

# Syllabus - FAS 5407

## BIOLOGY OF FISHERY & AQUACULTURE INVERTEBRATES

### 1 Course Overview

#### Course description:

Invertebrate animals (e.g. mollusks, crustaceans, echinoderms) comprise at least 97% of described species. Many are important fisheries and some are increasingly important in aquaculture. Invertebrates are more anatomically and biologically diverse than finfish, and this diversity must be understood in order to study their fishery management or aquaculture. This course will examine the biology of marine and freshwater invertebrates that are important as fisheries or in aquaculture. Topics will include taxonomy, morphology, distribution, habitat requirements, nutrition, major predators and parasites, significant ecological interactions, and life cycles. Non-food fisheries, such as commercial sponges and pearl oysters, will also be included. The course will be organized by taxonomic groupings, or phyla. Topics will be chosen for their biological relevance to fisheries and aquaculture, but procedural topics (methods, management, models, etc.) will not be emphasized here.

- 3 Credits
- Summer C
- Format [100% online, asynchronous]
- [location or <http://elearning.ufl.edu/> ]

**Course Prerequisites:** none

**Instructor:** Patrick Baker, PhD

Program in Fisheries

School of Forest, Fisheries, and Geomatics Sciences, University of Florida.

email: [pkbaker@ufl.edu](mailto:pkbaker@ufl.edu)

office tele: 352-273-3629

office at Millhopper Campus (7922 NW 72<sup>st</sup> St., Gainesville), Bldg. 544, room 30

- Please use the Canvas email or [pkbaker@ufl.edu](mailto:pkbaker@ufl.edu) for fastest response.
- Office hours (telephone, in-person, or video conference): Tuesday & Friday, 8-10 am.

### **Textbook and Readings:**

There is no required textbook. The following texts and laboratory manuals are suggestions only, although all of them are recommended if you intend to stay in the field of invertebrate zoology. No textbooks focus on the biology of fishery and aquaculture invertebrates in general, although there are many that cover a specific fishery group. Additional texts or manuscripts for specific topics will be noted during the course.

#### Suggested Invertebrate Zoology Texts (not required)

- Brusca, R.C., G. Giribet, & W. Moore (2022) *Invertebrates*. 4<sup>th</sup> Ed. Sinauer Associates. Sunderland, MA, USA. 1104 pp. ISBN-10: 0197554415.
- Nybakken, J.W. (1996) *Diversity of the Invertebrates: A Laboratory Manual*. Gulf of Mexico Version. McGraw Hill, Boston, MA, USA. 320 pp. ISBN-10: 0697151239.
- Pechenik, J.A. 2014. *Biology of the Invertebrates*. 7<sup>th</sup> Ed. McGraw Hill, Boston, MA, USA. 606 pp. ISBN-10: 0073524182.
- Ruppert, E.E., R.S. Fox, & R.D. Barnes (2003) *Invertebrate Zoology*. 7<sup>th</sup> Ed. Brooks-Cole, Belmont, CA, USA. 989 pp. ISBN-10: 0030259827.  
**Note:** Some websites incorrectly list this edition as 2015, which is simply the paperback version of the 2003 edition.
- Wallace, R.L. & W.K. Taylor (2002) *Invertebrate Zoology Lab Manual*. 6<sup>th</sup> Ed. Benjamin Cummings, San Francisco, CA. 356 pp. ISBN-10: 0130429376.

Writing Texts are not required, but at least one of those below is strongly recommended.

- University of Chicago Press Staff (2017) *The Chicago Manual of Style*. 17<sup>th</sup> Ed. Univ. Chicago Press, Chicago, IL. 1184 pp. ISBN-10: 022628705X
- Strunk, W., Jr., & E.B. White. 1995. *The Elements of Style*. 3<sup>rd</sup> Ed. Pearson, London, UK. ISBN-10: 0205191584

**Note:** earlier editions of the above writing guides are acceptable, but print copies are preferable to digital because of formatting issues. Neither is expensive.

#### Additional Invertebrate Biology Resources:

Wikipedia is a useful secondary source of information for some invertebrates but should never be used as a reference. You may use Wikipedia to find primary references, but Google Scholar (<http://scholar.google.com/>) and PubMed (<http://www.ncbi.nlm.nih.gov/pubmed>) are examples of more comprehensive databases.

Taxonomy is a rapidly advancing field and even online resources such as Wikipedia may not represent the latest revisions. The most widely accepted taxonomic resource for marine invertebrates is the World Registry of Marine Species (WoRMS, <http://www.marinespecies.org/>). There is no comparable resource for freshwater invertebrates. Other resources will be noted during the course.

## 2 Learning Outcomes

This course will introduce the student to the biology of the non-vertebrate marine and aquatic animals that humans harvest or culture. Invertebrates (e.g. mollusks, crustaceans, echinoderms, etc.) comprise the majority of animal species and many are important fisheries or aquaculture species. Invertebrates are anatomically, physiologically, and ecologically more diverse than finfish, and this diversity must be understood in order to study their fishery management or aquaculture.

By the end of this course, students will:

- Become familiar with most groups of marine and aquatic invertebrate animals that are or have been fished by humans, for food or other purposes
- Have been introduced to the major groups of marine and freshwater invertebrates that are commercially cultivated, or are being studied for commercial cultivation
- Be aware of aspects of the physiology, diet, major ecological interactions, and life cycles of marine and aquatic invertebrates that are relevant to their management or cultivation
- Have been provided with resources, including texts, original research papers, and Internet sites to allow further study in areas of individual interest

## 3 Course Logistics

Students may access lectures, assignments, readings, and supporting materials through the course Canvas site as they become available.

### Technology Requirements:

- A computer or mobile device with high-speed internet connection.
- A headset and/or speakers. A microphone and a webcam are optional, for use only if the student wishes to communicate visually with the instructor.
- Latest version of web browser. Canvas supports only the two most recent versions of any given browser. [What browser am I using?](#)
- Installation of proctoring software will not be required for this course.

**Synchronous online sessions may be recorded.** In the event that we have an optional synchronous online class session, sharing your video, screen, or audio during class sessions is taken to mean that you are consenting to being recorded for the benefit of students who cannot attend live as well as for class review during the current semester. If you have special circumstances or concerns about privacy, it is your responsibility to discuss it with your instructor.

**Instructional Methods:**

The lecture material, in the form of narrated Power Point presentations, will be prepared in advance and will not be live. Presentations are posted each week at <https://lss.at.ufl.edu/>, prior to Wednesday for the topics listed in the course schedule below for that week. There are four formats, each with their advantages and limitations, as follow:

1. Stream the presentation online at the website above as an MP4 video. This is simple and the audio file plays continuously, but the Internet links do not work, and you cannot easily click back and forth through the presentation.
2. Download the color .pdf file – In this version, the Internet links work, but not the audio.
3. Download printable .pdf file – These are smaller downloads, but there are no audio files or Internet links. Many students print these files out and write notes on them.
4. Download .ppt file – The original PowerPoint files are large downloads and require you to have a recent version of PowerPoint, but everything works the way I designed it, or the way I would present it in a live lecture.

You may go through the presentations at your pace. Unless otherwise requested on an individual basis, online interactions between students and instructor will be via email ([pkbaker@ufl.edu](mailto:pkbaker@ufl.edu)). **Use my email rather than the Canvas link if you need a response quickly.**

### 3.1 Description of Assessments & Activities

There will be no assigned online group participation, since students in this course typically live in multiple time zones. Students may view course materials or take quizzes and exams on their own schedule.

**Quizzes:** Each week starting with the second, that there is not a larger exam, there will be a timed quiz with five multiple-choice questions taken from the prior week's material. You may use your notes, the presentations, or any other resources except other students to answer the questions, but there will be only ten minutes for the entire quiz, which is insufficient time to look up the answers if you have not studied. Quizzes will be posted in the Canvas course website prior to Wednesday of the week they are due, are closed midnight on the following Sunday, and will have five questions each. There is no make-up if you miss the deadline, except by prior arrangement (see **5.1. Late Submissions & Make-up Requests**, below).

**Exams:** There will be two exams: a midterm exam midway through the course, and a final exam at the end of the course. The midterm will cover the material from the preceding weeks, and the final exam will be comprehensive. As with the quizzes, you may use any materials to answer the questions, but the exams will be timed (a total time equal to 2 minutes per point on the exam) and there will be no make-up without prior arrangement. The questions will include both short-answer and longer questions.

You will be asked to submit electronic images of your own sketches or diagrams for the midterm and final exams, which can be uploaded in any of several ways. If you do not have a way to upload an image, you must make prior arrangements for an alternative.

**Reports:** Two species reports will be required, one due halfway through the course and one at the end of the 11<sup>th</sup> week. The due date is midnight on Friday of the week they are due. You must come up with a species for the second report, approved by the instructor, by the end of the 6<sup>th</sup> week. Late reports will be accepted at the instructor's discretion, but will suffer a penalty proportional to the lateness. More information on reports is provided separately in **Writing Assignments Guidelines for FAS 5407**, available separately on the course website.

### 3.2 Grades & Grading Scale

Students will be graded based on online quizzes (nine in total) and two exams, and on two written reports, to be submitted via the e-Learning website or via email to the instructor. The relative value of each is outlined in Grades & Grading Scale, below. Points assigned to quizzes, exams, and reports are not the same as grade point percentages, but represent a precise fraction of such. For example, since there will be nine quizzes worth a combined 26.25% of the grade (below), if a quiz has five points, each point is worth just over 0.58% of your grade (pop quiz worth no points: replicate my math!). A report will be graded based on 100 points, but still be worth only 10% or 20% of the grade.

The course grade will be broken down as follows.

Quizzes (combined)	26.25% of grade
Midterm Exam	17.5% of grade
Final Exam	26.25% of grade
Report 1	10% of grade
Report 2	20% of grade

#### Grading Scale (%)

A 90-100  
B+ 85-89.99  
B 80-84.99  
C+ 75-79.99  
C 70-74.99  
D+ 65-69.99  
D 60-64.99  
E < 60

For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

## 4 Learning Content

### Proposed Schedule of Topics.

Each week will be divided into an estimated 9-12 recorded presentations (PowerPoint presentations), one to several presentations per topic. The schedule listed below is an approximate guideline and actual times will be modified as needed, but all of the topics listed below will be covered in that order. Quizzes and exams are due by midnight on the Sunday following the week for which the quiz is listed (e.g. Quiz 1 is due by midnight, May 29). Reports are due by midnight EDT (Florida time) on the Friday of the week listed.

Week 1 (May 15-19): <u>Course Introduction &amp; Sponges</u>	(no quiz)
Week 2 (May 22-26): <u>Cnidarians: Corals &amp; Jellyfish</u>	<b>Quiz 1</b>
Week 3 (May 30 - June 2): <u>Rotifers, Annelids, &amp; Peanut Worms</u> <i>Note: May 29 is a holiday but this will not affect our schedule.</i>	<b>Quiz 2</b>
Week 4 (June 5-9): <u>Mollusks: Introduction &amp; Gastropods</u>	<b>Quiz 3</b>
Week 5 (June 12-16): <u>Mollusks: Bivalves</u>	<b>Quiz 4</b>
Week 6 (June 19-23): <u>Mollusks: Cephalopods &amp; Lophophorates</u> Topic for final report due to instructor for approval.	<b>Quiz 5</b> <b>Report 1 Due</b>
Mid-Summer Break (June 26-30) NO CLASSES	
Week 7 (July 3-7): <u>Arthropods – Introduction</u> <i>Note: July 4 is a holiday but this will not affect our schedule.</i>	<b>Midterm Exam</b>
Week 8 (July 10-14): <u>Crustaceans: Miscellaneous Crustaceans</u>	<b>Quiz 6</b>
Week 9 (July 17-21): <u>Crustaceans: Shrimps, Lobsters, &amp; Crabs</u>	<b>Quiz 7</b>
Week 10 (July 24-28): <u>Echinoderms</u>	<b>Quiz 8</b>
Week 11 (July 31 - Aug. 4): <u>Echinoderms &amp; Chordates</u>	<b>Quiz 9</b> <b>Report 2 due</b>
Week 12 (Aug. 7-11): no presentations	<b>Final Exam</b>

## 4.1 Readings

Additional online or written resources will be suggested during the course. Most of these will not be required but, if they are, free electronic versions will be located. Other optional reading materials are up to students to purchase, download, or borrow through the UF library system. Examples of possible materials include the following.

Landman, N.H., Mikkelsen, P.M., Beiler, R., & Bronson, B. 2001. *Pearls: A Natural History*. Field Museum, Chicago, IL. 232 pp. ISBN-13 : 978-0810944954.

*Who says biology has to be technical? This is a delightful coffee table book, yet filled with information that will make invertebrate zoology relevant even to people who care nothing about clams and snails.*

Mikkelsen, P.M., & Bieler, R. 2008. *Seashells of Southern Florida. Living Marine Mollusks of the Florida Keys and Adjacent Regions. Bivalves*. Princeton University Press, Princeton, NJ. 503 pp. ISBN-13 : 978-0691116068

*This is an example of an important regional identification and biology text for a specific group. If you live elsewhere, I can recommend resources for that region.*

Thorp, J.H., & D. Christopher, D. (eds) 2014. *Thorp and Covich's Freshwater Invertebrates*. 4<sup>th</sup> ed. Academic Press, Cambridge, MA. 1148 pp. ISBN-13 : 978-0123850263.

*This is sort of a memorial edition (Covich has passed, hence the title), to a major multi-author text on freshwater invertebrates of North America. It is excellent for general biology, but there are different volumes for species identification.*

Vandyk, J. (ed.) 2003-2021. BugGuide. Department of Entomology, Iowa State University, Ames, IA. Accessed Apr. 9, 2021. <https://bugguide.net>

*This is a user-generated online resources for images and taxonomy of insects, centipedes, millipedes, and arachnids, both on land and in freshwater. It is a good resource for terrestrial arthropod and freshwater insect identification and taxonomy.*

Williams, A.B. 1984. *Shrimps, Lobsters, and Crabs of the Atlantic Coast of the Eastern United States, Maine to Florida*. Smithsonian Institution Press, Washington, DC. 550 pp. ISBN-13 : 978-0874749601

*Sometimes the latest is not the best. This text, while old, remains the most reliable resource for identification and general biology of the larger marine crustaceans of the eastern U.S.*



## 5 Policies and Requirements

This course plan and syllabus are subject to change in response to student and instructor needs . Any changes will be clearly communicated in advance through Canvas.

### 5.1 Late Submissions & Make-up Requests

It is the responsibility of the student to access on-line lectures, readings, quizzes, and exams and to maintain satisfactory progress in the course. Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: <https://catalog.ufl.edu/UGRD/academic-regulations/>.

Computer or other hardware failures, except failure of the UF e-Learning system, will not excuse students for missing assignments. Any late submissions due to technical issues must be accompanied by the ticket number received from the Helpdesk when the problem was reported to them. The ticket number will document the time and date of the problem. You must e-mail the instructor ([pkbaker@ufl.edu](mailto:pkbaker@ufl.edu)) within 24 hours of the technical difficulty if you wish to request consideration.

For computer, software compatibility, or access problems call the HELP DESK phone number—352-392-HELP = 352-392-4357 (option 2), or access online help at <https://helpdesk.ufl.edu/>.

### 5.2 Communication Courtesy and Professionalism

Just as in any professional environment, meaningful and constructive dialogue is expected in this class and requires a degree of mutual respect, willingness to listen, and tolerance of opposing points of view. **Respect for individual differences and alternative viewpoints will be maintained in this class at all times.** All members of the class are expected to follow rules of common courtesy, decency, and civility in all interactions. Failure to do so will not be tolerated and may result in loss of participation points and/or referral to the Dean of Students' Office.

### 5.3 Semester Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning.

**At approximately the mid-point of the semester**, the School of Forest Resources & Conservation will request anonymous feedback on student satisfaction on various aspects of this course. These surveys will be sent out through Canvas and are not required but encouraged. This is not the UF Faculty Evaluation!

**At the end of the semester**, students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

## 5.4 Academic Honesty Policy

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."*

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment."*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct or appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated.

Online plagiarism checks will be used if plagiarism is suspected. Artificial Intelligence programs that write essays will be regarded by this instructor as a form of academic dishonesty, but grammar check programs that discover errors in your own work are acceptable.

At this time, FAS 5407 does not use online proctoring, provided on contract to the University of Florida by [Honorlock](#)<sup>™</sup>. Should academic dishonesty during exams be detected, the instructor will use online proctoring, resulting in additional costs and inconvenience to all students.

Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

## 5.5 Inclusive Learning Environment

This course embraces the University of Florida's Non-Discrimination Policy, which reads,

*The University shall actively promote equal opportunity policies and practices conforming to laws against discrimination. The University is committed to non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information and veteran status as protected under the Vietnam Era Veterans' Readjustment Assistance Act.*

If you have questions or concerns about your rights and responsibilities for inclusive learning environment, please see the instructor or refer to the Office of Multicultural & Diversity Affairs website:

<http://multicultural.ufl.edu>.

## 5.6 Services for Students with Disabilities:

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. 001 Reid Hall, 352-392-8565 or [DRC@ufsa.ufl.edu](mailto:DRC@ufsa.ufl.edu), also at <https://care.dso.ufl.edu/>.

## 5.7 Software Use

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

## 6 Campus Helping Resources

For issues with technical difficulties for e-learning in Canvas, please post your question to the Technical Help Discussion in your course, or contact the UF Help Desk at:

- [Learning-support@ufl.edu](mailto:Learning-support@ufl.edu) | (352) 392-HELP - select option 2 | <http://elearning.ufl.edu>
- Library Help Desk support <http://cms.uflib.ufl.edu/ask>
- Writing Program resources <https://writing.ufl.edu/writing-studio/writing-resources/>
- SFRC Academic Hub <https://ufl.instructure.com/courses/303721>

### 6.1 Student Life, Wellness, and Counseling Help

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- Counseling and Wellness resources <http://www.counseling.ufl.edu/cwc/>
- U Matter, We Care <http://www.umatter.ufl.edu/>
- Career Connections Center <http://career.ufl.edu/>
- Other resources are available at <http://www.distance.ufl.edu/getting-help> for online students.

### 6.2 Student Complaint Procedure

The School of Forest Resources & Conservation cares about your experience and we will make every effort to address course concerns. We request that all of our online students complete a course satisfaction survey each semester, which is a time for you to voice your thoughts on how your course is being delivered.

If you have a more urgent concern, your first point of contact should be the SFRC Academic Coordinator or the Graduate/Undergraduate Coordinator for the program offering the course. You may also submit a complaint directly to UF administration: <https://distance.ufl.edu/state-authorization-status/>.