warmest time of year in Algonquin, but it could be rainy at times. We are likely to use canoes on one or more days of field work.]
Evaluation:	• In-course – Daily-log field Journal submitted at the end of the course 14% • In-course - Specimen collection (plants or insects) 8% • In-course - Creation of a dichotomous key based on collection data 8% • In-course - Two 3-minute presentations (prepared in advance) 10% • In-course - Participation grade 10% • In-course - Eight taxonomy modules → survey data, ID skills, and analysis 24% • Post-course - Eight taxonomy modules → post-course write-up 16% • In-course – Mini-quizzes 10%

An Average Day – What to Expect

(a) Daily timeline	Most days will begin before 7:30 breakfast with bird banding, although students will be on a rotation of about 4 days so that only a portion of the class will begin before breakfast. After breakfast most days, students will be in the field. Initially, it will be the whole group, but after an acclimatizing period, students will work in groups of about three. Several locations will be accessible on foot near the station, but we will also taxi students to several nearby sites when required (Old Airfield, Bike Trail, Two Rivers Trail, Bat Lake Trail, etc.). Lunch will normally be back at the station. On some days, we will also be in the field in the afternoon, and occasionally in the evening – even after sundown once or twice. But there will be a break for personal time each day. Also, most days we will be in the classroom for at least one hour. This will be for varied purposes: (a) short lectures from the professor, (b) 3-minute presentations by students, (c) identification practice, (d) collection development, etc. A course schedule will be provided at the start of the course, but weather will almost certainly require adjustments as we go. Each student will be in a group, also on rotation, that will require after-dinner clean-up duty two or three times during the course.
(b) Work habitat & Physical exertion	Students will be on foot a lot, and will likely be walking at least several kilometers per day. The terrain is rugged and varied, but the change in elevation is not great, so there is not a lot of climbing. Good running shoes or light hiking boots will usually be appropriate. Some landscapes are low and wet underfoot. Once or twice we will be wading, and in such cases old running shoes that can get wet will probably be superior to boots. Once or twice we will be canoeing, although it will involve only relatively short distances. Inevitably, students will occasionally be in the field when rain arrives, so rain gear is highly desirable. Previous spring and summer field courses at the WRS have proved to present no major challenges where students have reasonable physical fitness.
(c) Common activities	Daily: Walking on quiet bush roads and trails, walking in wooded and open habitats off-trail, working in classroom, identifying biodiversity and recording location or survey data Less than daily, but likely more than once: Wading in shallow water (small river or marsh), collecting plants, collecting insects, mist-netting and handling birds, bird-banding, canoeing Associate inconveniences: getting wet from rain, twisted ankles in uneven terrain, being annoyed by biting insects (mosquitoes and deer flies), long days
(d) Weather, dehydration, & biting insects	Late July is the height of summer in Algonquin. Daily high temperatures are commonly in the high 20s^{o}C, with a high probability of sunshine most days. It is almost always considerably cooler at night, perhaps even as low as 10^{o}C. Most days are not likely to rain, but it will rain during the course at one or more points. Providing that students travel with a water bottle and are attentive, dehydration is unlikely. Days exceed 15 hours of daylight at this time of year at this latitude. Even in warm weather, hats and skin-covering clothing will be best suited for most field activities to minimize sunburn and insect bites.
(e) Toxic/poisonous, wildlife/ plants	Some plants and fungi are poisonous to eat. There is no poison ivy or stinging nettle in the area. There are no venomous snakes. Ticks that attach to humans are rare in Algonquin, and to date, Lyme disease has not been recorded. There are stinging bees and wasps, but stings are infrequent. There are black bears and eastern wolves in Algonquin, and we have been lucky enough to see both in the past; they pose little risk providing that students follow protocol.
(f) Sleeping, washroom & laundry facilities	Students sleep in single-sex cabins shared with other students. Beds with mattresses are provided, but students should bring bedding (or sleeping bags) and their own pillow. Some cabins are not impervious to deer mice, but keeping a clean cabin minimizes their presence. Cabins have electricity but are not air-conditioned. The WRS has a utility building that includes single-sex washrooms with hot showers and flush toilets. Elsewhere on the WRS station (e.g. more distant facilities, such as the classroom), outhouses (pit latrines) are also used. The utility building also has laundry facilities.

(g) Meal plans & food allergies	The WRS has a kitchen and dining area that will accommodate the whole course at one sitting. Mostly, all students in the course will eat here three times per day (breakfast, lunch, dinner) at prescribed times. Breakfast is usually self-serve using cereal, toast, etc. but occasionally it is a hot breakfast. Lunches may be hot or cold, but are hearty. Dinners are usually a hot meal. On occasion, we may employ boxed lunches for consumption in the field. The WRS has kitchen staff who prepare the noon and evening meals. Good coffee is available each morning, but users are asked to contribute coins to the coffee fund if they consume it. Allergies are registered with the head cook, and vegetarian options are available. The facility cannot eliminate all allergens from the site, however. For instance, it cannot be nut-free. Naturally, students who react to allergens with anaphylaxis should come prepared with an epipen.
(h) Non-academic responsibilities	Students will be on clean-up duty two or three times during the course. This includes dish duty and also sweeping / cleaning of the utility building and the dining hall, but not cleaning toilets. Students are expected to be fastidious in their sleeping cabins in consideration of their bunk mates and to minimize attracting deer mice.
(i) Degree of isolation	The WRS is about 1.5 km north of highway 60 and it is accessible by a bush road prohibited to the public (but not to the course). Students are expected to make their own way to and from the course. However, there is bus service from the GTA to the Town of Huntsville, and field course personnel will pick up (July 18) and return (August 1) students there by arrangement. Similarly, for enrolled students who are interested, we will try to facilitate car pooling arrangements to and from the course. The station has power, so recharging devices is possible. There is no WIFI and cell service is intermittent. Occasionally but not daily, groups of students will be able to visit the Algonquin Visitor Centre where there is WIFI. During most of the course activities in the field and the classroom, cell phone use will be restricted anyway, so that students are “in the moment” occupying a non-virtual, non-electronic environment. The Two Rivers Store on highway 60 is about 2 km from the WRS, and it has fast food and some basic convenience items. There are first aid supplies at the Wildlife Research Station. The Huntsville Hospital is about an hour’s drive from the WRS.
(j) Alcohol & drugs	The WRS is not alcohol-free, but there is a no-alcohol course policy. At the end of the course, we plan to have an evening bonfire party where alcohol will be permitted. Smoking marijuana or marijuana products is not allowed.
(k) Vaccinations/ Insurances	Students should be up-to-date with whatever vaccinations are appropriate for Ontario, such as tetanus, and students are required to have Ontario health care coverage or the equivalent through a private insurer.
(l) Social Situations	Students are required to be considerate of those with whom they share sleeping quarters, and to work collaboratively with those with whom they will be working on course activities.
(m) Final comments	One field course comment from past version of this course, about the beautiful landscape: “I feel like I’m living in a postcard”.

Carleton University (OUPFB Module 17.)

Course Title:	**Canadian Scientific Research Diving**
Instructor(s):	Dr. Nigel Waltho Dept. Biology, Carleton University Phone: 613-297-6422 Email: nigel.waltho@carleton.ca
Dates:	July 24 – Aug 9th, 2020
Location:	Queen's University Biological Station (QUBS), Elgin, ON (½ hr north of Kingston)
Cost:	**Course Fees**: $2700 includes room & board, 25 scuba tank fills, daily boat transport. Payable as **$350 non-refundable deposit** to your home university, and $**2350 balance** to Carleton University. The balance is due by **May 1st** payable by cheque to: **Carleton University 814308-166-228000** Mail to: Haiyun Bo, Dept. Biology Nesbitt Bldg., Carleton University 1125 Colonel By Dr, Ottawa, ON K1S 5B6. **Equipment**: students must provide their own *complete set* of cold-water dive gear (e.g., two-week rental/purchase) in addition to a dive knife, dive light, dive watch, and dive compass. **Textbook/eText**: NOAA Diving Manual for Science & Technology 6th Ed. Best Publishing **Scuba Diver's Insurance**: each student must have DAN membership & Scuba Insurance.
Prerequisites:	**Academics**: students should be entering minimally their 3rd or 4th year of a Biology, Env. Sci., or similar program; and have at least (a) one advanced ecology course beyond the Introductory level, and (b) one biometry or statistics course. **Scuba**: students must possess a nationally recognized SCUBA certification; and have at least 5 open water dives with at least 2.5 hours logged bottom time. Students must hold current certifications in First Aid, CPR, and diving O_2 (DAN O_2 certification for those that require it I'll offer independently during the afternoon July 24th for an additional $95). **Medical**: students must be declared medically fit by a licensed physician trained in diving medicine (e.g., see list of Diving Physicians)
Enrolment:	6 (0) 4 students minimum

Course Description (brief):	Scientific diving whether in Canada or around the world requires additional knowledge and training above and beyond that of the sport diver. In Canada scientific diving falls under the Canadian Association of Underwater Scientists (CAUS). This course requires:
	• self-study and review of the NOAA diving manual with completion of weekly on-line tests *before* the two-week field/scuba portion begins
	• a two-week 25-dive/15hr-bottom time in-water training course including:
	  ○ dive rescue & accident management techniques
	  ○ navigation, deep, cold water, low visibility, tethered, and night diving
	  ○ scientific diving techniques such as benthic core sampling, quadrat sampling, fish surveys, habitat mapping, video transects, and underwater photography
	• nightly evening lectures/workshops including
	  ○ diving regulations, advanced diving physics and physiology
	  ○ species identification and underwater photography
	  ○ experimental design, power analyses, and statistical analyses

Evaluation:	• NOAA on-line and lecture-based quizzes/tests (10%) • field effort – including safe dive-site management, and initiative & industriousness (10%) • student presentations (10%) • final paper/research proposal, due Sept 30th (70%)

An Average Day – What to Expect

(a) Daily timeline	• pre-breakfast → dive gear, boat, safety checklists, gear assembled and ready for boat departure • 07:30-08:30 → breakfast & cleanup • 08:30-11:30 → scientific dive training • 12:00-13:00 → lunch and cleanup • 13:30-17:00 → scientific dive training • 17:30-18:30 → dinner and cleanup • 19:30-23:00 → dive lectures, student presentations, and scientific methodology/statistics workshops

(b) Work habitat & Physical exertion,
(c) Common activities
	Pre-field course:
	• students will be expected to study/review select chapters from the NOAA Diving Manual for Science and Technology textbook
	• student comprehension will be evaluated through on-line quizzes available weekly through June and July.
	Swimming & Watermanship:
	• The Canadian Association of Underwater Scientists (CAUS) require students to be competent in the water. This competency includes:
	  ○ without aids treading water for 20min., and swimming for 200m
	  ○ with mask, fins, and snorkel a 400m swim; and able to tow a fully dressed scuba diver 100m
	Scuba:
	• the first week of the course we'll be diving morning and afternoon on L. Opinicon. This lake is shallow (i.e., 20') so for the most part we'll be above the thermocline or at it's interface. The goal this first week is to maximize the required 15 hrs bottom time. The water may seem warm the first few days, but with slow creep hypothermia you'll be wearing your full winter wetsuit (e.g., rental, or drysuit if you have one) by week's end. Good eating, staying hydrated, and solid sleeps are key to mental and physical stamina through this first week.
	• the second week we'll be diving above Chaffey's Locks in Indian and possibly Clear lake. These lakes are deeper (e.g., 40-100'), well below the thermocline – complete full thickness wetsuits (e.g., rental, or drysuit if you have one) are mandatory. Albeit these second week dives will be shorter in duration, we'll use this second week to maximize the required 25-dive count. Slow-creep hypothermia can be avoided by keeping warm, eating well, staying hydrated, and having good sleeps.
	• probable but rare additional diving issues include:
	  ○ sinus squeezes → don't dive if you have a cold
	  ○ middle-ear barotrauma → easily avoidable with slow descents and proper ear-clearing techniques that we'll practice and stress repeatedly
	  ○ equipment failure (e.g., second stage free-flow) → such failures we'll practice contingency actions for, and train for these scenarios repeatedly
	• the 25-dive pedagogy is structured to initially review and train in core diving skills and dive accident management, and to then further these basics along two independent trajectories with the focus on dive safety and competency in:
	  ○ increasingly challenging dive environments (i.e., from shallow warm waters with good visibility, to black-out conditions at the colder deeper depths)
	  ○ scientific methods and equipment (e.g., benthic core sampling, quadrat sampling, fish surveys, habitat mapping, video transects, and underwater photography).
	Evening lectures:
	• after dinner, most evenings we'll have 3hr academic lectures (e.g., diving physics, physiology, statistical techniques), equipment workshops, student presentations, or similar. Students seem to struggle through these at times, especially in the absence of good eating, staying hydrated, and having solid sleeps.

(d) Weather, dehydration, & biting insects	**Weather:** • average daily high temperatures are approx. 26°C; and average nighttime low temperatures are 18°C. However, a hot spell could put us well into the 30-35°C plus temperatures; a cold wet spell can drop us to the low teen's. • during the day we'll be out on the boats, exposed to all weather conditions. On consecutive hot sunny days dehydration, sun burn, heat exhaustion are valid concerns. On cold windy wet days slow-creep hypothermia and the inability to get warm/dry are valid concerns. Bring water bottles, clothing layers and duplicates as required, hats, and polarized sun glasses if you have such. **Bugs:** • mosquitoes, deer, and horse flies are expected. Avoid scented soaps/shampoos. Appropriate clothing may be a better utility versus bug dope (especially when diving, you don't want the bug dope running into your eyes)

(e) Toxic/poisonous, wildlife/ plants	• Ticks & Lyme disease, and poison ivy may be present along the trails between buildings. Long clothing will minimize the risk • Zebra mussels may cover the rock substratum. Careful manoeuvring and buoyancy control will minimize cuts
(f) Sleeping, washroom & laundry facilities	• students typically share a room (gender specific) with another student(s) depending on the cabin allocated (see https://qubs.ca/facilities/accommodations) • students need to bring their own linen/sleeping bags/pillows • coin-operated washing/drying faciliites are available
(g) Meal plans & food allergies	• all meals are prepared by kitchen staff, served buffet-style in the main dining hall • meals are prepared with the provision of a balanced, healthy diet in mind. • normally, vegetarian meals are interspersed with the regular menu. Alternatives to meats are generally available for strict vegetarians. Dietary preferences and food allergies will be requested prior to your arrival on-site and will be accommodated as best as possible.
(h) Non-academic responsibilities	• QUBS staff attempt to keep common areas clean and tidy. However, housekeeping in individual accommodations and laboratories is the responsibility of the user. • general-use bathrooms and common areas, students have primary responsibility for housekeeping • simple things like removing outdoor footwear at entrances, carefully wiping your feet and mopping up spills as they happen will greatly assist with keeping QUBS buildings clean and tidy.
(i) Degree of isolation	• see https://qubs.ca/facilities • fundamental services (water supply, septic systems, electrical supply, heat, telephones etc.) are readily available • E-mail and internet are accessible using your own computer linked to the wireless system • First aid kits are readily available. In case of real emergencies call 911; and for diving-specific emergencies similarly call 911 first before the local (Kingston) hyperbaric chamber (or DAN).
(j) Alcohol & drugs	• as we are scuba diving most days, the course will remain alcohol and drug free • transgressions will be evaluated for immediate ejection from the course
(k) Vaccinations/ Insurances	• stubbed toes, scrapped skins are always possible – you should always have your tetanus shot up-to-date • all divers MUST be declared medically fit by a licensed physician trained in diving medicine Diving Physicians • all divers MUST have scuba-specific DAN insurances
(l) Social Situations	• QUBS is an academic institution, and not a holiday resort. Respectful (but casual) clothing is assumed at all times • as divers we'll be dressing on the boat prior to diving, and dressing down thereafter. Courteous behaviour and respectful bathing-suits are assumed • through the second week of the course we'll be travelling by boat through the Rideau system locks (Chaffey's locks). Professional behaviour in these public places is assumed
(m) Final comments	**Canadian Association of Underwater Scientists - CAUS certification:** • this field course centres on the field and academic training required for you to obtain your CAUS Level I Scientific Diver certification, and time permitting Level II. However, to obtain ***actual certification*** specific criteria must be met: o a minimum passing grade of 80% on the written quizzes o as a successful CAUS Level I Scientific Diver your scientific research diving is restricted to 20m depth o pass of the take-home paper due one month following the end of the course **ACUC Advanced Diver/Rescue Diver Certification:** • at the completion of this field course successful students may ***independently*** ask for their ACUC Advanced Sport Diver and Rescue Diver certifications. o these additional Sport diver certifications are available at an additional $50 each o no further dive training nor exams are required, however, as above a minimum passing grade of 80% is required for the written quizzes/tests o as an Advanced ACUC Sport Diver you will be certified to 30m for recreational sport diving. **At the end of the day…** • at the end of the day, this course is designed along multiple pedological trajectories, each contributing to your growth and maturation in: o dive rescue & accident management techniques o underwater navigation, deep, cold water diving, low visibility, tethered, and night diving o scientific diving techniques such as benthic core sampling, quadrat sampling, fish surveys, habitat mapping, video transects, and underwater photography o research design and statistical analysis of complex ecological data sets

University of Guelph (OUPFB Module 18.)

Course Title:	**Marine Biology and Oceanography**
Instructor(s):	James Ballantyne
Dates:	1 August – 15 August 2020
Location:	St. Andrews New Brunswick
Cost:	~$2000
Prerequisites:	University Ecology or Aquatic Course University Invertebrate Biology Course University Statistics Course
Enrolment*:	20 (5UOFBP)
Course Description (brief):	A two-week course held at the Huntsman Marine Science Centre, St. Andrews, New Brunswick. Aspects of the ecology, behaviour, physiology, biochemistry and genetics of marine organisms will be studied as well as basic oceanographic techniques. The course will include group exercises to study various intertidal and subtidal environments as well as boat cruises to collect plankton, benthic invertebrates, marine fish and to observe marine mammals. The course provides excellent opportunities for students to familiarize themselves with state-of-the-art techniques involved in various branches of marine biology and oceanography and conduct an individual research project.
Evaluation:	Group Project 40 % Individual Project 50 % Participation 10 %

*For your enrolment numbers please show the total enrolment with your reserved seats in parentheses; e.g. 12(4) would indicate total enrolment is 12 with 4 seats reserved for the home university.

An Average Day – What to Expect

(a) Daily timeline	An average work day in the first week (e.g., 7:00 AM breakfast, 8:00 AM field work rain or shine, 12:00 lunch, 1:00 continuing field work, 6:00 dinner, 7:00-10pm class lectures, lab work, individual projects. First week involves group projects that are scheduled according to the tides. Some early departures may occur.
(b) Work habitat & Physical exertion	The fieldwork habitat involves muddy, rocky, or slippery intertidal areas. Boat excursions may involve rough seas.
(c) Common activities	• common activities (e.g., boat travel over open ocean, walking in slippery habitats) • associated risks (e.g., sea sickness, sunburn, animal spines (non-poisonous).
(d) Weather, dehydration, & biting insects	• weather conditions likely to be encountered (strong sun, high UV, rain, strong wind).
(e) Toxic/poisonous, wildlife/ plants	Lyme disease ticks occur in area but no encounters yet Fish and sea urchin spines – gloves worn
(f) Sleeping, washroom & laundry facilities	Dorm rooms are shared with one other student (same sex). Bedding is provided, but towels etc. are not. Floors are generally segregated by gender. Each floor has a shared bathroom / showers. • Coin operated washing/laundry facilities are available
(g) Meal plans & food allergies	Any food sensitivities / allergies should be communicated to course personnel as soon as possible. Vegetarian meals may be accommodated by the dining hall staff, though strict vegans are unlikely to be satisfied (in our opinion and experience). Other requests for dining accommodations will be addressed individually, but keep in mind this is a field station not a restaurant.
(h) Non-academic responsibilities	
(i) Degree of isolation	The town of Saint Andrews is a 15-20-minute walk from the station. It has grocery, pharmacy, post office, souvenirs, hardware, and restaurants. A small health centre is in town, the closest hospital is the Charlotte County Hospital in Saint Stephen NB.
(j) Alcohol & drugs	Alcohol is permitted in dorm rooms only
(k) Vaccinations/ Insurances	No additional vaccinations needed
(l) Social Situations	Shared dorm rooms.
(m) Final comments	This is a great course to learn techniques in marine biology and oceanography and develop interpersonal skills.

University of Western Ontario (OUPFB Module 19.)

Course Title:	**Tropical Biodiversity**
Instructor(s):	Dr. Nina Zitani: P: 519-661-2111 x 85356; Dept. of Biology, Western; nzitani@uwo.ca; two graduate student teaching assistants, and local Ecuadorian naturalist guides
Dates:	1 - 21 August 2020
Location:	Ecuador, South America: Cabañas San Isidro, Yanayacu Biological Station (2,100 m); town of Coca (300 m); Shiripuno Lodge (220 m); the Capital City of Quito (2,800 m).
Cost:	Estimated $3,500.00 (Includes in-country transport, accommodation, 3 meals/day at lodges, buffet breakfast at hotels). These fees ***do not include*** roundtrip airfare (the course begins at Quito airport; students arrange their own flights), ~ $200.00 US cash for miscellany, passport, visa (for non-Canadian passports only: students must determine visa requirements), travel medical & trip cancellation insurance, required immunizations, field, safety gear. A non-refundable $350.00 deposit to home university due at registration; ~ $3,150.00 final payment due 1 March. Once all students have paid in full the professor will contact students (mid-March). Exact dates, number of days at locations, and cost may vary (depending on exchange rate with $US, the currency of Ecuador). Cancellation & Refund Policy: after March 1st anyone in arrears will be automatically removed from the course roster. Cancellation must be received in writing by March 9th, after which we retain your full payment as the monies are used at this time to pay vendors in Ecuador. No exceptions.
Prerequisites:	2nd yr. Biology or Environmental Science & 1 course in introductory ecology/evolution
Enrolment*:	13 (6 reserved for Western)
Course Description (brief):	This is an introductory course on Neotropical biodiversity, ecology, and forest conservation of the Amazon River System. We will experience Amazonian cloud forest and lowland rain forest, two of the most biodiverse ecosystems on Earth. Emphasis will be on the most diverse taxa -- the arthropods and plants -- though we will learn about many kinds of animals including vertebrates, and fungi. Students will learn tropical forest ecology, field sampling techniques (e.g. arthropod sampling techniques; light-trapping for nocturnal insects), identification skills, engage in group walks during the day & night. We will work directly with insects and students must not be squeamish and willing to learn about living insects and other arthropods. *Students are encouraged, but not required to handle live animals.* In the lowlands we board motorized canoes for a 4-hour trip downstream to Shiripuno Lodge. At this remote field station (no electricity) within Yasuni Biosphere Reserve, we will have an unparalleled opportunity to observe the biodiversity of lowland Amazonia, and interact with, and learn from the Waorani Indigenous Peoples on their ancestral lands.
Evaluation:	a) 15%: Leadership, professionalism, and enthusiastic participation. b) 20%: Sight Identification Quiz: plants, arthropods, and possibly other taxa. c) 20%: Group Hypothesis-Driven Research Project and Research Paper. d) 10%: Independent Study of a taxon and Oral Presentation. e) 25%: Field notebook, and Journal, with daily entries. f) 10%: Reflection essay (750-1000 words).

An Average Day – What to Expect

(a) Daily timeline	<u>Typical daily routine (times may change somewhat depending on weather, etc.):</u> 5:00-7:00 am bird/animal-watching (not all, but some mornings) 7:00-8:00 am - Breakfast & field prep 8:00-12:00 pm - Morning hike/in-the-field learning activities/research 12:30-1:00 Lunch 1:00-2:00 pm power nap/journal-writing/study time 2:00-3:30 lecture 3:30-6:00 – Afternoon hike/in-the-field learning activities/research 6:00 – 7:00 - Dinner 7:00- 8:30 - Evening group meeting and discussion 8:30 - 10:30 – Night hike/light-trapping for nocturnal insects 11:00 pm Bedtime/Silence/lights out (enforced)
(b) Work habitat & Physical exertion	Students must be able to hike in high rubber, waterproof boots for ~ 4 hours at a time in hard rain, on very muddy slopes at high elevation in the Andean cloud forest, and in high heat and humidity in lowland rain forest, carrying a knapsack with field supplies, water and snacks. Students should be prepared for remote tropical field station conditions (e.g. no electricity in the lowlands; limited or no internet; open air cabins in lowlands), be interested in learning about and at least tolerate living with a variety of arachnids (spiders and relatives) and other tropical fauna (e.g. diverse and abundant insects, bats, snakes). Students may need to use the bush as toilet (packing out all trash with them) on occasion. During hikes rest periods are taken when necessary.
(c) Common activities	• common activities: day and night hikes in potentially hard rain on very muddy trails in cloud and lowland rain forest; bus rides on steep Andean slopes; urban walks in Quito; 4-hour open, motorized canoe ride down a tributary of the Amazon River; data-gathering in the field for group research project/independent study; unforgettable, once-in-a-lifetime, fascinating natural history and science learning experiences in the Amazon rain forest with a highly trained, seasoned professor. • associated risks: altitude sickness (medication can be obtained from your doctor), collisions, getting lost, twisted ankles, fatigue, blisters from poor footwear, heat exhaustion, sun burn. We discuss safety and risks during the first day in the field and throughout the course. Students are instructed in basic field safety.
(d) Weather, dehydration, & biting insects	• weather conditions likely to be encountered: cool and wet conditions in high elevation cloud forest, hot and humid conditions in lowland rain forest; strong sun, high UV, high humidity, dehydration from hiking and sweating, heavy rain possible at any time. • a variety of biting & stinging arthropods are possible, e.g., mosquitoes, black flies, no-see-ums, horse flies, stinging wasps, biting, stinging ants, chiggers, spiders) • Long pants and high, waterproof boots, and waterproof pants and rain jacket are required field gear. Long-sleeved shirts recommended. Pants and shirts do not need to be fancy and new, in fact old pants and shirts work well in the field.
(e) Toxic/poisonous, wildlife/ plants	Dangerous animals possible: mosquitoes potentially carrying tropical diseases including but not limited to malaria, dengue, Zika, Yellow fever, chikungunya; stinging bees/wasps/ants, centipedes, arachnids, caiman, venomous snakes, large mammals, toxic plants.
(f) Sleeping, washroom & laundry facilities	• sleeping accommodations: students typically share a room with one or two other students of same sex • washroom facilities: flush toilets, access to toilet paper at field stations, but not guaranteed during travel and in urban areas; private showers, sometimes hot, sometimes cold water; shower in piped-in river water in the lowlands. • washing/laundry facilities: handwashing clothes in sink available, although clothes not likely to dry due to humidity; last few days in Quito laundry service in hotel (paid by student).
(g) Meal plans & food allergies	3 meals a day provided at field stations, and breakfast at hotels (when staying at hotels, students are responsible for lunch and dinner at a local restaurant). The places we go have been very good in the past about accommodating allergies and vegetarian/vegan diets. Students are responsible at all times for informing the airline, and the food preparation staff at all localities about food preferences and/or food allergies.

(h) Non-academic responsibilities	Leadership and professionalism at all times, beginning at course registration; follow all safety recommendations and requirements; respectful, courteous behavior towards everyone in the group and towards our Ecuadorian colleagues at all times; keeping rooms reasonably clean, taking short showers, sharing space and access to washrooms, keeping the shared laboratory space organized and neat, and helping cleanup rooms and temporary laboratory prior to departure from field stations; help carry course supplies in large containers at various times e.g., from the bus to the field station.
(i) Degree of isolation	At the field stations (majority of the course) do not expect access to internet. Hotels have wifi. First week: electricity is readily available at San isidro and Yanayacu in cloud forest; but not at Shiripuno in the lowlands other than possibly at night. There is no access to shopping of any kind other than occasional truck stops during bus rides, until the last few days in Quito. *Students must pack all necessary supplies such as hygiene needs and prescription medication, clothing etc.* Please see section below "Required vaccinations/Insurances" for further information.
(j) Alcohol & drugs	No drugs or alcohol use are permitted during this course at any time, for safety reasons.
(k) Vaccinations/ Insurances	**Required Vaccinations**: To travel to Shiripuno (the Amazon lowlands and the ancestral lands of the Waorani) you are required to show proof of vaccinations for: **Yellow Fever, Hepatitis A & B, and MMR (measles-mumps-rubella).** Visit a physician to obtain these required vaccinations (and prescriptions, see below). At a later date (TBA) before we depart, you must provide documentation to us that indicates that you have had the above vaccinations, so be sure to obtain the vaccination *and the documentation from the doctor (e.g., yellow card).* **Recommendations:** Due to the remote locations of our destinations, and the presence of malaria (http://www.cdc.gov/malaria/travelers/country_table/e.html), and dengue, chikungunya, and Zika viruses the following are additional medicines/products that are strongly recommended: 1) Antimalarial medication used in the prevention and treatment of malaria; 2) Sufficient insect repellent with DEET or other proven effective repellent (over-the-counter): http://wwwnc.cdc.gov/travel/yellowbook/2016/the-pre-travel-consultation/protection-against-mosquitoes-ticks-other-arthropods 3) A course of Cipro or other broad-spectrum antibiotic to use in the event of a bacterial infection; 4) Medication to be used in the event of altitude sickness; 5) All other routine immunizations, e.g., Typhoid, Tetanus, flu shot, etc. *Also, be sure to bring any other prescription medications that you will require -- do not expect to be able to obtain prescription medication while in Ecuador.* The most common medical conditions that students have suffered from on past courses are #1 TD - traveler's diarrhea #2 mild altitude sickness and #3 viruses we bring with us from Ontario e.g. influenza and 24-hour stomach flu. **Each student is required to have travel medical and trip cancellation insurance:** You are required to purchase travel medical insurance (that includes helicopter transport within Ecuador, in the event of a medical emergency), and trip cancellation insurance that covers the dates of the trip. For most of the trip we will be in remote locations (except Quito) with limited or no immediate access to medical assistance. Each student must provide proof of insurance and vaccinations at our request (once the course is in progress, prior to departure, we will communicate by email about how to do this).
(l) Social Situations	Students are expected to behave at all times according to the Academic Code of Conduct of their home university; students are expected to be respectful and courteous towards everyone in the group and to our Ecuadorian colleagues, and, wear required field gear and appropriate and respectful clothing in urban areas.
(m) Final comments	The professor has taught this course 6 times and completed 26 Neotropical field expeditions. Safety is taken very seriously, and we strive to provide a positive, rich, and rewarding learning experience for every student. This course provides a once-in-a-lifetime opportunity to experience one of the most biodiverse places on Earth, the Amazon rain forest, with seasoned, enthusiastic instructors, a variety of outstanding Ecuadorian field naturalists, Amazonian Indigenous Peoples (Waorani), and peers.

University of Guelph (OUPFB Module 20.)

Course Title:	**Field Ecology**
Instructor(s):	Alex Smith, Department of Integrative Biology, University of Guelph. salex@uoguelph.ca
Dates:	Sunday, August 02nd – Saturday, August 15th , 2020
Location:	Wildlife Research Station (WRS) on Lake Sasajewun, Algonquin Provincial Park
Cost:	$1,500. Includes all meals. Does NOT include transportation to WRS $350 non-refundable deposit due end of January 2020
Prerequisites:	At least one undergraduate course in each of ecology and statistics
Enrolment:	25 students (8 for OUPFB; 17 for University of Guelph)
Description:	This is a 12-day field course held in Algonquin Park, Ontario, during August. Emphasis is on the design and implementation of ecological field experiments; students acquire knowledge of natural history of plants, invertebrates and vertebrates as a result. Students design and conduct a research project in small groups on invertebrate or plant ecology in terrestrial or aquatic habitats and write an independent formal scientific paper. In addition, the students will work in teams on a field exercise to develop familiarity with scientific methodology and will produce a field notebook highlighting their own natural history interests as well as accurately documenting their observations, data collection, and questions. A group field exercise will be completed after departure from WRS and based on DNA data collected during the course. An organizational meeting will be held in the winter semester prior to the field course, and there may also be some formal lectures.
Evaluation:	Research Paper 60% Group Field Exercise 10% Proposal 10% Field Notebook 10% Self-Assessment 2.5% Participation 7.5%

An Average Day – What to Expect

(a) Daily timeline	Field work is intense and demands long days, both in the lab or field, but also sorting samples, and analyzing data, a typical field day is not 9 – 5 and students should be expecting to work very hard and, as a result, derive a great deal of satisfaction from their accomplishments at the end of two weeks. One should embark on a field course because they are passionate about being outdoors in all conditions, exploring nature, asking questions, and working hard. Some students perceive field course modules as opportunities for an easy grade, a credit-based vacation, this is not the case, the days are long and can be gruelling, but the sense of community and camaraderie that develops among the students is incredibly fun and rewarding. An average work day includes 7:00 breakfast (though cereal is available if an earlier start is necessary), 8:00 field work rain or shine, 12:00 lunch break, 1:00 continuing field work, 6:00 dinner, 7:00-10pm class lectures, field book updates, student presentations, field excursions).
(b) Work habitat & Physical exertion	Depending on the research projects, long back-country hikes, or canoeing (sometimes with portage) may be expected, 5-10km day hikes through varying elevations and through rocky/muddy/mosquitoey habitat are common. Students may find themselves immersed in bogs, ponds or lakes in hip-waders, climbing uneven terrain through mixed hardwood/conifer forest, long hours in open field/meadow habitats with only bushes as toilets or a long walk to an outhouse. Staying hydrated and resting when necessary will be key ingredients in maintaining stamina throughout the days. Being invested in hard work and data collection early will help to avoid the burnout that can occur if students do not balance their data collection and field work accordingly.
(c) Common activities	Hiking, canoeing, swimming are common activities.
(d) Weather, dehydration, & biting insects	Cold August nights and hot August days are common, as are days (weeks even) of rain. Students need to bring sun protection (sunscreen, wide-brimmed hats), a water bottle to carry water into the field, as well as rain gear (rain boots, rain pants, rain coats). A warm sleeping bag is necessary for cold nights. By mid August, the mosquitoes, blackflies and deer flies have started to wane, but are still prevalent and hungry. Depending on the season, they can be quite thick and wearing long sleeves, pants, and using repellent are excellent ways to ensure comfort.
(e) Toxic/poisonous, wildlife/ plants	Students must complete bear safety training as encounters with black-bears and other large wildlife (e.g. Moose) are possible around the field station and while in the field. Other natural hazards that are common are poison oak and poison ivy, wearing long plants and using common sense are the best defences. and use common sense to stay protected from biting insects and sun exposure.
(f) Sleeping, washroom & laundry facilities	• sleeping accommodations: shared cabins, not typically co-ed. Students need to bring bedding (warm sleeping bag, sheets, pillow). • washroom facilities: at the field station, there are flush toilets and hot showers, in the field, there are out-houses (sometimes) • washing/laundry facilities: washing machine available on a fee per use basis, clothes line for hanging to dry
(g) Meal plans & food allergies	Three meals are provided each day, if students have specific requirements (e.g. vegetarian) some can be met, others require students to supplement their own food.
(h) Non-academic responsibilities	Students are responsible for daily chores at the field station that include dishes, cleaning the common indoor areas, and tidying common outdoor areas, as well as pitching in on projects that may be ongoing while we are there.
(i) Degree of isolation	The WRS is a remote and very rustic field station that is equipped with electrical power but rudimentary (if any) cell/internet connections • Recharging electronic devices is possible, but outlets are limited and so patience is paramount • Cell reception around the station is improving, but still spotty, and data is typically very slow if it connects at all • Students can bring their own snacks, keeping them labelled and in a closed mouse-proof container
(j) Alcohol & drugs	Use of alcohol/drugs must follow the WRS policy, which is subject to change, but in the past, alcohol is permitted after working hours have wrapped up, and not during the day. Students must use substances responsibly, keeping their own safety and the safety of others as a priority. Intoxication will not be tolerated.
(k) Vaccinations/ Insurances	Up to date health insurance is required in case of accident or illness

(l) Social Situations	This course is two weeks of living in close proximity with a relatively small group of people. We share meal-times and spend a lot of time together as a group, but even more so in smaller project groups. It is important that people come with an open mind and are accepting of diverse personalities and perspectives, that people are friendly and supportive of each other. Students should be prepared to work in a small group of 4-5 people on a research project and be prepared to work hard to ensure that everyone is contributing fairly and collaboratively. Also, unless students drive their own vehicle (car-pooling is recommended as space for vehicles at the WRS is limited), getting to one of the small towns outside of Algonquin Park can be difficult (30 -45 min drive each way). Students must be prepared to be easy-going, friendly, and flexible with personal space expectations as quarters are tight for sleeping accommodations.
(m) Final comments	This is my absolute favourite course to teach, each group of students brings a vibrancy and enthusiasm for exploring nature and investigating scientific questions that invigorates my own curiosity and passion for field research. We will explore some absolutely stunning places in the boreal forest, and no doubt embark on some memorable adventures. Often people who participate in this course become long-lasting friends as it is a unique opportunity to connect with a diverse group of people from varying backgrounds but who all share similar passions. I look forward to meeting the 2020 cohort.

York University (OUPFB Module 21.)

Course Title:	**Écologie des estuaires (en français)**
Instructor(s):	Dr. Laura McKinnon (lmck@glendon.yorku.ca)
Dates:	August 3 -14
Location:	Métis-sur-mer Lighthouse, Métis-sur-mer, Québec, G0J1S0
Cost:	$800 (includes $350 non-refundable deposit to home university) covers shared accommodations, food and local transportation for offsite field activities. Students are responsible for transportation to and from the site and tuition at home institution.
Prerequisites:	A high level of proficiency in French and a university course in Introductory Biology and Ecology.
Enrolment*:	20 students (12 reserved for York/Glendon students)
Course Description (brief):	This field course takes place the small bilingual community of Métis-sur-mer located on the south shore of the St. Lawrence River. All of our work will be conducted on supra-and intertidal region and will include the sampling of all available taxa: birds, seals, invertebrates, and plants etc. Prior to the course students will be expected to complete a systematic literature review on a topic of their choice related to estuarine ecology and present the results of their review upon arrival. During the course students learn a variety of field techniques in estuarine ecology including, but not limited to: shorebird identification and census techniques, marine mammal monitoring, core sampling for marine invertebrate collection and identification of marine invertebrates. Student will also interact with several local ecologists from the nearby l'Institut Maurice-Lamontagne (Department of Fisheries and Oceans) as well as local park biologists. Finally, students will conduct community outreach and a field study and present preliminary results to the community in a mini-symposium at the end of the course.
Evaluation:	Systematic Literature Review and Presentation (20%) Field Activities (20%) Community Outreach Activity (10%) Scientific Poster (20%) Scientific Report (20%)

An Average Day – What to Expect

(a) Daily timeline	All field activities will be scheduled during daylight hours (5am to 9pm) but will be determined primary by the tide cycle so there may be some very early mornings, and some very late mornings.
(b) Work habitat & Physical exertion	Students must be in good physical shape and be able to walk on rocky, slippery terrain (wet intertidal rocky areas) as well as soft intertidal mudflats (being careful not to lose your rubber boots!).
(c) Common activities	Prepare for long days in the sun, rain or wind. Risks in the field include; fatigue, blisters from walking, heat exhaustion, sun burn, dehydration and bug bites.
(d) Weather, dehydration, & biting insects	• August on the shores of the St. Lawrence is variable with temperatures ranging from 10 to 20 degrees. Prepare for cool days on the lakeshore (hat/warm jacket/gloves), rainy days (rain jacket) and hot sunny days with little cover (sunhat/sunblock). Biting bugs are not too much of an issue.
(e) Toxic/poisonous, wildlife/ plants	• Bee stings are a possibility on the shore.
(f) Sleeping, washroom & laundry facilities	• Students will share two rustic houses with single or double bedrooms. Linens are provided but students are encouraged to bring their own sleeping bag and pillow. There are coin laundry facilities at a nearby campsite (1.5km walk).
(g) Meal plans & food allergies	• Students are responsible for making meals together. A schedule will be set up so that everyone shares this task equally.
(h) Non-academic responsibilities	Students will be responsible for group meals, doing dishes and keeping the accommodations in order. There are no maids. A schedule will also be made for this if necessary.
(i) Degree of isolation	• The field site is located at the site of an old lighthouse on a very quiet peninsula. The site is not isolated in that it is only a 10 minute drive from the nearest town and there are other summer residents living on the point – but it can feel isolated!
(j) Alcohol & drugs	No alcohol or drugs permitted during class activities.
(k) Vaccinations/ Insurances	Students must provide evidence of up to date tetanus vaccinations.
(l) Social Situations	Students will work closely with each other in small groups and will likely meet curious residents while they are conducting fieldwork.
(m) Final comments	Two weeks on the beach, how could anyone not love this course?

University of Ottawa (OUPFB Module 22.)

Course Title:	**Alpine Ecology** https://alpecol.wordpress.com/
Instructor(s):	Dr. Jessica Forrest jforrest@uottawa.ca Department of Biology http://forrestlab.wordpress.com University of Ottawa Ottawa, Ontario, K1N 6N5 Tel.: 613-562-5800 x 3948
Dates:	Sunday August 9 to Monday August 24, 2020 (2 weeks of instruction plus two days of travel)
Location:	Rocky Mountain Biological Laboratory (RMBL), near Crested Butte, Colorado, USA: http://www.rmbl.org/
Cost:	Approximately $1950 (including $350 deposit). This covers housing, meals, and user fees for 15 days at RMBL, as well as course supplies and travel around RMBL. It does not include travel to Colorado from Ontario (estimated at ~$850 return) or linens (e.g., sleeping bag, towel). Exact cost will depend on enrollment and the exchange rate at time of payment (summer 2020).
Prerequisites:	First-year biology, and preferably additional courses in ecology or evolution. An introductory statistics course is strongly recommended. Students must be physically fit and prepared for spectacular but sometimes uncomfortable conditions (outhouses, near-freezing temperatures during the night and early morning, no phone service, limited internet). Note that we will be hiking steep slopes at elevations > 3000 m, where oxygen levels are ~70% of those at sea level; even very healthy people find themselves short of breath at this altitude, and people with asthma may find it impossible. Students must have a passport valid until at least the end of August, no known barriers to entry to the United States, and proof of travel medical insurance covering a 16-day stay in the U.S. Non-Canadian students will need to determine visa requirements. Students will be required to sign a liability waiver to stay at RMBL (available at http://www.rmbl.org/staffforms), in addition to the course waiver.
Enrolment*:	12 (3 reserved for uOttawa)
Course Description (brief):	Students will spend two weeks in the awe-inspiring landscape of the Elk Mountains, learning about the unique challenges of life at high altitudes, how various plant and animal species have adapted to these challenges, and the threats posed to alpine habitats by current anthropogenic changes. Instruction will involve a mixture of guided walks, lectures, readings, and field data collection. During the first week of the course, we will explore different alpine and subalpine habitats, learning about their natural history and how to sample organisms and environmental variables along elevational gradients. We will give equal attention to plants and animals, including both vertebrates and invertebrates. Students will learn about some of the classic long-term studies taking place at RMBL, such as those on flowering phenology, climate change, marmot behaviour, and stream ecology. In the second week, students will conduct independent research projects, with guidance from the instructor, to test an ecological or evolutionary hypothesis of their choice. Students will gain experience with all aspects of experimental design, data analysis, and presentation of scientific findings.
Evaluation:	Field identification quiz (10%), participation (15%), project proposal and presentation (20%), field notebook or datasheets with raw data (5%), final data spreadsheet (5%), final group presentation (15%), and final paper due September 21 (30%).

An Average Day – What to Expect

(a) Daily timeline	During the first week of the course, activities will be a mixture of lectures (1-2 hours), class discussions, and outings to learn about the local biota or about particular researchers' study systems. In addition, we will spend two full days (likely days 3 and 5) on long hikes, sampling insects or plants along an elevational gradient. Throughout the first week, we will eat all meals at the RMBL dining hall (except for some packed lunches), so mealtimes are inflexible (breakfast 7:00-7:30, lunch 12:00-12:30, dinner 18:00-18:30). Course activities will typically run from 8:00 or 8:30 to 16:30 or 17:00, with short breaks as needed throughout the day. There will also be occasional, optional evening activities (e.g., in the past these have included scientific lectures for the whole RMBL community, a cricket match, and square dancing)—but you will likely also need to spend some evening time working on course assignments, since the time allotted to working on assignments during the day is not likely to be sufficient. Students typically find the first week quite tiring, since there is a lot to learn and a proposal to write, all while acclimating to the altitude. At the end of the first week, there will be a two-day "weekend", during which students can hike a mountain (with the instructor), travel to the nearby town of Crested Butte, do laundry, prepare for their independent projects, and/or rest. During the second week of the course, students will work in small groups (2-4 students per group) on independent research projects, and we will be cooking our own meals, so there will be more flexibility with schedules—that is, you can adjust your meal- and break-times to fit your sampling schedule. However, we will normally still eat dinners together at a mutually agreed-upon time. On the last day before departure, there may be another opportunity for a hike (depending on weather). Students also need to clean their cabins and the shared kitchen, pack, and complete the course evaluation.
(b) Work habitat & Physical exertion	We will be hiking on steep, rocky, mountain trails—and sometimes off trail. There is a mandatory mountain hike in week 1, which most students find extremely physically challenging. We will ascend to an elevation of 3800 m at an average grade of approx. 13% (steep!—especially when your body is still adjusting to the thin air). The ascent takes approximately 3 hours, and you will be carrying a lunch, snacks, extra clothes, and at least 2L of water. Every year, one student—always someone who tells me afterward that she's never actually liked hiking—ends up in tears on this hike because of sheer physical exhaustion. **If you don't like hiking, do not sign up for this course.** If you do sign up for this course, be sure you have good hiking boots with solid ankle support. Other than the one required mountain hike, the other hikes are either optional or shorter and easier. But you should expect to be walking, frequently uphill, for *at least* 2 hours every day.
(c) Common activities	Other than hiking, the common activities will depend on the project you choose to work on. Regardless, you will be outdoors during much of the day for two weeks at high elevation, so possible risks and hazards include sunburn (UV intensity is greater at high altitude), lightning, blisters, twisted ankles, fatigue, dehydration, wild animals, and altitude sickness. Risks are enumerated (along with mitigation measures) in the course waiver, which students will need to sign before arriving in Colorado. We will also cover basic safety measures on the first day of the course.
(d) Weather, dehydration, & biting insects	• Weather is extremely variable in the mountains. Mornings are cold (typically around 0°C), but air temperatures can reach 20°C during the day—and it can feel much hotter in the sun (at high elevation, solar radiation makes a bigger difference than air temperature to how warm you feel). • Mountain summits and ridgetops can be windy and cold, so it's important to bring extra clothes (windbreaker, warm hat, gloves) on mountain hikes. • Air is generally dry at high elevation, so dry skin, chapped lips, and even light nosebleeds are common. You will need to drink a lot of water and should minimize consumption of dehydrating beverages like coffee. • August is monsoon season in the mountains, so afternoon thunderstorms are common. In late August, it's not unusual to have a few completely rainy (or snowy), miserable days. • There are typically few biting insects at RMBL in August, but there are always non-biting insects around (flies, bees, grasshoppers, etc.).

(e) Toxic/poisonous, wildlife/ plants	• Mice are common, including in some of the cabins, and they can carry hantavirus, a potentially fatal respiratory illness. There have been no cases of hantavirus so far in the area around RMBL, but the disease does occur elsewhere in Colorado. • Ticks are rare at this elevation but they can occur and vector diseases. • Black bears are common, and they are especially likely to be encountered in late summer when searching for food before hibernation. Keep cabin and outhouse doors latched, and dispose of garbage in bear-proof dumpsters. • Mountain lions (cougars) are present in the area but rarely encountered. • Moose have become increasingly common and can be dangerous if threatened. • To minimize the risk of attack by large mammals, avoid hiking alone beyond the townsite. Do not approach large mammals. Make yourself conspicuous when hiking so that animals know you are approaching and can stay away.
(f) Sleeping, washroom & laundry facilities	• The research station is located in the abandoned mining town (townsite) of Gothic, Colorado. More information is available on the course website (https://alpecol.wordpress.com/field-station/). • Sleeping accommodations are rustic cabins. Some are old (e.g. 1950s), and most lack insulation. Images and detailed information available here: https://www.rmbl.org/field-station-info/housing/ - but note that you will be assigned a shared cabin (you will not have your own choice of a cabin). • Bedding is not provided. You will need to bring your own sleeping bag, rated to -5°C or below, and a pillow (if you want to have one). • Toilets in the townsite (where we will be based) are outhouses. On field outings, you will have to pee outdoors. • There is a communal wash-house in the townsite. One side has showers; the other side has laundry facilities (washer and dryer – though the air is so dry that you're usually better to just hang your clothes outside to dry).
(g) Meal plans & food allergies	• We will be on the RMBL meal plan for the first week of the course (buffet-style breakfast, lunch, and dinner for 7 days). • You will be asked before the course whether you want the vegetarian or meat meal plan. At the moment, there isn't a vegan meal plan, so if you are vegan, you may want to bring supplementary food of your own. However, the dining hall staff tend to be very accommodating, and they often provide vegan food (especially if you let them know your needs). There is also a well-stocked salad bar and a "left-overs fridge". There have been vegan students on the course before and they found enough to eat. • You will be asked before the course about any food allergies. The dining hall will normally accommodate these. • We will be buying our own food and cooking our own meals during the second week of the course. Everyone will have input into the shopping list. We will be cooking dinners together in a communal kitchen, so if you have food allergies, you will need to be vigilant. (There are "allergen-free zones" in the community kitchen that we will use on most days, but we will not have access to that kitchen every day.)
(h) Non-academic responsibilities	You are expected to help keep the classroom and computer lab, cabins, and communal kitchen clean; you must also return any equipment you borrow from the field station. Cabins will be inspected before your departure by RMBL staff and you will be required to pay a cleaning fee if your cabin isn't clean. Participation marks may be deducted if students do not keep common space clean. Students are asked **not to use their phones during lectures, student presentations, and mealtimes**. Participation marks can be used to enforce this policy.

(i) Degree of isolation	• Cabins and classrooms all have electricity, but power outages are not uncommon. • There is no phone service in the townsite. • There is a computer lab with approx. 10 computers and two printers in the centre of the townsite. These are usually available for use. • There is wireless internet in the townsite, but coverage can be poor in some areas, bandwidth is limited, and outages are not uncommon. You must not use internet to stream video or otherwise consume excessive bandwidth. • You can purchase a few things (e.g., snacks, coffee, postcards) at the Gothic Visitor Center and the Gothic Science Café, but there is no real store in the townsite. There will be no easy way to get personal hygiene supplies or other missing items during the first week of the course. There will be an opportunity to re-stock after the first week, when we do our grocery shopping, but you should not expect to be able to shop during the week. • In the event of medical difficulties, there is a clinic in the town of Mt. Crested Butte, approx. 6 km from the townsite.
(j) Alcohol & drugs	Alcohol and marijuana use is permitted for students of legal age (21 in Colorado) outside of class hours, provided it does not interfere with class activities or lead to inappropriate or unsafe behaviour. Students **must** exercise caution, since effects of drugs can be intensified at high elevation. Moderation is strongly advised.
(k) Vaccinations/ Insurances	No particular vaccinations are required. Students should have travel medical insurance for the U.S.
(l) Social Situations	You will likely be sharing a cabin with at least two other students, and potentially as many as seven. You are likely to be sharing a room with 1-2 other students. These students may also be field-course students, or they may be working as researchers or research assistants at RMBL. In the latter case, they may be keeping different hours than we are. During the first week of the course, you will be spending most of your time during the day with the entire class. If you need your own space outside of class time, you should be able to find something (e.g., there is a small library, the community centre, the natural history building, etc.). During the second week of the course, you will spend most of your time with your project group. Sometimes group members start to dislike one another. The TA and I will do what we can to help in these situations, but we also expect everyone to behave as responsible and respectful adults – which means working together even if you dislike each other.
(m) Final comments	If you dislike physical activity or the outdoors, this is not the course for you. If you love hiking and want to learn about alpine plants and wildlife at a world-renowned biological research station, and you don't mind sharing moderately uncomfortable living quarters with other people for two weeks, this course could be a good fit.

Queen's University (OUPFB Module 23.)

Course Title:	**Effects of human development on aquatic environments and biodiversity in Canada and China.**
Instructor(s):	Prof. Yuxiang Wang (Biology, Queen's) 613-533-6134 yuxiang.wang@queensu.ca Prof. Steve Lougheed (Biology, Queen's) 613-533-6128 steve.lougheed@queensu.ca
	Monday, Aug 10 – Sunday, Aug 23, 2020 (14 days)
Location:	Lower and middle reaches of the Yangtze River in Eastern China
Cost:	Estimated Cost: $2,500 ($350 deposit to home university at the time of application) covering all costs of room and board at various field sites, and all local travel. International airfare is NOT included.
Prerequisites:	Completion of 2nd year biology or environmental program or permission of the instructors.
Enrolment*:	Maximum of 14 (4) students from OUPFB and 16 students from 4 partner Chinese universities (Fudan, Tongji, China Southwest and Beijing Normal Universities).
Course Description (brief):	This course provides Canadian & Chinese students with first-hand experience with tools for environmental and biodiversity assessment, and insights into the interaction between human development and the environment, with focus on selected aquatic ecosystems in both China and Canada. This 2-week field course takes place exclusively in China where we will visit the Shanghai/Jiangsu/Zhejiang area (Dongtan Reserve on Chongming Isl. of Shanghai, the Grand Cannel system, various wetlands, and Tai Lake), with potential visits to other conservation areas and wetlands along the Yangtze River. Students will learn about differing attitudes and perceptions of development and biodiversity in the two cultures. We will visit a series of aquatic sites along the Yangtze River, and undertake some comparative research on habitat degradation, quantifying biodiversity, and assessing water quality. Guest researchers will illuminate major issues in aquatic habitat degradation, bioremediation, and biodiversity conservation. Students will write a major paper on their research upon return to their home institutions. The course is organized around five themes: 1) Biodiversity assessment, 2) Habitat assessment including reconstructed wetlands, 3). Aquatic environmental degradation, 4). Water control & usage, 5) Relationship between social economic development and aquatic environment. See: http://post.queensu.ca/~yuxiangw/teaching/fieldcourse.html for more information.
Evaluation:	Course participation (20%), Field journal (10%), Blog (10% - e.g. see https://chinacanada2018.sclougheed.ca), Seminars (20%), Final report (40%)

An Average Day – What to Expect

(a) Daily timeline	Activities will vary across days. Here is an example of what one such day might look like: 6:00am Bird hike, 7:30 am breakfast, 8:30am GPS instruction and basic training practicum, 9:30 am GeoCaching exercise, 12:00 Lunch, 13:00 wetland plant diversity survey, 16:00-17:30pm free time, 17:30 Dinner, 19:00-22:00 students seminars and discussion, 22:30-23:30 field journal and group debriefing.
(b) Work habitat & Physical exertion	We will engage in some activities that require physical exertion. For example, we will undertake a few daily hikes in the field that might be 4-6km carrying small field gear. We will also do some benthic invertebrate survey in chest-wader, and fish and frog catching, wetland surveys, and lake shore walks that will require using hip or chest waders. Be prepared for some heat and humidity during the day, long-hours in the field (rain-or-shine), some biting insects and ticks. As there are no outhouses or toilets in the field away from the station buildings, you may have to use the woods or squatting toilets when the need arise.
(c) Common activities	Activities in the course will be varied and involve hiking, sometimes with field gear, and possibly rowing small skiffs, water work using hip and chest waders. Some activities may involve observations requiring standing or sitting for long periods. Students should bring suitable footwear (light hiking boots), wide-brimmed hats, long, light-weight pants, and rain jackets. We will ensure that we bring sufficient water and use sunscreen as some days may be quite hot and some walks somewhat arduous. We may do some work along road sides and will exert all due caution wearing bright clothing and exiting vehicles cautiously. We will also do some night work and all participants should bring head lamps.
(d) Weather, dehydration, & biting insects	August are typically the hottest and most humid month along the Yangtze River with daytime temperatures on occasion exceeding 35 degrees. We will work in such heat, rain or shine, but will be sure to carry water and always use appropriate clothing. There will be mosquitoes. Students can use repellent and tuck the cuffs of their field pants into their socks to mitigate these concerns.
(e) Toxic/poisonous, wildlife/ plants	**Risk:** Insect stings & bites. **Hazard:** During summer field personnel there is a possibility of insect bites (mosquitoes are common). Even personnel without history of allergic reaction may react because they have never before been exposed. **Mitigation:** At any sign of anaphylaxis one should contact medical facility for immediate evacuation via cell phone if there is signal or land-line from the lodge. Always carry benadryl as this may lessen the reaction. For researchers working far from roads or our facility it may be well to carry an epipen or two, although these require prescriptions.
(f) Sleeping, washroom & laundry facilities	Students will have indoor accommodations in various stations and hotel guest house typically in shared rooms with multiple beds. Students should bring their own sheets and light sleeping bags. There are shared flush toilets and showers either in the same buildings as bedrooms or in another building. A self laundry services and air-dry hanging racks or lines are available.
(g) Meal plans & food allergies	All meals are provided by the course. Most food allergies can be accommodated including peanut, seafood, and gluten with advanced notices.
(h) Non-academic responsibilities	Students are expected to keep their shared living accommodations clean, and to ensure that they leave it as they found it at the end of the course
(i) Degree of isolation	While we are somewhat isolated, we will make local trips where students can pick up snacks. Some of the stations we are staying have WiFi and there is no issue with recharging telephones, cameras or computers (AC electricity supplies are 220v in China). The station has first aid supplies and we are within 1h to hospitals.
(j) Alcohol & drugs	We follows the university's policies on alcohol use: See https://www.queensu.ca/secretariat/sites/webpublish.queensu.ca.uslcwww/files/files/policies/board/StudentCodeOfConduct.pdf
(k) Vaccinations/ Insurances	Students should have all routine vaccinations including an up to date tetanus shot.
(l) Social Situations	The places are travelling to are reasonably populated urban, suburban and rural areas in China. Some of the facilities we use have concurrent research activities. This means that we request that all users respect the space and needs of others and this includes limiting noise late at night or early in the morning.
(m) Final comments	We have run this course since 2005 alternating between China and Canada. The China version of the course has always been well received and we make adjustment continuously based on the availability of facilities and feasibility and seasonality of our activities. Bringing together Chinese and Canadian students offers a wonderful opportunity to learn about different cultures and approaches to conservation and science.

University of Ottawa (OUPFB Module 24.)

Course Title:	**Wildlife and Ecology in East African Ecosystems**
Instructor(s):	Professor Jeremy Kerr Department of Biology University of Ottawa Ottawa, Ontario K1N6N5 jkerr@uottawa.ca Phone: (613)562-5800 x4577 http://www.macroecology.ca/ Catherine Sirois-Delisle (Department of Biology, University of Ottawa)
Dates:	ROUGHLY August 15 to August 31, 2020 (**dates are chosen to minimize flight costs**).
Location:	
Cost:	***Approximately* $5900** (Airfare, accommodations, travel within country, and food **are included**; some additional costs for travel medicine and a travel visa are necessary). The exact cost will depend upon airfares, itineraries, and the international monetary exchange rates at the time our booking is made. We have no control over such fluctuations and students must recognize that costs may vary. The standard OUPFB deposit will be required to secure a place in the course.
Prerequisites:	Completion of second year university biology program, including introductory ecology course, or equivalent that we recognize is mandatory. Permission of the instructor and satisfactory completion of the course's risk assessment materials are required. For safety reasons, students must agree to and abide by a code of conduct, take responsibility for their actions in the field, and formally recognize risks in a waiver.
Enrolment*:	22 (8 reserved for uOttawa)
Course Description (brief):	This course brings students on wildlife safari through some of the world's most extraordinary and iconic ecosystems, found across northern Tanzania, one of the safest areas in Africa. Ecosystems in the area include different kinds of forests, savannahs, and higher elevation ecosystems on the slopes of extinct volcanoes. Parks to be visited include the Serengeti, Kilimanjaro, Ngorongoro, Tarangire, and possibly Arusha). We will discuss how ecological interactions in this region are shaped by climate, predators, herbivory, wildlife migration, volcanic history, and human use of different habitats. We will observe species' behaviour and interactions in the field and some introduction to human-wildlife interactions (including zoonotic diseases).
Evaluation:	Before the course, each participant will be asked to become the "course expert" for a particular ecological or conservation topic and to prepare a short seminar on the subject, which will be presented informally to the group during evening in the field. Formal reports must be submitted within three weeks after return to Canada. • 15% oral participation and engagement with course activities, including Mandatory half-day risk management session attended in person or by teleconference. • 15% oral presentation in the field based on elements of the field experience in Tanzania. Oral presentation is researched and prepared in advance of field course. • 35% field book: observations and responses to questions completed in the field. • 35% final essay: expanded and scholarly presentation of material covered in the oral presentation for the course, using primary scientific literature (i.e. journal articles) as sources. All components of the course must be completed, including risk management participation.

An Average Day – What to Expect

(a) Daily timeline	An average day in the field in Tanzania will begin around 0700 with breakfast prepared by camp crews and served in a meal tent or lodge. Trips out on safari will begin around 0830, including hours of wildlife and ecosystem observation during the morning. The warmest parts of the day in places like Serengeti will be when lunch is served, followed by a short rest period, and then more time out on safari in the afternoon. Safaris do not take place in the evenings. Class activities after dinner will include presentations by students, discussions amongst participants of the day's events, notable sightings, and interpretation of observations.
(b) Work habitat & Physical exertion	A significant part of the course is in the form of safari, which is in big Toyota Land Cruiser-type vehicles. However, some hiking is also likely. Walks along the middle elevations of Kilimanjaro are likely to be quite cool much of the time, as are potential hikes into a crater (Empakaai) of the Ngorongoro conservation area. These are not strenuous hikes, but they are at high elevations of about 2000-3000m, so they feel demanding compared to a walk at sea level. There may be some walks in hot areas near Tarangire National Park with armed guides and local conservation leaders.
(c) Common activities	• Participants must be able to hike for moderate periods in warm weather and at elevations. Safety rules in the field must constantly be observed. Participants must contact a travel physician prior to the start of the course regarding necessary vaccinations, preventative medications and to receive advice regarding personal medical requirements (e.g. asthma or allergies). Most food allergies and preferences can be accommodated. All participants must have a passport that will be valid for six months past the end of the course. Citizens of most countries (including Canadians) require a visa before departure. Travel abroad involves inevitable risks; consult the Foreign Affairs travel web site. Additional information on risks and risk management will be provided • Common activities include high elevation walks in areas with abundant wildlife. • Associated risks relate mostly to discourteous interaction with local peoples and are mitigated through simple politeness. Some wildlife species present risks, particularly mosquitoes that may carry malaria. This risk is mitigated through the use of travel medication that prevents the disease and bug spray to prevent mosquito bites. While we will be in close proximity to large wildlife species, like elephants and buffalo, and top predators, like lions, we do not approach these animals outside our vehicles. We may encounter them on walks in the presence of trained guides or in campsites in the Serengeti, but will not approach them.
(d) Weather, dehydration, & biting insects	• Because most visited regions of Tanzania are at high elevation, it is less warm than most people expect and some areas are cold, requiring jackets. The course will take place during the dry season, so significant rainfall is unlikely. Sunburn can happen fast in dry, tropical environments but this risk is mitigated identically to a day outdoors in Canada. The course is supported by a camp crew that distributes and manages pure water supplies, so dehydrations risks are low provided students remember to drink a little extra water. • The two main insects that are irritants in the field are Tsetse flies, which are like horseflies in southern Canada, and mosquitoes. Tsetse flies are managed by park staff using baited traps that usually reduce tsetse populations very substantially, and tsetse fly bites have been uncommon in the past. Mosquito bites are also uncommon in the dry season and should pose few or no risks provided students heed travel medicine advice provided by their doctor.
(e) Toxic/poisonous, wildlife/ plants	We have not encountered plants that are poisonous on contact, though many plants are poisonous if consumed (as in Canada). Most work on safari prevents any contact with snakes, but it is not impossible to encounter a snake (which may be poisonous) in a campsite in some areas. Students should always wear their hiking boots when walking around campsites. Mobile ant colonies called "Safari ants" can be irritating if stepped on but they form distinct groupings that can be avoided by stepping over them.

(f) Sleeping, washroom & laundry facilities	• There are tents for students, who will pair up overnight appropriately. • Many washroom facilities are similar to those that would be found at provincial parks in Ontario, with flush toilets and toilet paper. Students should bring their own just in case. Some pit toilets will be used in the most remote locations. • There may not be laundry facilities, so students should bring enough clothes to make it through. It is possible, during breaks, for students to hand wash the most critical items if they run short.
(g) Meal plans & food allergies	Staff cooks are experienced at accommodating diverse dietary needs, including vegetarianism, veganism, and kosher/halal. They also have experience in catering for those with allergies.
(h) Non-academic responsibilities	Students have few camp responsibilities beyond being courteous with camp crew staff and packing up their things as we move to new locations. Camp staff break camp and set it up elsewhere. Cooking is done by the camp crew also, as is the driving.
(i) Degree of isolation	• Camp crew can charge phones and cameras regularly using equipment in camp. • Cellular service in Tanzania is better than in remote areas of Canada and cell signals are available in most locations, although it may be faint in some of the most remote locations.
(j) Alcohol & drugs	No drug use is permitted under any circumstances, as this is illegal in Tanzania and can be punished severely. **Responsible** alcohol use in camp is permitted. There are many local beers that students may choose to purchase and there will be some opportunities to do so.
(k) Vaccinations/ Insurances	Vaccinations should be considered with a travel doctor. This may include vaccination against hepatitis, typhoid, tetanus, and a series of regular boosters if those are out of date. Oral prescriptions for drugs that prevent malaria (e.g. malarone) are likely to be provided by a travel doctor.
(l) Social Situations	Students will be working with a team of peers in a close group for a period of about two weeks. There is little time in urban environments.
(m) Final comments	This course has been described by many previous participants as “the best experience of my life”. We designed the class to encompass the most beautiful places we know from this part of the world. Safety remains our primary concern at all times.

University of Western Ontario (OUPFB Module 25.)

Course Title:	**Experimental Studies in Marine Biology**	
Instructors:	Paul Mensink (paul.mensink@uwo.ca)	Contact: Brenda Beretta (bberetta@uwo.ca) Biology, Univ. of Western Ontario, London , ON N6A 5B7; 519-661-2111 x 82555, fax 519-661-3935
Dates:	Saturday 15 August – August 31st, 2020	
Location:	Huntsman Marine Sciences Centre, St. Andrew's, New Brunswick	
Cost:	$2100 ($350 deposit at registration; $1750 to UWO by mid-July). Includes travel to/from St. Andrew's (by van, all in Canada), accommodations and on-site meals.	
Prerequisites:	Completion of two years in a Biology/Zoology program, including a course in statistics/experimental design (instructor's discretion).	
Antirequisite:	University of Guelph ZOO 4300 (Marine Biology and Oceanography).	
Enrolment:	Maximum 15 (4 reserved for UWO students), minimum 7	
Description:	This experiential learning adventure will introduce you to the flora and fauna of the Quoddy Region of the Bay of Fundy. We will work mostly in the extensive intertidal zone with its abundant, diverse communities of invertebrates and macroalgae. We will also spend some time observing and discussing marine fish, birds and mammals. You will learn how environmental and biological processes shape the assemblage of organisms that inhabit different marine habitats. You will also develop many useful skills including oceanographic sampling (water quality, dredges, grabs, trawls, plankton tows), surveying, organism identification (using scientific names), note-taking, quantitative ecological sampling, experimental design and fundamental data analysis. We will also observe how human activities affect this very productive ecosystem. Our days are long and intense, but your learning experience will be enhanced by diverse classmates, great facilities and a beautiful setting, first settled by Europeans in 1783. The first week is devoted to observations, identification and quantitative sampling in the intertidal zone and on the HMSC vessel. Students record their individual observations and data for use in assignments. The second week is devoted to research projects based in the laboratory and/or field.	
Evaluation:	(i) ***pre-course*** on-line quiz based on assigned readings (5%) (ii) 3-4 short assignments, completed ***on-site***, based on field observations and data collection (20%), (iii) ***on-site*** laboratory and field exams based on biological knowledge, identification (using scientific names) and collection of organisms studied during the first week (40%), (iv) performance and report (in the style of a journal article) based on the second week's project (35%; due approx. 5 weeks after departing St. Andrew's). When evaluating your performance we will follow UWO criteria, which can be found here: www.westerncalendar.uwo.ca/Archive/2017/2017/pg104.html	

An Average Day – What to Expect

(a) Daily timeline	Our field schedule is dictated by the tides, so we will likely work very early in the morning and late into the evening. Field activities usually last approximately 5 hours, including ~40 min. one-way drives. Before or after field exercises we will work in the lab identifying organisms. Most evenings there will lectures/discussions/presentations lasting ~1.5h. Yes, the days are long. Breakfasts are self-serve and at your own initiative. Lunches and suppers are served in a cafeteria, but when we must in the field during meal times, packed meals will be supplied.
(b) Work habitat & Physical exertion	Daily activities include walking up to 2 km with a backpack, often over wet, uneven, algae covered rocks or thick mud. Some exercises require being aboard a 15m research boat for up to 8 hours at a time. We will work outdoors in all types of weather (except lightning or other dangerous conditions). Most field sites have no services or toilet facilities.
(c) Common activities	Common activities include long drives, walking over uneven and slippery ground, long days exposed to heat/sun or cold/rain, and boat rides that last up to 8h. These can cause boredom (during drives) which can be alleviated with personal music players, books etc. Good hiking boots that are broken-in can mitigate the challenge of uneven ground. It is vital to check the weather forecast, dress appropriately and pack sufficient water to ensure you're ready for any weather. Although sea conditions are rarely very rough, those prone to motion sickness may want to pack dramamine
(d) Weather, dehydration, & biting insects	Weather can vary from hot (30°C) and sunny to cool (<10°C) and rainy, and it is always colder on a boat. Students are expected to check the weather and dress/pack accordingly for the day's activities. Layering is a prudent strategy and students should pack clothes made of fabric that insulates even when we, e.g. polarfleece, wool. It will be mosquito season, and Instructors/TAs can provide DEET-based repellent.
(e) Toxic/poisonous, wildlife/ plants	We will see lots of wildlife, but none are toxic.
(f) Sleeping, washroom & laundry facilities	Students will share dormitory rooms (2/room), segregated by gender, with your own bed, desk and bed linens. Room assignments are made at random. Shared bathrooms are equipped with showers, sinks and flush toilets. The dormitory is not equipped with air-conditioning. Coin-operated laundry facilities are available on-site, but they are limited and can be in high demand.
(g) Meal plans & food allergies	All on-site meals are included in the fees, but while in transit to/from St. Andrew's students must buy/provide their own meals. On-site breakfasts are self-serve (e.g. yogurt, juice, cereal, toast) and at your own initiative. Lunches and suppers are served at prescribed times in the dining hall by the kitchen staff. When in the field during meal times the kitchen staff will provide packed meals (e.g. sandwiches, fruit). With proper notice the kitchen staff is happy to accommodate specific dietary needs (e.g. vegan, allergies, Hallal etc.).
(h) Non-academic responsibilities	Students, along with instructors and TAs, are responsible for monitoring animal health and keeping the lab reasonably clean. We will request student help in packing/unpacking vans, and cleaning the lab before we depart.
(i) Degree of isolation	HMSC is a modern facility with reliable cell phone coverage, water and electricity, but we are expected to conserve resources where possible. The campus has wifi coverage sufficient for course work, but its bandwidth is limited so the use of high-demand streaming (e.g. Netflix) is forbidden. There are no computer workstations available, so laptops are recommended. Unfortunately we will not have access to the counselling services typically available at Universities, but the Instructors are available for discussions. St. Andrews is a small, but well-serviced tourist town with a Scotiabank branch, post office, grocery/drug/hardware store etc. It is a pleasant 20 min. walk to the shops. There is a small clinic in town, and the nearest hospital is a 25 min. drive.

(j) Alcohol & drugs	Alcohol consumption is permitted only in dorm rooms. No alcohol will be consumed prior to (i.e. within 8 hours) or during field work. Anyone deemed unable to fully function as a result of intoxication will not be allowed to participate in field activities; this will be reflected in the student's grade for those activities. Smoking of any legal substance is permitted only in designated areas, but the rules regarding intoxication always apply.
(k) Vaccinations/ Insurances	OHIP (or other Canadian equivalent) is the only required insurance. We will request your health card number and information about any supplemental insurance you may have. All such information will be kept strictly confidential.
(l) Social Situations	Sharing rooms with people you hardly know, and working long hours in close quarters can sometimes raise tensions. Students are encouraged to discuss these with those involved and, if necessary, with the Instructors. We will share the campus (including dormitory and dining hall) with other student groups, some as young as 11, as well as the public. Always treat others with consideration! Remember you are an AMBASSADOR for the course; your University's code of conduct and non-discrimiation/harassment policy is in effect at all times.
(m) Final comments	This course is challenging, but it offers many rewards. You will see organisms you've never seen before in their natural habitats. You will learn useful skills and make new friends. In this small class the Instructors will emphasize the development of professional skills that will aid your future academic and career choices.

Ryerson University (OUPFB Module 26.)

Course Title:	**Urban Water Ecosystems**
Instructor(s):	Dr. Stephanie Melles stephanie.melles@ryerson.ca
Dates:	Aug 16 - 30, 2020
Location:	Ryerson University. Students will be housed at the new Daphne Coxwell Centre on Church Street. Fieldwork will occur in the City of Toronto at a selection of locations: Tommy Thompson Park, the Don River watershed, Toronto Island, the Rouge River National Urban Park, and Highland Creek Park (Rouge Hill GO Train station). Other possible excursions to wetlands, wastewater treatment plants, sewage lagoons, and water treatment plants may occur (e.g., Highland Creek Treatment Plant, Stevenson Swamp, Ashbridges Bay Water Treatment).
Cost:	**Course Fees**: $1300 includes accommodation for 13 nights, lunch & dinner x 12, and pre-loaded presto transit cards for travel to and from field sites. Payable as **$350 non-refundable deposit** to your home university, and **$950 balance** to Ryerson University. The balance is due by May 1st payable by cheque to: Ryerson University. Mail to: Caltha Rimmer, Administration Manager, Chemistry and Biology, Kerr Hall (KHN210), Ryerson University. 350 Victoria Street, Toronto, Ontario M5B 2K3.
Prerequisites:	**Academics:** students should be entering minimally their 3rd or 4th year of a Biology, Env. Sci., or similar program; and have at least (a) one advanced ecology course beyond the introductory level, and (b) one biometry or statistics course.
Enrolment*:	Up to 20 (8 reserved for Ryerson students)
Course Description (brief):	This course will provide participants with opportunities to learn basic field biology skills (sampling methods and identification) in the City of Toronto with a focus on urban water systems. Students will gain an ability to accurately and reflectively characterize field observations; they will learn basic sampling and sampling design techniques; and they will design and collect data for their own scientific experiment. Course goals will be achieved through engagement in field-based observations, sampling, and through the application of practical skills during excursions to urban water sites in and around the City of Toronto, with a focus on the Rouge National Urban Park. Students will present their independent or small group research project during in-class workshops or seminars. At the end of the course, a successful student will be able to: 1. Perform basic water quality measurements and observations at a variety of sites 2. Characterize biotic and abiotic components of urban water ecosystem (e.g., components of stream, wetland, pond, lake) 3. Survey urban water ecosystems. Students will learn techniques to sample and identify organisms in the following taxonomic groups: riparian birds, fish, and aquatic invertebrates. 4. Assess aspects of habitat for a variety of species and taxonomic groups 5. Design and conduct ecological field experiment(s) employing various sampling designs 6. Present scientific hypotheses and experimental design elements
Evaluation:	• Field Journal Exercise(s) (individual) 15% • Data collection, entry/processing, and interpretation via homework (individual) 15% • Group research project proposal and presentation (teams of 3) 20% • Participation (evaluation completed by professor, TA, and team peers using a specific evaluation form) 10% • Final report (7-10 pages, to be submitted four weeks after the field course) 40%

An Average Day – What to Expect

(a) Daily timeline	The average day will start at 7:00 or 8:00 with travel to field site, 9:00 field work rain or shine, 12:00 lunch break, 1:00 continuing field work, 5:00 travel back from field site, 6:00 dinner, 8:00-9:30 pm (sample processing, class lectures, data preparation, log book updates, student presentations). However, earlier or later start/end times are possible.
(b) Work habitat & Physical exertion	Students should be prepared for physical exertion (e.g., daily hiking up to 10-15 km) with backpack necessities; 8 hrs/day sometimes in muddy/wet conditions, wadable streams, shorelines, wetlands, wearing hip-waders; long day-light hours with minimal toilet facilities. (e.g., water breaks, rest periods, and bathroom breaks will be scheduled where possible).
(c) Common activities	• common rain or shine activities (e.g., wading in shallow water, traversing wetlands, hiking in riparian areas, walking along trails, lab sample processing, long days) • associated risks (e.g., ticks that carry Lyme disease, dehydration, getting lost, sunburn, twisted ankles, fatigue, blisters from poor footwear, heat exhaustion, hypothermia). Appropriate field safety measures will be taken, and students will be advised about appropriate procedures, equipment, and supplies (e.g., precautions about Lyme disease)
(d) Weather, dehydration, & biting insects	• Weather conditions likely to be encountered will reflect Toronto temperatures and conditions. • June in Toronto can be variable with temperatures ranging from 15 to 25 degrees. Prepare for cool days on the lakeshore (hat/ jacket), rainy days (rain jacket), and hot sunny days in the park with little cover (sunhat/sunblock). • Pease be aware that you will experience insects (e.g., 24/7 mosquitoes, blackflies, no-see-ums, sand flies, deerflies, and horseflies). Long sleeve shirts and pants are recommended even on hot days. Hiking boots or sturdy footwear and rainboots are required.
(e) Toxic/poisonous, wildlife/ plants	Ticks that carry Lyme disease, mosquitoes, West Nile virus, bees/wasps, poison ivy, Giant hogweed, poison oak, stinging nettle. The most common poisonous plant encountered will be poison ivy. You will be taught how to identify it and avoid it. It is very unlikely that we will encounter Giant hogweed, but it is possible. Ticks that carry Lyme disease are also possible.
(f) Sleeping, washroom & laundry facilities	• Sleeping accommodations in downtown Toronto 4-bedroom, gender specific, student apartments with private rooms and two bathrooms, fridge, and kitchenette (no stove or hotplate). There is a shared community space on the 8th floor that has a cooking area with refrigerators, sinks, and two stoves, as well as a TV and seating area. Daily housekeeping service included. • Bed linen and towels provided (hotel style - hair dryer, iron and ironing board available at front desk for allotted time periods for each use) • Complimentary wireless high-speed internet (Wi-Fi) available throughout the residence. • Laundry machines available on the main residence floor (The cost for each wash is $2.00 and $1.50 for each dry)
(g) Meal plans & food allergies	Meal plan includes a box lunch and entrée dinner for $35.25/day which is included in course fees. ***Students will need to arrange for their own breakfast items.*** For meal plan lunch and dinner arrangements, let us know early of any allergens or food requirements.
(h) Non-academic responsibilities	Students must abide by the Ryerson Student Code of Non-academic Conduct https://www.ryerson.ca/senate/policies/pol61.pdf
(i) Degree of isolation	We will have all the benefits of being housed in downtown Toronto. However, during daily field excursions, we will be relatively isolated (e.g., in the Rouge Valley National Urban Park ~30 minutes away) and washrooms will not be readily available.
(j) Alcohol & drugs	Alcohol and legal marijuana will be permitted during off hours so long as appropriate code of conduct is adhered to. Ryerson Policy 61, C12 https://www.ryerson.ca/senate/policies/pol61.pdf
(k) Vaccinations/ Insurances	See: https://www.toronto.ca/community-people/health-wellness-care/health-programs-advice/immunization/immunization-for-adults/ Travel insurance is highly recommended and may be required (TBD).
(l) Social Situations	Be prepared for living in close quarters, working in groups, long days with little to no down time, and being surrounded by students with different cultural backgrounds than your own. It is the shared responsibility of all community members to foster a welcoming, supportive and respectful learning, teaching, research, and work environment. See: https://www.ryerson.ca/equity/
(m) Final comments	This course will provide you with a good introduction to field methods in applied ecology related to aquatic ecosystems in the heart of Canada's largest city. You will learn to perceive and appreciate this diverse urban environment in entirely new ways. Field courses can change your life!

University of Toronto (OUPFB Module 27.)

Course Title:	**Tropical Field Biology**
Instructor(s):	Prof. John Stinchcombe, john.stinchcombe@utoronto.ca Prof. Megan Frederickson, m.frederickson@utoronto.ca Prof. Adriana Bravo, adriana.bravoordonez@utoronto.ca
Dates:	Approx. August 16 - 30, 2020
Location:	Peru (Wayqecha Cloud Forest Research Center, near Cuzco; and Los Amigos Research Center, near Puerto Maldonado)
Cost:	Approximately **$1,900** includes food, accommodation, field station fees, and in-country transportation (flights within Peru, and ground/boat transportation to and from field sites). **Not included:** International airfare (approx. $1,200 for a return flight from Toronto to Lima by Air Canada), travel insurance (mandatory), travel visa (if required), beverages, laundry, etc. If you wish to be on the same flight(s) as the instructors, information will be provided after you have made your course deposit. Students must purchase their own airfare tickets and must either travel with the professors, or meet the class in Lima by the time the professors arrive in Lima. **IMPORTANT:** A $350 deposit is due to your home university with your OUPFB application. The remaining deposit must be received by the host university in two instalments: • A $650 deposit is due May 1, 2020. Students must provide the EEB Undergraduate Office with photocopies of two documents: (1) Valid passport, and (2) Certificate of proof of travel insurance (that covers the dates of the field course) by May 2020. Students must have a passport **valid until at least February 2021**. The remaining $900 is due July 17, 2020.
Prerequisites:	First year biology course; *Recommended*: Upper year courses in ecology, evolution, behaviour, or organismal biology.
Enrolment*:	20 (18)
Course Description (brief):	This field course will examine the ecology and evolutionary history of the Andes-to-Amazon region through a combination of lectures, discussions, and field research projects. There will be mandatory pre-trip lectures and meetings (dates and times TBA) during which we will discuss in detail the logistics of the trip and also introduce the ecosystems of the Neotropics. During our two weeks in Peru we will visit two main field sites, one in cloud forest and one in lowland rain forest. Visiting these two sites will allow us to explore how plant and animal communities change as we travel from the Andes Mountains to the jungles of the Amazon Basin. We will spend several days at the Wayqecha Research Center, which is located almost 3,000 m above sea level on the eastern slope of the Andes. We will then travel to the Los Amigos Research Center, before travelling back to Lima via the jungle city of Puerto Maldonado. The Los Amigos Research Center is situated in the Amazon Basin at only 250m above sea level and surrounded by lowland tropical rain forest. Both the Wayqecha and Los Amigos field stations are operated by the Amazon Conservation Association and more information can be found online at: Wayqecha: www.amazonconservation.org/ourwork/research_wayqecha.html Los Amigos: www.amazonconservation.org/ourwork/research.html
Evaluation:	Marks will be based on performance in group and individual projects, and participation. Each student will give oral presentations to the class and hand in a report on an independent project at the end of the course. Grades will be available a few weeks after completion of the course. Assigned oral presentation 20% Discussions of assigned readings 15% Group projects 15% Independent project 30% Participation 20%

An Average Day – What to Expect

(a) Daily timeline	During the first week of the field course, we will conduct several group exercises designed to familiarize you with common techniques and approaches in field ecology and evolution. We will explore the forests around two biological stations during these exercises, with the goal of introducing the tremendously diverse natural history of the Andean and Amazonian regions. We will also have a series of lectures to provide background and context to what you see in the field. On the second week of the course, students will perform an independent research project, designed to test an ecological or evolutionary hypothesis. Students will gain exposure to all components of the scientific process including natural history observations, hypothesis generation, experimental design and data collection, data analysis, and an oral and written presentation of the results.
(b) Work habitat & Physical exertion	We will spend a great deal of time in the field in all weather conditions. Students should be comfortable spending long hours outdoors, standing and walking, and physically and mentally prepared to spend two weeks in remote locations. Students should be prepared for strenuous physical activity, long hours, and rustic accommodations.
(c) Common activities	Risks are similar to those for any eco-tourist visiting Peru (diarrhea, parasitic infections, snake and insect bites and stings, and crime). Students should be aware that while at the biological stations there is limited access to medical assistance; therefore, travel insurance is mandatory.
(d) Weather, dehydration, & biting insects	Weather conditions will vary among sites we will visit. We will meet in Cusco, a city in the Andes of Peru at 3399 m.a.s.l. with an annual temperature of 13 °C. The weather conditions in the Andes are usually dry and with high UV incidence. We encourage students to pack warm clothes for this part of the trip. After a brief stay in Cusco, we will visit the cloud forests of the south eastern slope of the Andes (2000-3010 m.a.s.l.). The average annual temperature in this region is 12.5 C, with colder and damper evenings. For the second week, we will go to the lowland rainforests (200 m.a.s.l.) where the annual average temperature is 26.5 °C. Although August falls into the dry season, some rain as well as high humidity must be expected in both forest sites. Given the changing conditions, we strongly advice students to stay hydrated and to use sun block all the time to prevent dehydration, sun burns or heat shock. While mosquitos are not an issue in Cusco or in the cloud forests, they are common in the lowland rainforests. Mosquito repellent should be used at all times as well as long sleeves and long pants to prevent mosquito bites. Ticks may also be found in the lowland forests. Long sleeves, long pants, rubber boots and repellent will prevent tick bites. Because of the high temperatures and humidity in the lowlands, we advise students to wear light breathable clothing.
(e) Toxic/poisonous, wildlife/ plants	While visiting the cloud forests and lowland rainforest, we will be exposed to some natural hazards such as mosquitos that may carry tropical diseases such as malaria, yellow fever, dengue or zika; flies that may carry leishmaniasis; poisonous snakes; and stinging bees, wasps and ants. Although all these risks are not common, we take specific actions to prevent them from happening. For instance, we strongly encourage student to use insect/tick repellent, wear long sleeves, long pants and rubber boots, walk and work along the trails, never be alone in the forest, and always be aware of the potential risks.
(f) Sleeping, washroom & laundry facilities	Blankets, sheets, and bug nets (where necessary) will be provided. Students do not need to bring their own sleeping bags or blankets. Accommodations will be a mixture of cabins, common dorms, or platform tents, depending on availability. Toilets will be rustic with toilet paper provided. Showers will mainly be cold water, though warm water is sometimes available. Laundry is hand-washing with soap, water, a brush, and a clothesline.
(g) Meal plans & food allergies	The course will provide meals to students during the whole duration of the course after the group meets up in Peru. A daily plan of three meals (breakfast, lunch and dinner) will be offered at the stations and during days traveling among sites. Students should expect basic meals (e.g. fruit, bread, rice, beans, eggs, limited amounts of meat). While we try our best to accommodate specific meal plans, sometimes things

	don't go as planned. Thus, we ask students to be as flexible and patient as possible and to make sure we will try to find a solution.
(h) Non-academic responsibilities	The entire group will participate in organizing, carrying, and maintaining group gear.
(i) Degree of isolation	We will stay at two biological stations that are remotely located in the Peruvian Amazon. Electricity is not available 24/7, but we will be able to recharge cameras, laptops, or any other electronic devices. Although there is sometimes internet access at the stations, it is very limited and nonreliable. While at the stations, we will have no access to stores for food, personal hygiene supplies or forgotten equipment. Communication with the plugged-in world is episodic.
(j) Alcohol & drugs	There is a zero tolerance policy on drugs; students will be given a 0% and sent home in the case of drug use or possession. On alcohol, we follow the policies of the hosting field stations, and it is only permitted for those of legal age.
(k) Vaccinations/ Insurances	We encourage students to consult with their personal doctors or a health care professional at least 6 weeks before they travel to Peru about the required vaccines and any other medical advice. The Government of Canada recommends Canadians going to Peru to have all their routine vaccinations up-to-date. Among those vaccines are measles-mumps-rubella (MMR), diphtheria, tetanus, pertussis, polio, varicella (chickenpox) and influenza. It also provides a list of other vaccines travelers must consider such as yellow fever, hepatitis A, hepatitis B, etc. Although we encourage students to discuss this information, available at https://travel.gc.ca/destinations/peru, with their personal doctors, we strongly recommend them to get the yellow fever vaccine as it occurs in the area we will visit. Students should obtain standard travel insurance.
(l) Social Situations	The dress code in Peru is up to you. There are no restrictions (political or religious) on what to wear on a daily basis. But women wearing too revealing clothing may bring the attention of some men on the streets and may be subject to harassment. Some people in cities like Cusco wear traditional clothes on a daily basis. Cusco is a city that receives about 1.5 million tourists per year. So, students should be ready to stay in a busy city with many locals offering handicrafts, food, pictures, among other things or simply asking for some change. They should politely refuse the request and keep going. During the whole course, students will be sharing limited space on a daily basis. Students are expected to be respectful, patient, flexible, organized, and clean.
(m) Final comments	This is an unparalleled opportunity to spend 2 weeks in Peru, visit rare and threatened ecosystems, see incomparable biodiversity, and learn while doing. You'll leave the course with ~20 new best friends, and learn a ton.

Laurentian University (OUPFB Module 28.)

Course Title:	**Restoration Ecology: From Microbes to Trees to Fish**
Instructor(s):	Dr. John Gunn, jgunn@laurentian.ca, Dr. Nadia Mykytczuk, Dr. Peter Beckett, Dr. Graeme Spiers, Dr. Nathan Basiliko Vale Living with Lakes Centre, Laurentian University
Dates:	Monday, August 17 to Saturday, August 29, 2020
Location:	2 Field Camps: Hannah Lake, Sudbury and Research Centre, Killarney Park
Cost:	$1200. [$350 deposit to home university; $850 balance due Aug.1, 2020] Travel to and from Sudbury and return from Killarney not included. Course fee includes accommodation, board, and all in-course travel (excludes fish and chips in Killarney)
Prerequisites:	All registrants in the course must be able to swim and are physically fit for extensive hiking and overnight camping. One of ecology, plant biology, limnology or soil science are recommended. Introductory statistics will also be an important asset.
Enrolment*:	12 students
Course Description (brief):	The field course is an experimental and research based study of natural and assisted recovery in the Sudbury Basin at one of the most famous environmental success sites in the world. Magnificent Killarney Provincial Park will serve as a comparative reference study for the mining study sites in Sudbury. Lab facilities within the "Living with Lakes Centre" will also be available to students (www.livingwithlakes.ca). Our approach is to create research teams and immerse students in challenging research projects while introducing them to methods and analytical techniques that are designed to trigger their interests to pursue further studies in environmental sciences. Participants will learn standard sampling techniques for water, soil, zooplankton, benthic invertebrates and early successional forests, as well as in situ and lab methodology for assessing toxicity and biomolecular techniques for characterizing microbial communities. Water based recreational activities in Sudbury (Dragon boating) and canoeing and hiking in remote reference sites in Killarney Wilderness Park will instruct, delight and provide some fun. On the first day of the course, each student will be required to present a 20-minute seminar and provide a brief written summary on an assigned topic (topics selected in May 2020). These seminars must be prepared in advance. Each student must submit a scientific paper in journal format on the data collected by their research team, one month after the fieldwork is completed. (Note: In past courses several groups actually succeeded in getting their reports published as journal papers.)
Evaluation:	20% seminar 10% field notes and quizzes 20% participation 50% research paper due one month after the course

An Average Day – What to Expect

(a) Daily timeline	The camp in Sudbury is located on a small lake approximately 10km out of town in a treed area but within sight and sound of a highway (no stores nearby). Our final day in Killarney involves tenting, swimming, canoeing and hiking in a wilderness park with a meal time visit to the village itself. 7:00 breakfast, 7:45 ready to depart with lunches and daypack (away all day), 8:00 field work rain or shine, 12:00 lunch break at the research centre or in the field , 13:00pm continue field and lab work, 17:30-18:30 dinner, 18:30-20:30 lectures, seminars and sample processing, 20:30-21:00 return to camp; usually followed by a hot sauna, swim snack and sleep. The camp is run by a Finnish community member as part of a church group. Lovely people.
(b) Work habitat & Physical exertion	Good physical fitness is a great asset for enjoying field camp so that you can fully engage in all the outdoors activity. Time is always in short supply as we hike trails, carry, dig, wade and paddle across the exposed and rocky landscape and try to get home in time for dinner. People have always been good to help each other but no one wants to unnecessarily slow down the group. Note: You must be able to swim and with a little training should be able to learn to get back into a canoe if it flips (yes, we practice this).
(c) Common activities	Describe: • While carrying day packs and gear you'll be travelling in groups of 3-5. You'll be hiking up rocky trials to sampling location with little to no shade, canoeing or boating across lakes, setting nets and traps, wading and sampling streams with long days in trucks on highways and gravel roads etc. • Common sense is needed to avoid blisters, bear encounters, dehydration or heat exhaustion (e.g. hats, sun screen, drinking lots of water, rest breaks). We are careful to avoid thunderstorms and lightening.
(d) Weather, dehydration, & biting insects	Describe: • The daily temperature ranges from 15-30°C with high sun exposure. In late August mosquitoes and black flies have had most of their fun already and conditions are much improved, except for pesky deer flies.
(e) Toxic/poisonous, wildlife/ plants	There are usually bees and wasps and perhaps exposure to poison ivy but not many risks exist from small creatures except for those students with severe allergies. Black bears are very common at our study sites, so we provide an educational video and the group leaders carry pepper spray. We have not had problems to date. Most bears are seen while driving or boating. They usually disappear quickly when they hear, smell and see our student groups.
(f) Sleeping, washroom & laundry facilities	• At the Sudbury camp, students stay in dorm style rooms, 2-3/room in single gender groups. No bedding is provided. You are required to bring a sleeping bag and your own pillow. Flush toilets are available. There is a shower but there is a 5min limit per person – no exceptions. There are no laundry facilities available but there is a sink and a clothesline for swimming suits and towels etc. At the Killarney camp accommodations are in a single or shared tent. You need a sleeping pad, a flashlight, sleeping bag, pillow etc. There will be flush toilets nearby.
(g) Meal plans & food allergies	Very good hardy meals provided, with vegetarian options available but with limited variety. Usually very good bread and desserts and a good variety of options for students to pack their own lunches after breakfast. With advance notice the cooks do their best to support individual student needs and allergies, however a strict vegan, celiac, or other restrictive diet would be challenging and these students should bring extra foods at their own costs if necessary.
(h) Non-academic responsibilities	N/A
(i) Degree of isolation	• There is no wifi and few electrical outlets at the camp. Good opportunities to connect with web and research while on campus at Laurentian University • No readily walkable stores but occasional stops are made to pick up supplies, go to pharmacies, etc.
(j) Alcohol & drugs	No alcohol, narcotics or smoking at camp. Killarney wilderness park has a complete can and bottle ban.
(k) Vaccinations/ Insurances	No special vaccinations or insurance required. A waiver form must be filled out prior to participation.
(l) Social Situations	Field camp is a close knit team activity, a very social time with students spending a lot of time together in close quarters for projects, meals etc. Most groups have a great time and many remain life long friends and future colleagues. Students who need a lot of privacy tend not to enjoy field camp. Groups usually like to meet the local people, talk with the camp staff and are caring and supportive of each other, especially in their project group as they share data and the long hours of working together.
(m) Final comments	Our field camps are usually designed to give students an intense experience of what it may be like to be a graduate student or professional scientist. Many students have been turned on to science during field camp in a way the lecture hall may fail to do.

Queen's University (OUPFB Module 29.)

Course Title:	**Environmental change in lake ecosystems**
Instructor(s):	Dr. Shelley E Arnott, arnotts@queensu.ca
Dates:	Sunday Aug 23 to Sat Sept 5, 2020
Location:	Queen's University Biology Station
Cost:	$1200 (includes $350 deposit). Balance due Aug. 1. This cost includes room and board, local transportation, and supplies.
Prerequisites:	University course in general biology. Additional course(s) in ecology and biostatistics are an asset.
Enrolment:	Max 12 students
Description:	In this two-week course, students will become proficient at limnological sampling, conducting surveys in a heterogeneous landscape, and experimental design. Students will be based at the Queen's University Biology Station and will collect data on lakes along the Rideau Canal, in Frontenac Provincial Park, and on QUBS property. We will survey and compare lakes with different physical and chemical characteristics and with different levels of human impact, including invasive species. Emphasis will be on examining physical, chemical, and biological factors that determine the abundance and distribution of organisms within and among lakes. Students will learn limnological techniques commonly used to characterize lake ecosystems. In addition, we will use high-resolution data from lake monitoring rafts to model lake physical properties. During the first 5-6 days of the course, students will work in teams to collect data on ~ 20 lakes in the Frontenac Arch landscape. In the second half of the course, students will conduct independent research experiments inspired by their observations and interests that developed while visiting lakes in "The Land Between", a region with rich biodiversity and unparalleled beauty. Students will be required to canoe/boat, hike, and carry limnological equipment to the lakes. A moderate level of physical fitness and a positive attitude are essential. Previous canoeing/boating experience is NOT necessary. Students will receive basic instruction in paddling techniques and boating safety at the beginning of the course.
Evaluation:	1) Seminar: 30 minute seminar, prepared in advance, based on scientific literature 20% 2) Group project to showcase data and analyses on lakes 20% 3) Written report (10-15 pages) based on data obtained individual projects (due~ 4 weeks after end of field course) 40% 4) Participation: 20%

An Average Day – What to Expect

(a) Daily timeline	A typical work day for the first 5-6 days— 7:00 breakfast, 8:00-12:00 gather gear and sample bottles for field work, canoe/hike/drive to field site, sample lake; 12:00-1:00 lunch break in the field or at QUBS, 1:00 travel to and sample second lake, 5:30-6:30 dinner, 7:00-8:00 student seminars, 8:00-10:00 lab work and preparation for next day. The final six days are for independent projects. Daily timeline will depend on projects and individual schedules.
(b) Work habitat & Physical exertion	We will be outdoors every day for the first half of the course, canoeing or rowing to the middle of the lake, hiking to lakes, portaging canoes (0.2 to 1 km). The property is wooded and hilly but there are clear paths. Students will be expected to carry limnological sampling equipment and sample bottles (~10-15kg). Limnological sampling is not physically demanding, but students will be hauling zooplankton nets from lake bottom to surface (10 to 40 m) several times. We will be sitting in boats for ~2 hours while sampling.
(c) Common activities	• common activities: walking in woods and fields, paddling or rowing boats, taking limnological samples • associated risks: the main risk at QUBS is Lyme disease that is tick borne. This is entirely preventable, though, and we will train all students in methods for preventing tick bites, inspecting for ticks, and treating bites. For walking in woods and fields, sturdy footwear is essential, and waterproof boots and rain gear may be needed on some days. A second important risk is drowning if boats capsize. Everyone must wear a personal floatation device that will be provided and will receive training in canoe rescue. All field work will be done in pairs or groups.
(d) Weather, dehydration, & biting insects	The weather at QUBS at the end of August tends to be pleasant with daily highs in the mid-20s and nighttime lows in the teens. We occasionally have rain so bring rain gear and waterproof boots. Warm layers are also advisable. At this time of year there are few biting insects, but sometimes deer flies can be bothersome. Students should bring water bottles to ensure adequate hydration while in the field.
(e) Toxic/poisonous, wildlife/ plants	Ticks are now common at QUBS, especially in tall grass/fields. While Lyme disease is serious, it is preventable and we will teach you how to prevent tick bites, and how to deal with them effectively if you are bitten.
(f) Sleeping, washroom & laundry facilities	• sleeping accommodations: shared dorm-like rooms or small cabins; you will need to bring your own sleeping bag and pillow, towel and toiletries • washroom facilities: flush toilets in the larger cabins, otherwise nearby in the lodge • washing/laundry facilities: available for a fee; it is advisable to bring enough clothing for two weeks
(g) Meal plans & food allergies	All meals are prepared and eaten in a large central modern operations building at QUBS. Food is served cafeteria-style. Allergies and most dietary restrictions can be readily accommodated.
(h) Non-academic responsibilities	You are required only to keep the lab and your own living area reasonably clean and free from leftover food, and to bus your own tables after meals. You will also be responsible for the care and maintenance of limnological equipment.
(i) Degree of isolation	At QUBS the main operations centre is wired, so you should have no trouble (at least in that building) • recharging cameras, laptops, devices (also in all of the accommodations) • accessing wi-fi Cell service is patchy and not reliable at all locations. Food is cooked in a central facility on a predetermined schedule so it is not possible to make last-minute requests to satisfy dietary requirements and there is no food (except fruit) available between meals QUBS is well equipped with first aid supplies • you should bring your own medications, and even first aid supplies if you have favourites • is not close to a doctor or hospital. This is a relatively remote location so it takes 30 min or more to get professional medical attention

(j) Alcohol & drugs	Alcohol is not permitted in work buildings, but small quantities (associated with responsible behaviour) is permitted in the residences; smoking and vaping are not permitted in buildings at QUBS.
(k) Vaccinations/ Insurances	No special vaccinations are needed. Insurance is not needed for Ontario residents. Students should bring their health cards in the unlikely event that medical care is needed.
(l) Social Situations	There will likely be other researchers or visitors at QUBS while you are there for the course. The main times you will be interacting with people outside the course will be at meal times. You will be working and living with the same group of about 14 people for the entire two-week period. We try our best to make this a fun and rewarding educational experience, and that works best if everyone is fully engaged in the course. This is a unique opportunity to completely immerse yourself in field research. Everyone must follow Queen's Code of Conduct, which is based on the simple premise of mutual respect. There is a zero-tolerance policy for harassment or violence towards any student or staff at QUBS. Any violations of this policy should be immediately reported to the course instructor or QUBS staff.
(m) Final comments	This is a fun but intensive course where we try to visit different lake types and participate in independent studies, immersing ourselves in both field work and data analysis for the full 12 days. We generally have planned activities for entire days so you will not have a lot of free time for other activities. People who fully engage, find the course rewarding and interesting. Most of your learning will be through hands-on experiences and practical applications of concepts and ideas. Please also see the QUBS website https://qubs.ca for more detailed information about many of the above topics and especially https://qubs.ca/sites/default/files/2016-05/QUBS_Guidelines_for_fieldcourse_users_2014.pdf

McMaster & Carleton Universities (OUPFB Module 30.)

Course Title:	**Land or Sea – Tropical Research in Jamaica**
Instructor(s):	Dr. Jurek Kolasa (McMaster University) kolasa@mcmaster.ca Dr. Nigel Waltho (Carleton University) nigel.waltho@carleton.ca
Dates:	Dec 27/28, 2020 – Jan 09/10, 2021. Two weeks (N.b. do not book flights until dates are confirmed)
Location:	Discovery Bay Marine Laboratory, University of West Indies, Jamaica
Cost:	**Course Fees:** Deposit: ***Terrestrial or Snorkel Project*** $350 / ***SCUBA Project*** $350 Balance: $1945 / OR / $2595 **Total: $2295 / $2945** • **Course fees** cover students' transportation from Montego Bay to DBML, and return. **Course fees** include two weeks Room and Board at DBML, and Facility fees. For Scuba divers, the higher course fees cover the 2X daily air-fills, underwater ID books and slates, and the second week boat fees. • The **$350 Deposit** is non-refundable, paid to your home university; the **Balance** ($1945, or if scuba diving $2595) is paid by cheque to **Carleton University 814308-166-228000**. Mail cheques by Aug 31st to: Haiyun Bo, Dept. Biology Nesbitt Bldg., Carleton University, 1125 Colonel By Dr, Ottawa, ON K1S 5B6. **Airfare**: required to Montego Bay, and return **Equipment**: each student must have a valid passport with a minimal 6-month expiratory date. Students must provide their own field equipment such PVC m^2 quadrats, tape-measures, pencils/erasers, and log books as appropriate to their research project. Further; • snorkelers and scuba divers must provide their own mask, snorkel, fins, and wetsuit • scuba divers must additionally provide their own dive watch/dive computer, and BCD's and Regulator (e.g., we recommend a two-week rental from your local dive store). All Scuba divers must have DAN membership & Scuba insurance.
Prerequisites	**Academics:** students *should* be in their 3rd or 4th year of a Biology, Env. Sci., or similar program; and: • have at least one advanced 3rd/4th year ecology course beyond the Introductory (2nd year) level, and • have at least one biometry or similar statistics course. **Snorkelling/Scuba**: students must be comfortable swimming. Scuba students must be minimally certified with their basic *open water scuba certification*.
Enrolment:	20 (6) 14 students minimum
Course Description (brief):	• Research projects on the ecology of marine/coastal organisms in the area (swimming/walking) of the Discovery Bay Marine Laboratory. Research emphasis is on the distribution and community structure of readily observable species assemblages (e.g., brittle starts, sea urchins, coral reef fish, corals, sponge & algae, and coral diseases) as these relate to *ecological* process (e.g., competition, tri-trophic interactions, predator-prey refuge zones, crypsis, habitat structure). Projects on terrestrial shore crabs, molluscs, insects, and coastal plants or stream ecology are also possible. • Student teams (groups of 2-3) submit a 3-4 pg research proposal due Nov 1st, 2020. Proposals may need updating upon review/comments made. • Once in Jamaica the focus varies as the needs arise for the different research projects. For all projects, students will perform field work/data collection morning and afternoon, and engage in lectures/presentations/or workshops through the evenings.
Evaluation:	**Research proposal**: due Nov 1st, 2020 (group project 10%) **Field effort:** commitment, initiative, participation, & industriousness (individual effort 10%) **Quizzes**: (individual effort 10%) **Final paper**: following your return home, students may assist each other with their statistical analyses, but the written final paper can only be individual in effort. This paper is to mimic the format of a published paper, due Feb 28th, 2021 (individual effort 70%)

An Average Day – What to Expect

(a) Daily timeline	07:00-08:00 → prepare field gear/ dive gear 08:00-08:45 → breakfast and cleanup 09:00-12:15 → morning field work 12:30-13:15 → lunch and cleanup 13:30-17:30 → afternoon field work 18:30-19:30 → dinner and cleanup 19:30-23:00 → lectures, species id workshops, presentations, statistical workshops

(b) Work habitat & Physical exertion,
(c) Common activities
	Pre-field course:
	• students will be assigned into research teams based on research interests & home university. Teams are required to submit a 3-5 pg. peer-reviewed research proposal by Nov. 1st (10% final grade)
	Walking/ Swimming/ Snorkelling & Scuba Competency:
	• terrestrial projects may require up to km-long daily walks along coastal rocks (sharp, uneven, risk of falling/ bruising), or through thick bush (plant thorns, uneven rocks) carrying, as required, their field equipment.
	• snorkellers and scuba divers will necessarily show a minimal level of swimming (& scuba) competency. This will be evaluated the first day including:
	  ○ treading water for 10min., a 200m swim, and a 25m underwater swim
	  ○ for scuba divers → mask/regulator recovery, buoyancy control, scuba-scuba exchange
	Research Projects:
	• all students are expected to engage in field research activities through both morning, and afternoon – everyday
	• all students are expected to keep their research site clean, and uncluttered when not in active use (e.g., during meals, overnight)
	• all students are expected to stow their gear in a safe manner when in transit, and/or when work is complete
	• all *in-water* students (e.g., snorkelling/ Scuba) need to address these common risks:
	  ○ seasickness → generally avoided with Gravol ginger
	  ○ middle-ear barotrauma → if sustained you'll be out of the water for minimally a week; easily avoided with slow descents and proper ear-clearing techniques that we'll practice again and again
	  ○ slow-creep hypothermia → avoidable by keeping warm (full body minimum 4-5 mm wetsuits), eating well, staying hydrated, and having good sleeps.
	• all students are expected to participate/engage in evening lectures, workshops, and presentations as scheduled.

(d) Weather, dehydration, & biting insects	**Weather:** • average daily high temperatures are between 22-30°C; and average nighttime low temperatures are above 18°C. However, northern weather systems can significantly cool things down (Jan 2010 our temps. were 8°C cooler for a solid week). Rain and cold weather can make for a non-Caribbean experience – be prepared. • the sun can be hot, and UV burns do occur. Common sense long loose clothing and hats are recommended over sunscreen. In-water students use Reef-friendly sunscreen only. • snorkellers/Scuba divers bring an extra sweater/warmth – you need to protect against slow-creep hypothermia during the second week especially. • occasional heavy winds/rains – bring appropriate gear **Dehydration:** • a significant concern due to both being in a Caribbean climate and for the divers, that you are scuba diving. One year a student had kidney failure and had to be sent home for medical treatment because the student was not drinking enough. Fresh water is plentiful on campus – bring a water bottle and keep it with you at all times. Keep drinking – your pee should be clear. **Bugs:** • mosquitoes are active among the vegetation, and in the evenings/night (bug spray, long sleeves and pants). P • potentially the larger biting insect problem are the sand-flies and no-see-ums. Keep your outdoor shoes outside your residence (small sand grains can carry the no-see-ums indoors); deet-based bug sprays do not work on the no-see-ums, instead bring baby oil and "after-bite" for the itch. • long loose clothing help as sun-screen and similarly as bug barriers. Scented soaps/shampoos attract these bugs. • there is no malaria but dengue fever is present in Jamaica. If you feel flue-like symptoms talk to the instructors.

(e) Toxic/poisonous, wildlife/ plants	• on land → avoid manchineel apple and any plant that oozes white, sticky milk. Many plants have thorns and some have sharp leaf edges • In water → there are numerous hazardous marine species present that could abrade, sting, puncture, or bite. These include sponges, corals, fire-corals, fireworms, cone shells, urchins, jellyfish, stingrays, eels, scorpion fish, and sharks. • the simplest and most effective defenses against all of the above is good buoyancy control, be aware of your immediate surroundings, don't touch, and don't wag the tail of a passing shark. For scuba divers we will practise buoyancy control throughout the course.
(f) Sleeping, washroom & laundry facilities	• separate male/female student dorms (4-6 to a room) with bunk beds/mattresses/linen (no heating, no AC). • students should consider bringing a sleeping bag for extra warmth – especially the snorkellers/scuba divers • strongly recommend students bring their own towels • strongly recommend bringing second pair shoes/flipflops for indoor use only • each dorm room has its own flush toilet and cold-water shower • laundry facilities are available for a small fee
(g) Meal plans & food allergies	• meals are prepared on site by the kitchen staff. As the station accommodates many visiting courses a year the staff is well versed in addressing most vegetarian, gluten-free, or nut/seafood allergy diets. However, you may need to bring supplements if your diet is significantly restrictive. • if you need your morning tea/coffee – bring teabags/ pound or two of ground beans and an inexpensive bodum. Further, if you need to have your mid-morning/mid-afternoon snacks (e.g., granola bars) then bring your own non-perishable sealed snacks.
(h) Non-academic responsibilities	• students are responsible to keep their own dorms/washrooms clean (cleaning supplies provided)
(i) Degree of isolation	• the Discovery Bay Marine Laboratory is isolated. We are essentially off the map, however the town of Discovery Bay is approx.. a 30min. walk away. • DBML does provide power (Canadian style electric wall outlets) and wireless internet service (albeit slow but adequate for emails/browsing – DO NOT use the internet to download movies/YouTubes, or other). Keep your photos on your own computers/cameras, upload them to Facebook, Instagram, etc when you get home. • cell phone coverage is available, but make sure you obtain a roaming plan with your regular service provider BEFORE you leave home otherwise your roaming fees will be astronomically sky-high. Consider alternatively installing "WhatsApp" on your cell phone, or purchasing a local Simcard once in Jamaica. • the station does have its own medical facility for daily bumps and bruises. More significant injuries you'll necessarily be transported to Discovery Bay and beyond.
(j) Alcohol & drugs	• the course will remain alcohol and drug free. Transgressions will be evaluated for immediate exit from the course. Possible exceptions include New Year's Eve celebrations.
(k) Vaccinations/ Insurances	• to get the latest updates regarding health and recommended vaccinations for travelling to Jamaica visit https://travel.gc.ca/destinations/jamaica • every scuba diving student must have DAN diving insurance https://www.diversalertnetwork.org/insurance/dive/ independent to other insurances you might already have

(l) Social/ Cultural Situations	• the DBML is an academic institution, not a holiday resort thus respectful swimwear and clothing is assumed.
	• avoid:
	  ○ ladies → strappy/strapless tops/dresses (i.e., shoulders/midriffs to be covered); butt cheeks showing shorts
	  ○ guys → muscle shirts
	  ○ wet bathing suits in the dining hall; clothing advertising drugs, alcohol companies, or inappropriate phrases
	• accommodation is in rooms with mosquito screens but not glass windows. Sleep is easily disrupted by noisy behaviour in the adjacent rooms or access areas (stairs, passages). Do not contribute to these concerns.

(m) Final comments	• notwithstanding all the above, this course is a great experience for all (e.g., hands-on scientific research, personal growth, new friends with like-minds, unique experiential learning, local culture, music, colour).
	• on an academic front, the course is designed along multiple pedological trajectories, each contributing to your growth and maturation in:
	  ○ tropical systems ecology
	  ○ research design and statistics
	  ○ writing scientific papers
	• it's a lot to pack in in two weeks, but with advance preparation (i.e., your research proposal) and with years of experience teaching this course the rewards are well worth the efforts for all of us.