

**CARLETON UNIVERSITY**  
**Ontario Universities Program in Field Biology**

<b>Course Title:</b>	<b>Ecology of Coral Reefs – Scuba Diving</b>
<b>Instructor(s):</b>	Dr. Nigel Waltho Dept. Biology, Carleton University Phone: 613-520-2600 Ext. 8764 Email: <a href="mailto:nigel.waltho@carleton.ca">nigel.waltho@carleton.ca</a>
<b>Dates:</b>	Dec 26/27 <sup>th</sup> , 2019 – Jan 09/10 <sup>th</sup> , 2020. Two weeks (N.b. do not book flights until dates are confirmed)
<b>Location:</b>	<a href="#">Cape Eleuthera Institute (CEI) &amp; Marine Biology Station</a> , Cape Eleuthera, Bahamas
<b>Cost:</b>	<p><b>Course Fees:</b> \$3395 includes room &amp; board, daily scuba gear (BCD, regulator, weights, tanks), all air fills, daily boat transport, and ground transportation between the Rock Sound airport and the Cape Eleuthera Station. Payable as <b>\$350 non-refundable deposit</b> to your home university; and <b>\$3045 balance</b>. The balance is due by <b>Sept. 01<sup>st</sup></b> payable by cheque to:</p> <p style="text-align: center;"><b>Carleton University 814308-189022</b></p> <p style="text-align: center;">The cheques should be mailed to: Ruth Hill-Lapensee, Dept. Biology, Carleton University, 1125 Colonel By Dr, Ottawa, ON K1S 5B6.</p> <p><b>Airfare:</b> required to Rock Sound, Bahamas, and return.</p> <p><b>Equipment:</b> each student must provide their own mask, snorkel, fins, wetsuit (full body 4-5mm minimum), and dive watch (any waterproof watch or dive computer waterproof to a minimum of 50m).</p> <p><b>Scuba Diver's Insurance:</b> every participant must have <a href="#">DAN membership &amp; Scuba insurance</a>.</p>
<b>Prerequisites:</b>	<p><b>Academics:</b> students should be entering their 3<sup>rd</sup> or 4<sup>th</sup> year of a Biology, Env. Sci., or similar program; and (a) have at least one advanced ecology course beyond the Introductory level, and (b) have at least one biometry or statistics course.</p> <p><b>Scuba:</b> students must be comfortable swimming, on boats, and scuba trained/certified minimally to an <i>open water scuba certification</i> before the beginning of the course.</p>
<b>Enrolment:</b>	18 (3) 12 students minimum
<b>Course Description (brief):</b>	<ul style="list-style-type: none"> <li>• Research emphasis is on the distribution and community organization of readily observable species assemblages (e.g., coral reef fish, corals, sponge &amp; algae, and coral diseases) as these relate to <i>ecological</i> process (e.g., competition, tri-trophic interactions, predator-prey refuge zones, crypsis, habitat structure).</li> <li>• Students (buddy teams of 2-3) submit a 3-4 pg research proposal due Nov 15<sup>th</sup>, 2019. Proposals may need updating upon review/comments made.</li> <li>• Once in the Bahamas the focus initially is on safe diving practices and learning species identification. As the course progresses the focus shifts to data collection from a defined array of 30 patch reefs. All data observed contributes to a Master class spreadsheet that you'll then draw specific data relevant to your question, analysis and final paper.</li> <li>• Evening sessions include dive lectures, species identification lectures, project design workshops, statistical workshops, and data entry.</li> </ul>
<b>Evaluation:</b>	<p><b>Research proposal:</b> due Nov 15<sup>th</sup> 2019 (group project 10%)</p> <p><b>Field effort:</b> including safe dive-site management &amp; diving practices, initiative &amp; industriousness (individual effort 10%)</p> <p><b>Quizzes:</b> (individual effort 10%)</p> <p><b>Final paper:</b> 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 28<sup>th</sup>, 2020 (individual effort 70%)</p>

Deadline to apply is **Feb 8, 2019**.

If interested please complete the application form and submit it to the OUPFB course coordinator at your school.

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 cheque.

## An Average Day – What to Expect

<p>(a) Daily timeline</p>	<p>07:00-08:00 → prepare dive gear, prepare dive boat          08:15-09:15 → breakfast and cleanup          09:30-12:00 → morning research dive          12:15-13:15 → lunch and cleanup          13:30-17:00 → afternoon research dive          18:15-19:15 → dinner and cleanup          19:30-23:00 → dive lectures, species id workshops, statistical workshops</p>
<p>(b) Work habitat &amp; Physical exertion, (c) Common activities</p>	<p><b>Pre-field course:</b></p> <ul style="list-style-type: none"> <li>students will be assigned to buddy dive teams based on research interests &amp; home university. Teams are expected to submit a 3-5 pg. peer-reviewed research proposal by Nov. 15th (10% final grade)</li> </ul> <p><b>Swimming &amp; Scuba Competency:</b></p> <ul style="list-style-type: none"> <li>as a scuba diver, you are expected to show a minimal level of swimming &amp; scuba competency. This will be evaluated the first day including:             <ul style="list-style-type: none"> <li>treading water for 10min., a 200m swim, and a 25m underwater swim</li> <li>mask/regulator recovery, buoyancy control, scuba-scuba exchange</li> </ul> </li> </ul> <p><b>Research Diving:</b></p> <ul style="list-style-type: none"> <li>access to the dive site is by boat, approximately a 20 min. boat ride from campus. We'll travel twice daily (morning dive, and afternoon dive – except in extreme weather) returning back to campus in-between for lunch. To optimize bottom time and to keep everyone safe within the scuba no-decompression-limits the boat must be packed with your dive gear each morning before breakfast, and each afternoon before lunch. It is your responsibility to ensure your gear is complete. The boat departs at the requisite times, whether or not you are ready.</li> <li>the first week centers on review and furthering your dive training for underwater work, and species identification. The second week focuses on data collection. The dive site itself is a network of 30 numbered patch reefs that vary in size from a small car to a large bus. Patch reefs range in depth from 30' to 50', and are spread out over the area roughly the size of a football field.</li> <li>following descent from the dive boat, you and your dive buddy will necessarily fin-kick to your numbered patch reef for that dive. At the patch reef and depending on your research project, you'll use quadrat sampling to identify and record species percent cover (e.g., coral, diseases, algae, sponges), or whole patch reef species abundances (i.e., fish) with the underwater species identification key provided. Towards the completion of the dive you'll fin-kick back to "Tunnel Rock", a coral pinnacle whose upper reef surface is at 15', for a minimum 3-minute safety-stop before surfacing and swimming back to the boat. Once all divers have returned to the boat, we'll return to campus where you are responsible to help remove all the dive gear off the boat, clean the boat, and contribute towards dive gear cleaning/safe storage.</li> <li>probable but rare diving ailments include:             <ul style="list-style-type: none"> <li>seasickness → generally avoided with Gravol ginger, and keeping your eyes on the shoreline during transit</li> <li>middle-ear barotrauma → if sustained you'll be out of diving for minimally a week; easily avoided with slow descents and proper ear-clearing techniques that we'll practice again and again</li> <li>slow-creep hypothermia → avoidable by keeping warm (full body minimum 4-5 mm wetsuits), eating well, staying hydrated, and having good sleeps.</li> </ul> </li> <li>once the dive gear is safely stowed for the night the remaining afternoon hours before dinner are yours. Students typically use this time to learn/discuss unknown species, data entry, laundry, or other.</li> <li>evening classes start as soon as the evening kitchen duties are complete (i.e., cleaning dishes, sweeping the dining hall, washing the floors). Class topics vary as a function of where we are in the course. At the beginning of the course lectures revolve around learning DCIEM dive tables (100% pass required), and dive safety. Middle-course lectures are focused on learning the 100's of species observed (Quizzes associated). The last week of lectures begin with a general overview of statistical methods, from which I then introduce community ecology specific statistical techniques, to end off with individualized project workshops. These evening sessions typically end between 10:30-11:00 pm.</li> </ul>
<p>(d) Weather, dehydration, &amp; biting insects</p>	<p><b>Weather:</b></p> <ul style="list-style-type: none"> <li>average daily high temperatures are 25-26°C; and average nighttime low temperatures are 16-18°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.</li> <li>the sun can be hot, and burns do occur. Common sense long loose clothing and hats are recommended over sunscreen. BUT as you'll be scuba diving for two weeks, you will need warmer clothes for the second week all else being equal (slow-creep hypothermia).</li> <li>our bigger concern are the winds. With no winds the seas are flat, but with heavier winds we can experience 3'-4' waves. If strong N or NE winds occur early in the course we are unlikely to dive, but such winds become less of an issue towards the end of the course as your gain experience with the dive boat. Nonetheless assume some days will be no diving due to weather/wind conditions. During these times, we focus on classroom workshops instead.</li> </ul> <p><b>Dehydration:</b></p> <ul style="list-style-type: none"> <li>a significant concern due to both being in a Caribbean climate and the fact 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.</li> </ul> <p><b>Bugs:</b></p> <ul style="list-style-type: none"> <li>there are few mosquitoes (bug spray), but 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.</li> <li>long loose clothing help as sun-screen and similarly as bug barriers. Scented soaps/shampoos attract these bugs.</li> </ul>

(e) Toxic/poisonous, wildlife/ plants	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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. We will practise buoyancy control throughout the course as such control is key to safety, preventing damage to the corals, and for data collection.</li> <li>• there are some poisonous woods in the forests – these will be shown.</li> </ul>
(f) Sleeping, washroom & laundry facilities	<p><b>Sleeping accommodations:</b></p> <ul style="list-style-type: none"> <li>• separate male/female dorm-like rooms with bunk beds/mattresses. Students need to bring their own pillow case (and pillow if you have your favourite), sheets and blankets, OR pillow case &amp; sleeping bag. Nights can be chilly (see above). Strongly recommend bringing second pair shoes/flipflops for indoor use only.</li> </ul> <p><b>Flush toilets:</b></p> <ul style="list-style-type: none"> <li>• available, but water conservation is priority, therefore “if it's yellow let it mellow, if it's brown send it down”.</li> </ul> <p><b>Showers:</b></p> <ul style="list-style-type: none"> <li>• ambient temperature showers (i.e., no hot water); army showers only, that is, one-minute water supply (i.e., quick on to get wet then off, shampoo/soap, quick on to rinse). Bring your own towels, soap, shampoo.</li> </ul> <p><b>Laundry:</b></p> <ul style="list-style-type: none"> <li>• coin laundry facilities are remotely available (30-45 min. walk to marina) - bring your own soap</li> </ul>
(g) Meal plans & food allergies	<ul style="list-style-type: none"> <li>• meals are prepared on site by the kitchen staff. As the station accommodates 88 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.</li> <li>• 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.</li> </ul>
(h) Non-academic responsibilities	<ul style="list-style-type: none"> <li>• students are responsible to keep their own dorms/washrooms clean (cleaning supplies provided), and to help clean the kitchen/dining hall after each meal. The latter will be based on a daily rotational kitchen crew (i.e., 4 students per day)</li> </ul>
(i) Degree of isolation	<ul style="list-style-type: none"> <li>• the Cape Eleuthera Institute is isolated. We are essentially off the map, however a small convenience store is available at the marina (approx. 30-45 min. walk from campus). There are no ATM's.</li> <li>• CEI does provide power (Canadian style electric wall outlets) and wireless internet service (albeit slow and expensive via satellite connection). Keep your photos on your own computers/cameras, upload them to Facebook, Instagram, etc when you get home.</li> <li>• 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 “WhatsApp” for text-messaging</li> <li>• the station does have its own medical facility for daily bumps and bruises. More significant injuries you'll necessarily be transported off the island to Nassau at your own cost (hence, see the insurances below).</li> </ul>
(j) Alcohol & drugs	<ul style="list-style-type: none"> <li>• as we are scuba diving most days, the course will remain alcohol and drug free. Transgressions will be evaluated for immediate exit from the course</li> </ul>
(k) Vaccinations/ Insurances	<ul style="list-style-type: none"> <li>• to get the latest updates regarding health and recommended vaccinations for travelling to the Bahamas visit <a href="https://travel.gc.ca/destinations/bahamas">https://travel.gc.ca/destinations/bahamas</a></li> <li>• in a large part because medicare is limited on Cape Eluthera and in addition to the fact that you are scuba diving, every student must have DAN diving insurance <a href="https://www.diversalertnetwork.org/insurance/dive/">https://www.diversalertnetwork.org/insurance/dive/</a> independent to other insurances you might already have</li> </ul>
(l) Social/ Cultural Situations	<ul style="list-style-type: none"> <li>• the Cape Eleuthera Institute is an academic institution, not a holiday resort thus respectful swimwear and clothing is assumed. Avoid:             <ul style="list-style-type: none"> <li>○ ladies → strappy/strapless tops/dresses (i.e., shoulders/midribs to be covered); butt cheeks showing shorts</li> <li>○ guys → muscle shirts</li> <li>○ wet bathing suits in the dining hall; clothing that advertises drugs, alcohol companies, or inappropriate phrases</li> </ul> </li> </ul>
(m) Final comments	<ul style="list-style-type: none"> <li>• this field course is the only field course available centered on gaining academic research skills in a strictly scuba diving environment. The fact that we run the course in a coral reef environment is icing on the cake.</li> <li>• the course is designed along multiple pedological trajectories, each contributing to your growth and maturation in:             <ul style="list-style-type: none"> <li>○ ecology of coral reefs</li> <li>○ research design and statistics</li> <li>○ writing scientific papers</li> <li>○ dive training</li> <li>○ scientific dive training</li> </ul> </li> <li>• it's a lot to pack in in two weeks, but with advance preparation (i.e., your research proposal) and years of experience teaching this course the rewards are well worth the efforts for all of us.</li> </ul>