BIOLOGY 355 – Marine Invertebrates of Southern New England Summer 2025

Instructors: Dr. Niels Hobbs (nvshobbs@uri.edu)
Rebecca Venezia (rebecca_venezia@uri.edu)
Class / Laboratory Room: Rooms 310-320, CBLS, Kingston Campus, URI

Hours: *Much more variable than course description suggests*.
Minimum lab open hours (with more possible, as needed):
Tuesday and Thursday - 2-8pm
Monday, Wednesday, and Friday - Noon-6pm
Lecture / meeting on Tuesdays, ~5-7pm (depending on fieldtrips)
Semi-optional ~daily trips usually tide-dependent, TBA

COURSE DESCRIPTION

This course is structured around intensive lab and field work, with one (~1-2 hrs.) lecture and class meeting a week. Most of your grade will be based on collecting and accurately identifying a broad sample of local marine invertebrates, and presenting these in a final photo catalog that is put together by each of you *individually* and cataloged in a powerpoint slide collection. In addition, part of your grade will be based on a taxonomic report on an assigned species, a small field study, and a final practical exam.

The course schedule is dictated largely by the schedule of low tides. We'll go in the field to different intertidal and dock sites around Rhode Island (and occasionally farther) nearly every day (at least for the first few weeks), and the laboratory will be open each weekday for several set hours, with more depending on demand. These daily field trips will be tide-dependent, but weather-independent, so students should be prepared for foul weather. Students can also expect to put in some long (but highly rewarding and fun) hours into this class. The weekly lecture on Tuesday evening with focus on putting all the critters we collect in the context of general invertebrate/animal diversity and ecology.

This is an intensive class, but it'll also be a lot of fun. We get muddy, sweaty, slimy, tired, and sometimes a little stung - but it will be worth it!

PREREQUISITES

One year of introductory biology and, ideally, one semester of a relevant course in ecology or biodiversity.

COURSE LEARNING OBJECTIVES

By the end of this course, the student will be able to:
1. Identify core characteristics of the major invertebrate animal groups and determine the identities of species common to southern New England coasts.
2. Describe the major characteristics of key coastal habitats and list some of their more abundant invertebrate species.
3. Understand the means by which species are collected in the field, identified and, as needed, preserved.

WHAT'S EXPECTED OF YOU

Though the hours are mostly flexible, you should expect to spend a minimum of 15 hours in the lab and on trips each week in order to get the most from this course (remember, the course catalog lists this as 8 scheduled hours plus an additional 8hrs TBA, so we expect this minimum amount).

GRADES

Photographic Collection of Animals (up to 100 spp.) in .ppt or .pdf –	70%
Final practical exam of species taxonomy and ecology –	15%
Presentation on taxonomy and ecology of one species –	15%

Class participation and proficiency with sampling and lab techniques *may* also affect your final grade (generally in a positive way).

Important note: what's particularly expected of you is that you identify these animals yourself. The instructors are here to help guide you along in the process, and we might even provide hints. We also encourage some cooperative work in terms of collecting and maintaining critters, but the only way you will properly benefit from this class is if you are the one doing the actual final ID. Just copying someone else's ID and taking the same photos not only cancels any knowledge you can derive from this class, but it's also plagiarism. If you don't know what that means, please see the university's policy on plagiarism and cheating. It ain't pretty.

FIELD TRIPS

In past years, students carpooled to sampling sites, but this year we'll mostly be using departmental vans. As noted, there usually will be daily field trips at times determined by the tides, including an optional longer day trip to collect specimens on Cape Cod (more details on this in class!). As students get more familiar with the sites, the techniques, and what species are found where, students can probably start doing some semi-independent collecting, but even these must be done with at least one other person from the class - we can't have students going out on their own to collect at some of these sites for obvious safety reasons. Tide times can be found online here:
http://usharbors.com/monthly-tides/Rhode%20Island/Narragansett%20Pier

EQUIPMENT

Boots, bucket, CD/SD, Camera, rain gear, hat, sunscreen…

It is recommended that you purchase your own thigh-high rubber boots for using in the field. Water shoes or an old pair of sneakers can also be used if you don't mind getting wet (and sometimes cold), but sandals or open shoes are absolutely not allowed due to the risks posed by broken shells and glass. You should also get a good large bucket (with a lid) to transport your collections.

You need to also provide your own blank CD, SD card, or thumb-drive (recommended) to record your final photo collection for handing in at the end of the class. Additionally, a nice digital camera and a good field notebook are also highly recommended. While it won't suffice to simply take photos of most critters solely in the field (for one, you'll find it very hard to ID later on from a photo), it can be very handy to have one good shot in the wild before the specimen gets beaten up (or eaten) in transit back to the lab.

Finally, you should obviously use sunscreen (at least SPF 40 or 50) and wearing a good protective hat and long sleeved shirt are advisable. Btw, we'll probably get class t-shirts, if enough folks are interested in that.

TEXTS (none required, but it would be good to have one of your own):

Howard Weiss. 1996. *Marine Animals of Southern New England and New York*.
Connecticut EPA. ISBN # 0-942081-06-4
Great, easy to use format, though a bit out of date and in a not very portable size. This is a relatively user-friendly and thorough guide. www.ctdeepstore.com - Search for it under DEP publications - $19.95

Leland Pollock. 1995. *A Practical Guide to the Marine Animals of Northeastern North America.*
Rutgers. ISBN # 0-8135-2399-0
Superb ID manual that's more thorough than Weiss. Rutgers sells it for $40, but you can generally get it for less than half that at Abebooks.com or Amazon.

Additional taxonomic journal articles – since most of these ID books don't go into full detail of all the species that could be found in our area, we'll provide several additional sources for identifying some of the important taxa that are relatively neglected in these books.

NB: Due to the ever-changing field of Taxonomy, particularly given the advances made by molecular techniques, the names for some species have changed (sometimes more than once), so we'll try to provide updated errata for the latest names. If you own a copy of one of the ID books, I strongly recommend you make these changes. See WoRMS (www.marinespecies.org) for more current names.

TIPS TO COLLECTING AND IDENTIFYING CRITTERS

For the first part of the class, you'll learn how to use much of the basic field and lab equipment, but a few pointers up front are good. There is no one way to collect all the organisms you'll need for your collection – almost every species has their own unique niche that makes collecting them as much an art form as it is science. Some species require digging deep and quick into mud and then sifting them through a screen, others are easy to pull off rocks, while some need to be pried off carefully with a scraper, and others need to be shaken from seaweed or caught in a plankton net. By the end, you'll all be quite proficient at these techniques.

Once you've collected them, you'll need to take some care that they don't get injured or die before you have a chance to identify them. The best thing to do is to not get too greedy when collecting – only collect a modest amount that won't fill up your bucket and will manageable to identify in a day or two. If you collect too much, it'll all probably be a big stinky mess by the time you get part way through it. When you have your collection in the lab, be sure to keep an airstone in the collection container at all times. This will go a long way toward making sure that all the critters you've abducted have a chance at survival through the whole process and may even make it back to the wild intact.

As you identify these organisms, be sure to pay attention to the details. Perhaps start by taking two animals that look similar, say two crabs or two worms, and look for differences in some of the finer details. Usually this means looking under one of the dissecting scopes. Are there different numbers of spines, or plates, or are their claws shaped differently, or their segments arranged differently? Soon you'll develop a good eye for the important characteristics. The instructors are here to help you with those – don't be afraid of asking for suggestions. There are also more than a few critters that really really really don't want to be identified – they'll fight you all the way – they swim around really fast, or they'll try to run away, or hide in their shells. These will take some finesse and different techniques to get them to cooperate, but with patience you can get them.

As you use the keys in the books, be sure that all the clues add up. There are a LOT of species out there, some are super common and will be easy to find quickly, some are quite rare, and it may be very difficult (even impossible) to hunt down a particular species. You can get most of the 100 species by collecting common and easy critters, but some of them unavoidably will be more difficult.

THE PHOTO-COLLECTION

In days of yore, a proper taxonomist was one who pillaged the natural world – catching, shooting, stuffing, pickling, pinning, and labeling any critters unfortunate enough to cross *his* path… well, it's not too different same now, but we do things different in Bio 355. We skip nasty chemicals (formaldehyde, particularly) to fix and preserve specimens that never quite look, well, alive ever again. Instead, we collect, identify, and photograph – and then, hopefully – return alive the animals we collect. In order to get a proper appreciation for the remarkable diversity of life out there in the waters around southern New England, you will need to collect and correctly identify a good cross-section of marine and estuarine animal species. Ideally, you'll identify all of them down to the species level, but there will be some that simply defy full identification. You can still get credit for that specimen even if you give a higher taxonomic name for it, but you'll only be able to count one for that category, unless you can adequately justify a difference, i.e. you'll only get credit for one "Copepod."

When you're taking photos of your specimens, be sure that you start with one really clear overall shot of the entire animal, and then take a few more (or whatever number you need) of the specific detail characteristics that distinguish it as the species you claim it to be. At the end of the class, when all of these are being graded, you will *only* receive credit for a species if you've taken nice, clear (focused!) shots of the important features – i.e. it may be fairly obvious to me that you've got a green crab, as you claim, but unless I see clear details of the correct number of spines on the carapace, you won't get credit. This is important, because it assures me that you understand the important features and you're not just guessing. It's recommended that you identify and photograph a small number of "cushion" species – above your 100 species – in order to assure you get the maximum number of points, even if you get a few wrong.

Additionally, the more species you identify, the more you'll get out of Bio 355 beyond a good grade. In acquiring 100+ species, you'll have no choice but to collect a really solid cross-section of marine invertebrate diversity. You'll see animals that even the best Hollywood CGI lab couldn't possibly dream up. Some of them, you might not even have previously thought could possibly be animals. That's what this class is all about.

For each species you identify, you'll need to record the following:
- Species identification – *Genus* and *species*, and family (confirm updated names via marinespecies.org)
- Specific location collected (and date) and type of habitat (rocky shore, floating dock, etc)
- Salinity and temperature of water
- Abundance you observed (abundant, common, uncommon, rare)
- Native or introduced?
- key characteristics you used to identify this species, with minimal jargon
- source used to identify

By the way, the record is 161 correctly identified species – can you beat that?

CARE OF EQUIPMENT

Salt water and much of our equipment don't mix well. This means that we need to regularly wash field gear (boots, nets, etc) after field use. You should also clean the glassware and any airstones you're using for critters. It MOSTLY means that we need to be super-extra careful with the Microscopes, Cameras, and Computers! You know what happens if you drop your cell phone in the water… Well, it's a lot worse if you drop it in salt water. Some of the microscope and camera set-ups we'll be using in the lab are more expensive than a year's tuition. They definitely cost more than what I make teaching this class, if you get my drift. So, PLEASE BE CAREFUL – quickly wipe up any spills, just plain don't spill near the expensive stuff, and wipe off the stages of the microscopes after you've used them.

Additionally, almost as valuable as the lab equipment are the books that we use. Some of them are cheap and easy to replace, others are very rare and essentially impossible to replace (and some of those are from my personal collection!). Please use great care with these! Please be sure that your hands are not wet and that you take some care with the spines of these tomes. You're encouraged to buy and use your own gear (boots and books, particularly), and it's just as important that you care for your field equipment investment.

CARE OF ANIMALS

As stated before, we really strive to not totally decimate the natural world – it may not seem it, but 10-15 people out on a collecting trip can do some damage. Plus, instead of preserving everything in alcohol or formalin, we will be doing our best to work with these organisms as they really look – alive. As much as possible, this means we need to keep the animals submerged in water, with a working air stone keeping the water moving. Do not overcrowd your collections, only collect what you can identify in a day or two, and try to return the critters within a couple days. Some of the species we'll collect are not native to local waters, and we may have *other plans* for them (see below). The woods across Flagg Road could always stand to have some high-quality fertilizer. Otherwise, utmost care and respect for these organisms is expected – after all, this is a Biology class, not a Necrology class.

The biggest exception to this guiding principle is when we deal with <u>non-native species</u> – which we will do a lot. For some of the more nasty of these (AKA "invasive species"), we will NOT return them to the water for them to do more harm.

CARE OF YOURSELF

The field can be a little dangerous; there are plenty of slippery rocks and sharp barnacle shells – use common sense and be careful. Though there are a lot of really great species to collect sub-tidal, we cannot allow scuba-diving or snorkeling as part of this class. Also, very few of the animals we will encounter can possibly hurt you, but if you are stung or cut by something, let us know right away.

The greatest danger probably comes from the elements, particularly the sun. Protective clothing and sunscreen are necessary. Also, it's a very good idea to have a bottle of water to keep yourself well-hydrated. If you have allergies or the like, please be sure to have your medication handy – and absolutely let us know of any relevant medical conditions.

Finally – remember the class motto: ***HABEO CANCERES***.

2025 PROPOSED SCHEDULE:
(all field trips meet and leave from lab, unless otherwise noted – remember, each trip is optional, but you should plan on doing ~two trips a week if possible)**:**

Tues May 20 (low 8:10pm; 0.6') - class at 5pm - intro and orientation session
Wednesday May 21 (low 8:49am; 0.3') - field trip at 9am - Galilee Mudflats
Thursday May 22 (low 9:46am; 0.1') - field trip at 10am - Galilee Mudflats
Friday May 23 (low 10:38am; 0.0') – TBD – may do a quick morning trip then lab time.

Monday May 26 (low 1:06pm; -0.4') - **Memorial Day** NO CLASS (but feel free to go on your own)
Tuesday May 27 (low 1:57pm; -0.3') - 2pm - Sprague Bridge (or possibly Allen Harbor)
Wed May 28 (low 2:51pm; -0.2') - 2pm - TBD
Thursday May 29 (CC low 7:36am; -1.6') - 5 AM departure!!! – SANDWICH CAPE COD (back to lab by ~noon)
Friday May 30 (low 8:41am; 0.3' / 9:38pm; 0.5') – Lab

Monday June 2 (low 8:04am; 0.6') - 2pm - Allen Harbor Marina
Tuesday June 3 (low 8:55am; 0.6') - 4pm - Allen Harbor Marina
Wednesday June 4 (low 9:32am; 0.6') - 2pm - Point Judith Marina Midterm checks!
Thursday June 5 (low 10:05am; 0.6') - 4pm - Point Judith Marina
Friday June 6 (low 10:40am; 0.5') - Lab

Monday June 9 (low 12:37pm; 0.3') - TBD
Tuesday June 10 (low 1:18pm; 0.3') - TBD Species presentations, 5pm
Wednesday June 11 (low 2:00pm; 0.3') - TBD
Thursday June 12 (low 2:43pm; 0.3') - TBD
Friday June 13 (low - 3:25pm; 0.3') – Lab

Monday June 16 (low 5:38pm; 0.4') - TBD
Tuesday June 17 (low 6:36pm; 0.5') - TBD Lab Practical, 5pm
Wednesday June 18 (low 7:08am; 0.2'/7:36pm; 0.6') - TBD
Thursday June 19 (low 8:04am; 0.2'/9:16pm; 0.5') - **Juneteenth** NO CLASS (may have lab open)
Friday June 20 **Last day of class** – lab time only.

Final presentations due by Sunday June 22 at 5pm