

# Biology of Invertebrates (Lecture) – BIOL 690

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<b>Lectures:</b>	TR 10:50 am -12:05 pm, RITA 103
<b>Instructor:</b>	Dr. Christine Byrum
<b>Email:</b>	<a href="mailto:byrumc@cofc.edu">byrumc@cofc.edu</a>
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<b>Office:</b>	RITA 233
<b>Office Hours:</b>	By appointment

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## Course Overview:

This graduate course is designed to familiarize students with the biology of invertebrate species. Over 98% of all animal species are invertebrates, so we'll be covering a lot! In this class, we will examine invertebrate diversity, reviewing the major taxonomic groups, learning key features that characterize each taxon, and examining aspects of invertebrate functional morphology, behavior, physiology, and development/life histories. In the lecture, materials will be presented as lectures, discussions, and short student presentations. In the laboratory, students will have the opportunity to examine living and/or preserved specimens and to record detailed observations of these fauna firsthand. There will also be opportunities to observe invertebrates in the field!

## Student Learning Objectives:

- 1) Students will master terminology used to describe morphological characters, taxonomy, and other aspects of invertebrate biology.
- 2) Students will describe the distinct body plans/features that distinguish each major taxon.
- 3) Students will demonstrate familiarity with development/life histories of invertebrate taxa.
- 4) Students will examine hypotheses concerning invertebrate evolution.
- 5) Students will discuss recent findings in this discipline.
- 6) Students will demonstrate proficiency in scientific communication, present information in a short talk to the class, and write a research paper relevant to invertebrate biology.
- 7) Students will become adept at recording laboratory observations and presenting detailed accounts of these findings in an organized and precise manner.
- 8) Students will critically review a scientific paper related to invertebrate biology.

**Texts:** *Biology of the Invertebrates*, 7<sup>th</sup> edition. Jan Pechenik, 2014 (McGraw-Hill).  
*Invertebrate Zoology Lab Manual (6th edition)*. Wallace and Taylor, 2003 (Pearson).

**Prerequisites:** Introduction to Cell and Molecular Biology (BIOL 111/111L), Evolution, Form, and Function of Organisms (BIOL 112/112L), and Biodiversity, Ecology, and Conservation Biology (BIOL 211/211D).

**Co-requisites:** Genetics (BIOL 305), Statistical Methods I (MATH 250).

## Course Policies

**Attendance:** Students are expected to attend each class, to arrive on time, and to stay for the duration. Regular attendance and participation is critical in this course. If the student is unable to attend, he/she is responsible for all information that was reviewed. If an absence is anticipated, the instructor should be informed ahead of time.

**OAKS:** Lecture notes will be available on OAKS prior to class. Be aware that notes posted before lecture may be revised and re-posted after lecture at the instructor's discretion. Although the slides are designed to aid in preparation for tests, other materials presented in class (orally, on the board, etc.) are also important. Regular class attendance is crucial to understanding the materials.

**Office Hours:** Office hours will be by appointment. To schedule an appointment, contact the instructor by email, telephone, or after class. Students having any questions about the materials or the class are highly encouraged to come by and discuss it with the instructor.

### **Class Assignments:**

**Tests:** Over the semester, three tests (non-cumulative) and a final exam (1/2 non-cumulative, 1/2 cumulative) will be administered in the lecture portion of the course to assess the student's knowledge of the subject matter. Tests comprise a significant portion of the grade, so the student should be sure to prepare thoroughly for each evaluation. In addition, points gained during bonus opportunities offered at the beginning of class may be applied to test scores.

**Paper:** Write a 8-10 page paper about a topic relevant to the Biology of Invertebrates. These papers should be double spaced and written using Calibri, Cambria, or Times font. A complete references section (containing at least 12 references from the primary literature...NOT website citations!) should accompany the paper. Paper topics must be submitted to Dr. Byrum by January 22<sup>nd</sup>. Papers are due on April 4<sup>th</sup>, however those arriving prior to March 5<sup>th</sup> will receive bonus points (+4 points on your lowest test score). Be sure to submit a hard copy and to email a .pdf or .doc version to [byrumc@cofc.edu](mailto:byrumc@cofc.edu).

**Short Presentation:** At the beginning of the semester each student will select a date to present "fun" information relevant to invertebrate biology (<5 minutes). They could show a short video, talk about a recent finding in the news, read a poem about invertebrates, show off cool invertebrate fossils, dress up as your favorite invertebrate and sing an invertebrate-inspired song, bring invertebrate-inspired cookies, produce and display invertebrate artwork/sculpture, or any other fun invertebrate-related activity. Students will sign up for a presentation date at the beginning of the course (these will be posted on OAKS) and should plan to arrive 5-10 minutes before class on the day of their presentation. Be sure that your "fun" activity differs from previously presented activities. At the end of the semester the class will select their favorite presentations and awards will be presented!

**Critical Review:** All graduate students will be required to read an assigned scientific paper and submit a 2-3 page critical review on March 12<sup>th</sup>. They should be sure to address the following:

- Strengths of the paper
- Weaknesses of the paper
- Originality of topic
- Whether it is understandable
- Grammar
- Importance in its field
- Style/overall representation
- Suitability for the journal
- Appropriateness of drawings/illustrations
- Whether title represents manuscript's contents
- Whether abstract is accurate and concise
- Whether methods are properly described
- Whether conclusions/interpretations sound
- Whether references are properly cited

**Lab Notebook/Exercises:** Each week students record their observations in their lab notebook. The lab notebook will be collected and evaluated three times over the course of the semester and scores received will comprise 18% of the final grade. Additional exercises may be assigned in lab and will also be included/evaluated as part of the lab notebook grade.

**Practical Exams:** Two practical exams will be administered in the laboratory portion of the course. Results from the first lab practical are worth 7% of the final grade and results of the second are worth 8%. These are described in more detail in the laboratory syllabus.

**Note:** Missing an assignment, test, or final without permission from the instructor will result in a zero. Make-up assignments/tests/finals will not be given except under extenuating circumstances. If the student cannot be present, they are expected to contact the instructor BEFORE the assignment/test/final. Whether the student is allowed to make-up the assignment/test/final is entirely at the discretion of the instructor. Student will fail the course if they miss 3 lab classes without permission.

**Grading of Assignments:** A single grade based on performance in both the lecture and lab will be assigned for this 4-credit course. The following criteria will be used to calculate the grade.

Lecture Tests (3) (non-cumulative)	27% (9% each)
Final Exam (1/2 non-cumulative, 1/2 cumulative)	15%
Paper	12%
Short Presentation	5%
Lab Practical Exams (2)	15% (1st practical = 7%, 2nd = 8%)
Lab Notebook/Exercises	18%
Critical Review	8%

**Grading Scale:**

90 and above: A	77-79.9: C+
87-89.9: B+	70-76.9: C
80-86.9: B	<70: F

**Classroom courtesy:** Students are expected to turn off cell phones and any other disruptive devices during class time, tests, and/or final exams (no texting!). Exceptions will be made in extreme situations such as spouses anticipating the birth of a child or a serious emergency. Permission to leave an electronic device on should be obtained prior to class.

**Accommodation:** Students requiring specific accommodations to complete course requirements should contact the instructor as soon as possible.

**Academic Integrity:** Students are expected to behave in an honest and responsible manner. Violations of the honor code are offensive and will generally be dealt with severely. We will adhere to the following policy as quoted from the Honor Council's recommended guidelines:

"Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each incident will be examined to determine the degree of deception involved.

Incidents where the instructor determines that the student's actions are related more to a misunderstanding, will be handled by the instructor. A written intervention designed to help prevent the student from repeating the error will be given to the student. The intervention, submitted by form and signed by both the instructor and the student, will be forwarded to the Dean of Students and placed in the student's file.

Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XXF in the course, indicating failure of the course due to academic dishonesty. This status indicator will appear on the student's transcript for two years after which the student may petition for the XX to be expunged. The F is permanent.

Students should be aware that unauthorized collaboration--working together without permission--is a form of cheating. Research conducted and/or papers written for other classes cannot be used in whole or in part for any assignment in this class without obtaining prior permission from the instructor.

Students can find the complete Honor Code and all related processes in the *Student Handbook* at the following site:

<http://studentaffairs.cofc.edu/honorsystem/studenthandbook/index.php>."

## Lecture Schedule

<b>Date</b>	<b>Topic</b>	<b>Reading</b>
Jan. 8 – T	Introduction to Biology of Invertebrates	Ch. 1-2
Jan. 10 - Th	Poriferans and Placozoans	Ch. 4
Jan. 15 - T	Cnidarians (Intro/Hydrozoa)	Ch. 6
Jan. 17 - Th	Cnidarians (Scyphozoa, Staurozoa, Cubozoa, Anthozoa)	Ch. 6
Jan. 22 - T	Cnidarians (Anthozoa), Ctenophores	Ch. 6, 7
Jan. 24 - Th	Bilaterians	Ch. 2
Jan. 29 - T	Platyhelminths and Nemertean	Ch. 8, Ch. 11
Jan. 31 - Th	Annelids ( <b>Lecture Test 1 will be given in lab</b> )	Ch. 13
Feb. 5 - T	Annelids	Ch. 13
Feb. 7 - Th	Molluscs – Intro to Molluscs and Minor phyla	Ch. 12
Feb. 12 - T	Molluscs – Cl. Bivalvia	Ch. 12
Feb. 14 - Th	Molluscs – Cl. Gastropoda	Ch. 12
Feb. 19 - T	Molluscs – Cl. Cephalopoda	Ch. 12
Feb. 21- Th	Arthropods – Intro	Ch. 14
Feb. 26 - T	<b>Lecture Test 2</b>	
Feb. 28 - Th	Trilobites and Marine Arthropods	Ch. 14
March 5 - T	Arthropods (Chelicerata)	Ch. 14
March 7 - Th	Arthropods (Myriapoda, Hexapoda),	Ch. 14
March 12 - T	Panarthropoda (Ph. Tardigrada, Ph. Onychophora)	Ch. 15
March 14 - Th	Nematoida (Ph. Nematoda, Nematomorpha) and Meiofaunal Groups (Ph. Kinorhyncha, Loricifera, Priapulida, Rotifera, Gnathostomulida, Gastrotricha)	Ch. 10, 16 - 18
March 19/21 – T/Th	<b>Spring Break</b>	
March 26 - T	Lophophorates (Ph. Phoronida, Brachiopoda, Bryozoa, and Entoprocta)	Ch. 19
March 28 - Th	<b>Lecture Test 3</b>	
April 2 - T	Echinoderms	Ch. 20
April 4 - Th	Echinoderms	Ch. 20
April 9 - T	Hemichordates	Ch. 21
April 11 - Th	Chordates (sPh. Tunicata)	Ch. 23
April 16 - T	Chordates (sPh. Tunicata and Cephalochordata)	Ch. 23
April 18 - Th	Class Discussion about Phylogenetic Relationships	
April 30 - T	<b>Final Exam</b> (8:00am – 11:00am in RITA 103)	

*\* Schedule may vary subject to scheduling changes and other modifications as needed.*