

Bergen Community College
Division of Mathematics, Science and Technology
Department of Biology and Horticulture

Invertebrate Zoology (BIO-225)

General Course Syllabus
SPRING 2016

Course Title	Invertebrate Zoology (BIO-225)
Course Description:	This course is a survey of the organisms without backbones, the invertebrates. Topics include the taxonomic concepts of cladistics versus the Linnaean phylogenetic study of these organisms. Concepts such as protostomes vs. deuterostomes, the development of the coelom, metamorphosis, etc. will be discussed. Laboratory sessions include external and internal examinations (dissections) of these organisms and descriptive and practical reinforcement of lecture materials.
Prerequisites:	BIO 101, BIO 203
General Education Course:	No
Course Credits;	4.0
Hours per week:	6.0 3 hours lecture and 3 hours lab
Course Coordinator:	Elena Tartaglia
Required Lecture Textbook:	Pechenik, J.A. 2010. <i>Biology of the Invertebrates</i> . 6 th Edition, McGraw-Hill Publishers. ISBN 978-0-07-302826-2
Laboratory Manual:	Hickman, C.P., Kats, L.B., Dolphin, W.D., Dean, H.L., and R.S. Schuhmacher: <u>Customized Laboratory Manual for General Biology II</u> , McGraw-Hill Companies, Dubuque, IA, 2006.

Student Learning Objectives - Lecture

The student will be able to:

1. Describe the environment in which invertebrates exist and some of their adaptations. Assessment will be based upon performance on exam questions.
2. Explain how evolution works and how it leads to greater biodiversity. Assessment will be based upon performance on exam questions.

3. Discuss how invertebrates are classified. Assessment will be based upon performance on exam questions.
4. Describe the protists, phylogenetically, morphologically, and their lifestyles. Assessment will be based upon performance on exam questions.
5. Identify the diversity of the poriferans. Assessment will be based upon performance on exam questions.
6. Discuss the significance of the hydrostatic skeleton. Assessment will be based upon performance on exam questions.
7. Identify the cnidarians and ctenophores. Assessment will be based upon performance on exam questions.
8. Describe the diversity and biology of the platyhelminthes, molluscs and annelids. Assessment will be based upon performance on exam questions.
9. Discuss the arthropods, structure, function, ecology and behavior. Assessment will be based upon performance on exam questions.
10. Discuss the nematodes, structure, function, and ecology. Assessment will be based upon performance on exam questions.
11. Discuss some of the “minor” phyla of invertebrates: tardigrades, onychophorans, kinorhynchans, gastrotrichs, brachiopods and bryozoans. Assessment will be based upon performance on exam questions.
12. Discuss the echinoderms. Assessment will be based upon performance on exam questions.
13. Describe the hemichordates and nonvertebrate chordates. Assessment will be based upon performance on exam questions.

Student Learning Objectives - Laboratory

1. Identify the protists, both preserved material and live. Assessment will be based on lab quizzes, lab book checks and observation in the lab.
2. Identify three phyla: Porifera, Cnidaria and Ctenophora. Assessment will be based on lab quizzes, lab book checks and observation in the lab.
3. Identify the different classes of platyhelminthes, free-living and parasitic—Classes Turbellaria, Trematoda, Cestoda. Assessment will be based on lab quizzes, lab book checks and observation in the lab.
4. Observe the classes of Mollusca: Classes Polyplacophora, Gastropoda, Bivalvia and Cephalopoda. Assessment will be based on lab quizzes, lab book checks and observation in the lab.

5. Observe the classes of annelids: Polychaeta, Oligochaeta and Hirudinea. Assessment will be based on lab quizzes, lab book checks and observation in the lab.
6. Observe members of Phylum Nematoda. Assessment will be based on lab quizzes, lab book checks and observation in the lab.
7. Identify and observe Phylum Arthropoda and its classes: Trilobita, Chelicerata, Crustacea and Insecta. Assessment will be based on lab quizzes, lab book checks and observation in the lab.
8. Observe members of Phylum Echinodermata and its classes: Asteroidea, Ophiuroidea, Echinoidea, Holothuroidea and Crinoidea. Assessment will be based on lab quizzes, lab book checks and observation in the lab.
9. Identify and observe some of the minor phyla: Gastrotricha, Acanthocephala, Bryozoa, Brachiopoda Assessment will be based on lab quizzes, lab book checks and observation in the lab.
10. Identify and observe the hemichordates and primitive chordates. Assessment will be based on lab quizzes, lab book checks and observation in the lab.

Student Assessment Tools:

The above student learning objectives will be generally assessed or evaluated by instructors using a variety of **assessment instruments** including **lecture exams, laboratory exams, quizzes, laboratory reports, written reports, presentations, projects, etc.** The decisions concerning the type or types and number of instruments that are used in a specific section of the course will be left to the instructor of that section. This information, when given by the instructor should be recorded by the student in the **Student Assessment Section** of this document.

Course Content:

Lecture Topics:

UNIT	TOPICS	READINGS
1.	Taxonomy and Evolution of the Invertebrates A. Linnaean System-Binomial Nomenclature B. Cladistics C. Phylogenetic Classification of Metazoans D. Evolution E. Life Begins	Chaps. 1, 2
2.	The Protists A. Where Protists Live B. Effects of Body Size C. Bilateral vs. Radial Symmetry	Chap. 3

- D. The Protist Cell
- E. Symbiosis
- F. Anatomy of Protists
- G. Reproduction
- H. Flagellated Protists
- I. Amoeboid Protists
- J. Spore-Forming Protists
- K. Ciliophora

3. The Metazoans Chaps. 4, 5
- A. Evolution and Development
 - B. The Hydrostatic Skeleton
 - C. The Porifera
 - 1. Asconoid, Synconoid and Leuconoid Structure

4. The Cnidarians and Ctenophores Chaps. 6,7
- A. Introduction
 - B. Diploblasty
 - C. Locomotion and Nutrition
 - D. Nervous System
 - E. Reproduction
 - F. Class Hydrozoa
 - G. Class Scyphozoa

READINGS

- H. Class Anthozoa
 - I. Coral Reefs
 - J. The Ctenophores
5. The Platyhelminthes Chap. 8
- A. Introduction
 - B. Class Turbellaria
 - 1. Locomotion
 - 2. Nutrition
 - 3. Excretion and Osmoregulation
 - a. Protonephridia
 - 4. Asexual Reproduction and Regeneration
 - 5. Nervous System and Sense Organs
 - 6. Sexual Reproduction
 - C. Class Trematoda
 - 1. Structure and Physiology
 - 2. Life Cycles
 - D. Class Cestoidea
 - 1. Structure and Physiology
 - 2. Reproduction
 - E. Host-Parasite Relationships

6. The Aschelminthes Chap. 16
- A. Introduction

- B. The Nematodes
 - 1. Structure and Physiology
 - 2. The Parasites
- C. Rotifers
- D. Kinorhynchs
- E. Gastrotrichs
- F. Acanthocephalans
- G. Phylogenetic Relationships

7. The Annelids Chap. 13

- A. Introduction
- B. The Polychaetes
 - 1. Structure and Physiology
 - 2. Regeneration
 - 3. The Trochophore Larva
 - 4. Metamorphosis
- C. The Oligochaetes
 - 1. Structure and Physiology
 - 2. Body Wall and the Coelom
 - 3. Ecology
- D. The Hirudinea
 - 1. Structure and Physiology

8. The Molluscs Chap. 12

- A. Introduction
- B. The Gastropods
 - 1. Evolution
 - 2. Structure and Physiology
 - 3. Taxonomy
 - 4. Ecology
 - 5. Torsion
- C. The Monoplacophorea and Polyplacophora
 - 1. Structure and Physiology
- E. The Bivalves
 - 1. Introduction
 - 2. Adaptive Radiation
 - 3. Structure and Physiology
 - 4. Larvae
- F. The Scaphopods
 - 1. Structure and Physiology
- G. The Cephalopods
 - 1. Introduction
 - 2. Adaptive Radiation and Locomotion
 - 3. Structure and Physiology
 - 4. Chromatophores, Ink Glands and Luminescence
- H. Evolution of the Molluscs

READINGS

9. Introduction to the Arthropods Chap. 14
- A. Structure and Physiology
 - 1. Hormones and Molting
 - 2. Metamorphosis
 - B. Taxonomy
 - 1. The Trilobites
 - 2. The Chelicerata
 - a. Arachnids
 - b. Scorpions
 - 3. The Mandibulata
 - a. Millipedes
 - b. Centipedes
 - c. Crustacea
 - i. Ostracods
 - ii Copepods
 - 4. The Insects
 - a. Structure and Physiology
 - b. Metamorphosis
 - c. Insect Flight
 - d. Social Insects
 - e. A Taxonomy of the Insects

10. Some of the "Lesser" Invertebrates Chap. 19
- A. The Tardigrades
 - B. The Onchyophorans
 - C. The Lophophorates
 - 1. Bryozoa
 - 2. Entoprocta
 - 3. Brachiopoda

READINGS

11. The Echinoderms Chap. 20
- A. Introduction and General Characteristics
 - B. Development and Embryology
 - C. The Stelleroidea
 - 1. Structure and Physiology
 - 2. Water Vascular System
 - 3. Regeneration
 - D. The Echinoids
 - 1. Structure and Physiology
 - E. The Holoturoids
 - 1. Structure and Physiology
 - 2. Evisceration and Regeneration
 - F. The Crinoids
 - 1. Structure and Physiology

12. The "Lesser" Deuterostomates
A. Hemichordates
B. Ascidians

Chap. 21

LABORATORY SCHEDULE

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|-----|--------------------|---|
| 1. | Exercise 1. | Review of the microscope. The Protozoans |
| 2. | Exercise 2. | The Poriferans |
| 3. | Exercises 3,4 | The Cnidaria and Ctenophora |
| 4. | Exercise 5. | The Platyhelminthes |
| 5. | Exercises 7,8,9 | Gastrotrichs, Rotifers, Aconthocephalans |
| 6. | Exercise 10. | The Molluscs |
| 7. | Exercise 11. | The Annelids |
| 8. | Exercise 12. | The Nematodes |
| 9. | Exercises 14,15 | The Tardigrades and Onchyophorans |
| 10. | Exercise 16. | The Arthropods Part I-Trilobita, Chelicerata, Crustacea |
| 11. | Exercise 16. | The Arthropods Part II- Crustacea continued, Insecta |
| 12. | Exercises 17,19,21 | The Sipunculids, Bryozoans, Brachiopods |
| 13. | Exercise 22. | The Echinoderms Part I-Echinoidea, Ophiuroidea, Crinoidea |
| 14. | Exercise 22. | The Echinoderms Part II-Asteroidea, Holothuroidea |
| 15. | Exercise 24,25 | The Hemichordates, Urochordates, Cephalochordates |

Note: This course will be taught in accordance with the above sequence but is subject to change with the instructor's notice.

Student Assessment:

Unit Examinations	_____ %
Quizzes	_____ %
Laboratory reports and hand-ins	_____ %
Other	_____ %
TOTAL	100%

If you have a medical condition or develop a medical condition during this semester, which prevents you from fulfilling the requirements of this course, you must notify your physician. You and your physician must decide whether or not it is appropriate for you to remain in this course. If the decision is to remain in this course, please obtain a letter from your physician indicating that your continued participation in this course is appropriate and present it to the Department Chair.

Faculty Addenda: As per individual faculty member

Lecture Attendance: As per instructor;

Lab Attendance: As per instructor;

Policy Concerning Late Assignments: As per instructor;

Policy Concerning Make-Up Testing: As per instructor;

Safety Information: As per instructor and assigned exercise;

College Policies:

Student Responsibility

Students will be held responsible for reading all pertinent information in college publications regarding withdrawals, course drops, college deadlines, and tuition refunds. Students are responsible for compliance with the rules and regulations as stated in college publications.

Absence of Instructor

Students are expected to wait twenty minutes for a faculty member to come to class. If at the end of twenty minutes, the faculty member does not come, the students should sign an attendance sheet, which indicates the course, date, and time. A student should deliver the attendance sheet to the divisional office (A304) if between 9:00 a.m. and 5:00 p.m. or to the Evening Office (C107) if before 9:00 a.m. or after 5:00 p.m. Students cannot be penalized by faculty for not waiting longer than twenty minutes.

Academic Dishonesty and Plagiarism

Bergen Community College is committed to academic integrity – the honest, fair and continuing pursuit of knowledge, free from fraud or deception. Students are responsible for their own work. Faculty and academic support services staff will take appropriate measures to discourage academic dishonesty. **Plagiarism** is a form of academic dishonesty and may be a violation of U.S. Copyright laws. Plagiarism is defined as the act of taking someone else's words, opinions, or ideas and claiming them as one's own.

Consequences of Violations Academic Integrity

A. Instructor's Sanctions for a Violation

The faculty member will determine the course of action to be followed. This may include:

- Assigning a failing grade on the assignment;
- Assigning a lower final course grade;
- Failing the student in the course
- Other penalties appropriate to the violation;

In all cases, the instructor shall notify the Vice President of Student Services of the violation and the penalty imposed. The student has the right to appeal the decision of the instructor to the appropriate department head.

B. Institutional Sanctions for Violations

When a violation of academic integrity has been reported regarding a student, the Vice President of Student Services may impose disciplinary penalties beyond those imposed by the course instructor, which may include suspension or dismissal from the College. The student shall have the right to a hearing before the Vice President of Student Services or a designated judicial affairs committee. Judicial procedures governing violations of academic integrity are contained in the student handbook.

Class Attendance

All students are expected to attend punctually every scheduled meeting of each course in which they are registered. Attendance and lateness policies and sanctions are to be determined by the instructor for each section of each course. These will be established in writing on the individual course outline. Attendance will be kept by the instructor for administrative and counseling purposes.

Eating and Drinking

Eating or drinking in classrooms, lecture rooms, laboratories, gymnasium, swimming pool, or passageways is forbidden. Covered beverages only are permitted in the library. Eating and drinking are permitted in cafeteria and vending areas only.

Learning Assistance

Henry and Edith Cerullo Learning Assistance Center

The Tutoring Center, English Language Resource Center, Math Walk-In Center and Writing Center are collectively known as the Henry and Edith Cerullo Learning Assistance Center. The Cerullo Learning Assistance Center is located in the Pitkin Education Building, in Room L-125. The telephone number is (201) 447-7489. The Learning Assistance Center, staffed with peer and professional tutors, offers free individual and group tutoring, supplemental instruction, and online tutoring for subjects offered at the College. The Center provides alternative approaches to problem solving and organizational skills. Tutors help clarify classroom lectures and textbooks and help students prepare for exams. These services build student self-confidence and reduce fear of failure. The Center is equipped with the latest technology and software, including tapes, books, review sheets, exercises and software.

Services for Students with Disabilities

Bergen Community College aims to create inclusive learning environments where all students have maximum opportunities for success. Any student who feels he or she may need an accommodation based on the impact of a disability should contact the Office of Specialized Services at 201-612-5269 or via email at ossinfo@bergen.edu for assistance.

Sidney Silverman Library

Main Building, Pitkin Education Center, L-wing, 2nd Floor.

Paramus Library Hours: (201) 447-7131 or visit <http://www.bergen.edu/library/calendar/gcal.htm>

Paramus Service Desk: (201) 447-7970

Meadowlands Location: 1280 Wall Street, Lyndhurst 2nd Floor

Meadowlands Library Hours: <http://www.bergen.edu/library/calendar/gcal.htm>

Meadowlands Service Desk: (201) 301-9692

www.bergen.edu/library

Testing Services

The Bergen Community College Office of Testing Services (OTS) is located in Room S-127. OTS serves the college community by identifying, developing, procuring, administering, processing, and/or evaluating examinations, which meet a variety of administrative and instructional needs. To contact the OTS, please call (201) 447-7202. The Office of Testing Services administers makeup tests as a service for students who, for compelling and exceptional reasons, have missed a scheduled classroom examination. Students must receive prior permission from and make arrangements with their course instructors to take these examinations, under specific conditions, in the Office of Testing Services, Room S-127.

WebAdvisor

WebAdvisor is a web interface that allows students to access information contained in Datatel's Colleague, the administrative database used by Bergen Community College. Students may use WebAdvisor to register for classes, to pay tuition and fees, to view their class schedules, to check grades, to check on progress toward degree requirements, etc. WebAdvisor accounts are available for all students enrolled in credit programs. New students are strongly encouraged to attend an in-person registration or advisement session before using a WebAdvisor account. Eligible students without WebAdvisor user names and passwords may access their WebAdvisor account by going to go.bergen.edu and selecting "I'm new to WebAdvisor." Then, follow the on-screen directions. Check the WebAdvisor FAQ for answers to common questions, such as how to reset your password. Students must have a valid e-mail address on file with the College to use WebAdvisor