Carleton University

OUPFB Module 13

Course Title:	**Canadian Scientific Research Diver**
Instructor(s):	Dr. Nigel Waltho Dept. Biology, Carleton University Phone: 613-297-6422 Email: nigel.waltho@carleton.ca
Dates:	Fri. July 21 – Sun. Aug 6, 2023
Location:	Queen's University Biological Station (QUBS), Elgin, ON (½ hr north of Kingston) Students make own travel arrangements to QUBS
Cost:	• **Course Fees = $2800,** payable as a **$350 non-refundable deposit** to your home university, and $**2450 balance** to Carleton University due by May 1st. Students with confirmed reservations will receive emailed instructions on how to pay the course balance well in advance of the payment deadline. **Course fees include**: ○ two weeks and two days room & board at the Queen's University Biological Station ○ 25 scuba tank fills, daily boat transport ○ course textbook (NOAA Diving Manual for Science & Tech. 5th Ed - digital) ○ DAN Oxygen certification (assuming you pass 😊) • **Equipment**: students must provide their own **complete set** of cold-water dive gear (e.g., two-week rental/or purchase) including mask, snorkel, fins, full wetsuit, BCD, cold-water regulator, dive belt & weights, dive knife, dive light, dive watch, and dive compass (dry suits are permissible if you have training).
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 (or equivalent) course beyond the Introductory level, and (b) one biometry or statistics course. If you do not meet these academic prereqs. please contact Dr. Waltho to discuss first. • **CoVid-19:** students must be double-vaccinated. Students are expected to bring their own daily mask protection(s) for the duration of the course as per the Provincial heath mandate at the time. • **Scuba**: ○ students must possess a nationally recognized **Open Water Scuba certification (e.g., PADI, NAUI, ACUC, SDI)**; have at least five open water dives, and have at least 2.5 hours logged bottom time (in addition to your checkout dives). ○ students must hold *current* certifications in **First Aid** & **CPR** at the time of the course ○ students must be declared medically fit by a **licensed diving physician** (e.g., see list of **Diving Physicians**) ○ students must have **DAN Membership & Scuba Dive Accident Insurance**
Enrolment:	6 (3) 4 students minimum
Course Description (brief):	Scientific diving whether in Canada or around the world necessitates training and competency significantly above that of the sport diver. In Canada, scientific diving falls under the Canadian Association of Underwater Scientists (CAUS). To meet these competency levels, our course requires: • self-study and review of the NOAA Diving Manual with eight weekly (by chapter) online tests **before** the two-week field/scuba portion begins • a comprehensive two-week 25-dive/15hr-bottom time in-water competency training 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: ○ National and Provincial diving regulations and standards, and advanced diving physics & physiology ○ species identification and underwater photography ○ experimental design, power analyses, univariate and multi-species statistical analyses
Evaluation:	• NOAA Diving Manual eight-weekly online quizzes, and lecture-based comprehension tests (20%) • field effort – including safe dive-site management, initiative, and industriousness (10%) • diving physiology seminar presentation (20%) • final paper = Research Proposal & Dive Plan, due Sept 30th (50%)

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 • 08:30-11:30 → dive training (e.g., morning dive) • 12:00-13:00 → lunch • 13:30-17:00 → dive training (e.g., afternoon dive) • 17:30-18:30 → dinner • 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 eight on-line weekly quizzes starting in May.
	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 plan to dive morning and afternoon on L. Opinicon. L. Opinicon is a shallow lake (i.e., 20-25') so for the most part we will be above the thermocline or at it's interface. The goal for 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, purchase, or drysuit if you have one) by week's end. Good eating, staying hydrated, and full sleeps are key to mental and physical stamina through this first week.
	• the second week we plan to dive above Chaffey's Locks in Indian and Clear Lake. These lakes are deeper (e.g., 40-100'), well below the thermocline – complete full thickness wetsuits (e.g., rental, purchase, or drysuit if you have one) are mandatory. Albeit the second week dives will be short in duration, we dive this second week to maximize the required 25-dive count with the deeper depths. 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 practice contingency actions for, and train for these scenarios often
	• the 25-dive pedagogy is structured to initially review and train towards competency in core diving skills and dive accident management, and to then further these core skills along two independent trajectories with the focus on dive safety throughout:
	  ○ increasingly challenging dive environments (i.e., from shallow warm waters with good visibility, to black-out conditions in the colder deeper depths)
	  ○ scientific methods and equipment (e.g., core sampling, quadrat sampling, fish surveys, habitat mapping, video transects, and underwater photography).
	Evening lectures:
	• after dinner, most evenings we have 3-hour academic lectures (e.g., diving physics, physiology, statistical techniques), equipment workshops, student presentations, or similar. Admittedly, 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 most days we will 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, hot gear, rain gear, dry gear, warm gear, sunblock, towels, hats, and polarized sunglasses 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	• In pre-CoVid times, students typically share a room (gender specific) with another student(s) depending on the cabin allocated. However, during this CoVid pandemic students will likely be allocated each to a single bunkie-style room (either the Junior or Medium cabins; see https://qubs.ca/facilities/accommodations). As we approach the course start date, I will have more clarity provided by the Station. • **students need to bring their own linen/sleeping bags/pillows** • washrooms and showers are available in the central building for all users • coin-operated washing/drying facilities 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 to housekeep • 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 Google Maps link • 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 • nonetheless, we'll be on campus/on the boat everyday through the course. There will be no time to independently leave the course for personal errands. There is, however, a small General Store at Chaffey's Locks that can address your cravings as need be.
(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 • students must be CoVid vaccinated as recognized by Canada • students must be declared medically fit by a licensed diving physician (see pg. 1) • students must have DAN Membership & Scuba Dive Accident Insurance (see pg. 1)
(l) Social Situations	• QUBS is an academic institution, and not a holiday resort. Respectful (but casual) clothing is always assumed • 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	**OUPFB Course Grade:**
	• Your university course grade is based on the marking scheme identified on Page 1., Course Evaluation. However, completing this course also gives you access to the Canadian Association of Underwater Scientists - CAUS accreditation:
	CAUS Accreditation:
	• CAUS accreditation is automatic (Level I Scientific Diver, and Level II Scientific Diver time permitting) if you successfully meet the CAUS competency standards throughout the course. These competency standards include:
	  ○ a minimum passing grade of 80% for each written quiz, **and the take-home final paper**
	  ○ meeting the required in-water skills objectives by course end
	• to maintain CAUS accreditation, an *annual* review by a qualified member institution is required (e.g., a dive under the watchful eye of the institution's DSO).
	ACUC Advanced Diver/Rescue Diver Certification:
	• at the completion of the course successful students may ***independently*** ask for their ACUC Advanced Sport Diver and Rescue Diver certifications.
	• no further dive training nor exams are required, however, a minimum passing grade of 80% is required for the written quizzes and take-home paper, and all in-water competencies must necessarily be demonstrated
	• these Sport diver certifications are available with an additional, independent cost to the student (approx. $50-$100 for each certification)
	At the end of the day…
	• at the end of the day, this course is designed along multiple academic and diving trajectories including:
	  ○ dive rescue & accident management
	  ○ underwater navigation, deep, cold-water diving, 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
	  ○ research design and statistical analysis of multi-species ecological data sets