

SYLLABUS

CODE: BIOL 205

TITLE: Invertebrate Zoology

DIVISION: Science & Health Sciences **DEPARTMENT:** Biology

COURSE DESCRIPTION: This course is designed for science majors. Through classroom and laboratory experiences, the student will demonstrate an understanding of taxonomy, morphology, structure, function and evolution of the various invertebrate phyla of animals. Laboratory experiences will include field collection, dissection, identification and taxonomic classification, and description of fundamental anatomical traits found within representative phyla. **NOTE: This course is offered only in the Fall Term.**

PREREQUISITES: A grade of "C" or higher in BIOL 102.

PREREQUISITES OR COREQUISITES:

COREQUISITES:

CREDITS: 4

LECTURE HOURS: 3

LAB/STUDIO CREDITS:

LAB/STUDIO HOURS: 3

REQUIRED MATERIALS: Refer to the Brookdale Bookstore Website for text requirements: www.brookdalecc.bkstr.com

ADDITIONAL TIME REQUIREMENTS:

Additional weekly lab time in the Independent Study Laboratory (MAS 041) is usually necessary for successful completion of the course.

COURSE LEARNING OUTCOMES:

The student will be able to:

- Demonstrate comprehension of invertebrate evolution beginning with the ancestral protozoans. (Mathematical/Scientific Reasoning/Information Literacy)
- Differentiate between the various invertebrate phyla and classes based on:
 - a. morphology
 - b. physiology
 - c. reproduction and development
 - d. behavior
 - e. habitat(Mathematical/Scientific Reasoning/Information Literacy)
- Correctly identify representative species of invertebrates from select phyla. (Mathematical/Scientific Reasoning/Information Literacy)
- Comprehend the influence of abiotic conditions and community interactions on the success of invertebrate species. (Mathematical/Scientific Reasoning/Information Literacy)

GRADING STANDARD:

A student must have an average of 65% or better for the classroom component and an average of 65% or better for the laboratory component of the course in order to earn a passing grade for the course.

Upon completion of the course, grades will be assigned as follows:

- A = 92 – 100%
- A- = 89 – 91%
- B+ = 86 – 88%
- B = 82 – 85%
- B- = 79 – 81%
- C+ = 76 – 78%
- C = 70 – 75%
- D = 65 – 69%
- F = <65%

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Unit examination results will be reported as the grade assigned by the faculty calculated to the first decimal place. These grades will be weighed according to course grading policy. In calculating the course grade, 0.5 will round up to the next numerical grade and 0.4 will round down to the next lower numerical grade.

A grade of C or better is required in all pre-requisite courses. Career studies courses must have a grade of C or better to count toward the Mathematics / Science Program – Biology Option. Students are permitted to withdraw from the course without penalty until approximately 80% of the semester is complete. Please see term schedule for the exact deadline.

At the end of the semester, application for an Incomplete may be made if a student with proper documentation needs to complete no more than one lecture exam and/or one laboratory practical. The granting of an Incomplete is at the discretion of the instructor. Please see Instructor's syllabus for additional Grading Policies.

COURSE CONTENT:

Unit One:	Introduction, Environmental Considerations, Classification and Relationships to the Protists
Unit Two:	The Poriferans, Placozoans, Cnidarians and Ctenophores
Unit Three:	The Platyhelminthes, Gnathifera and Nemertines
Unit Four:	The Mollusks
Unit Five:	The Annelids
Unit Six:	The Arthropods, Arthropod relatives and Nematodes
Unit Seven:	The Lophophorates and Echinoderms

DEPARTMENT POLICIES:

Attendance during class and laboratory sessions is strongly recommended for optimum performance in biology courses.

Lecture exams will be given in class or in the Testing Center, depending on instructor preference.

Laboratory practicals will be given during laboratory sessions, in accordance with schedules provided by the instructor.

Exams and practicals must be taken at the times designated by the instructor. A student who misses a lecture exam or laboratory practical must provide prior notification and proper documentation in order to take the exam or laboratory practical. The acceptance of said prior notification and proper documentation will be determined by the instructor.

Documentation must be provided within one week of the student's return to the classroom for a make-up exam or laboratory practical to be scheduled. A student who is unable to provide proper documentation for a missed exam or laboratory practical will be given a grade of zero for that exercise. Students may not re-take exams or laboratory practicals on which they perform poorly.

Requirements for course completion are listed in individual instructor syllabi.

COLLEGE POLICIES:

As an academic institution, Brookdale facilitates the free exchange of ideas, upholds the virtues of civil discourse, and honors diverse perspectives informed by credible sources. Our College values all students and strives for inclusion and safety regardless of a student's disability, age, sex, gender identity, sexual orientation, race, ethnicity, country of origin, immigration status, religious affiliation, political orientation, socioeconomic standing, and veteran status. For additional information, support services, and engagement opportunities, please visit www.brookdalecc.edu/support/

For information regarding:

- ◆ Brookdale's Academic Integrity Code
- ◆ Student Conduct Code
- ◆ Student Grade Appeal Process

Please refer to the **STUDENT HANDBOOK AND BCC CATALOG.**

NOTIFICATION FOR STUDENTS WITH DISABILITIES:

Brookdale Community College offers reasonable accommodations and/or services to persons with disabilities. Students with disabilities who wish to self-identify, must contact the Disabilities Services Office at 732-224-2730 or 732-842-4211 (TTY), provide appropriate documentation of the disability, and request specific accommodations or services. If a student qualifies, reasonable accommodations and/or services, which are appropriate for the college level and are recommended in the documentation, can be approved.

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ADDITIONAL SUPPORT/LABS:

Students enrolled in BIOL 205 have access to the Science Computer Laboratory (MAS 019) and the Independent Study Laboratory (MAS 041).

MENTAL HEALTH:

- Mental Health Crisis Support: From a campus phone, dial 5555 or 732-224-2329 from an external line; off-hours calls will be forwarded to BCC police (2222 from a campus phone)

Psychological Counseling Services: 732-224-2986 (to schedule an appointment during regular hours)

Course Website:

Biology Department information and BIOL 205 resources are available on the Brookdale website:

<http://www.brookdalecc.edu/pages/802.asp>

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#1 of 7 units

4
Credits

Name of Unit: Introduction, Environmental Considerations, Classification and Relationships to the Protists

Unit Objective: The student will demonstrate understanding of the classification of the invertebrates, the influence the environment has on invertebrate animals and the evolutionary connections to ancestral protist groups.

Textbook: Biology of the Invertebrates by Pechenik - 6th edition - Chapters 1-3

Method of Evaluation: Midterm Exam and Laboratory Practical

Estimated Time To Achieve: Two Weeks

Behavioral Objectives	Recommended Learning Experiences
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The Student Will Be Able To:

<ol style="list-style-type: none"> 1. Describe the importance of invertebrates in research. 2. Discuss the influence of environment on invertebrate morphology. 3. Discuss the evolution of the initial invertebrates and their representation in the fossil record. 4. Describe possible methods of invertebrate classification <ul style="list-style-type: none"> - cell number - embryology - body symmetry - developmental pattern 5. Discuss the concept of classification by evolutionary relationship. 6. Describe the use of phylogenetic trees as a means of inferring evolutionary relationships. 7. Discuss classification by means of habitat and lifestyle. 8. Discuss the evolutionary relationships between the protozoa and the invertebrate animals. 9. Describe the general characteristics of the protozoa. 10. Describe protozoan locomotory systems. 11. Discuss the various methods of protozoan reproduction. 12. Discuss protozoan feeding. 13. Describe the morphological features and reproductive characteristics of the alveolate protozoa: <ul style="list-style-type: none"> -the Ciliates -the Dinozoans -the Apicomplexans 	<p>Class Discussion Textbook Readings: Pages: 1-2</p> <p>2-6</p> <p>7-8</p> <p>9-16</p> <p>16-19</p> <p>19-31</p> <p>31-32</p> <p>37-39</p> <p>39-42</p> <p>42-44</p> <p>44-46</p> <p>46</p> <p>46-54 54-58 58-61</p>
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| 14. Describe the morphological features and reproductive characteristics of the amoeboid protozoa. | 62-68 |
| 15. Describe the morphological features and reproductive characteristics of the flagellated protozoa. | 68-72 |

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#2 of 7 units

4
Credits

Name of Unit: The Poriferans, Placozoans, Cnidarians and Ctenophores

Unit Objective: The student will demonstrate an understanding of the characteristic features of organisms classified as poriferans, placozoans, cnidarians and ctenophores.

Textbook: Biology of the Invertebrates by Pechenik - 6th edition - Chapters 4-5, 7

Method of Evaluation: Midterm Exam and Laboratory Practical

Estimated Time To Achieve: Two Weeks

Behavioral Objectives

Recommended Learning Experiences

The Student Will Be Able To:

Class Discussion
Textbook Readings:
Pages:

- | | |
|---|---------|
| 1. Discuss the basic characteristics of organisms classified within Phylum Porifera. | 79-85 |
| 2. Describe the cell level of organization exhibited by sponges and identify the numerous cell types present within the sponge body. | 79-85 |
| 3. Discuss the diversity of poriferans that exist today with a focus on Classification based on spicule composition. | 86-88 |
| 4. Describe the possible mechanisms of sponge reproduction and stages of development. | 89-90 |
| 5. Describe the basic characteristics of organisms classified within Phylum Placozoa. | 91-92 |
| 6. Describe the basic characteristics of organisms classified within Phylum Cnidaria. | 101-104 |
| 7. Describe the tissue level of organization exhibited by cnidarians and identify the specific tissues found within the cnidarian body. | 101-104 |
| 8. Identify the two basic cnidarian body plans: medusa and polyp. | 101-104 |
| 9. Describe the process of cnidocyte activation culminating in a sting. | 101-104 |
| 10. Discuss the classification scheme used in classifying cnidarians.
-Class Scyphozoa
-Class Cubozoa
-Class Hydrozoa
-Class Anthozoa | 104-124 |
| 11. Describe the possible mechanisms of reproduction for various representative species of cnidarians. | 104-124 |
| 12. Describe the basic characteristics of organisms classified within Phylum Ctenophora. | 137-142 |

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13. Discuss the classification scheme used in classifying ctenophores. 143-146
14. Successfully complete assigned laboratory experiences.

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4
Credits

Name of Unit: The Platyhelminths, the Gnathiferans and the Nemertines

Unit Objective: The student will demonstrate an understanding of the characteristic features of organisms classified as platyhelminths, gnathiferans and nemertines.

Textbook: Biology of the Invertebrates by Pechenik - 6th edition - Chapters 8, 10-11

Method of Evaluation: Midterm Exam and Laboratory Practical

Estimated Time To Achieve: Two Weeks

Behavioral Objectives

Recommended Learning Experiences

The Student Will Be Able To:

Class Discussion
Textbook Readings:
Pages:

- | | |
|---|------------|
| 1. Describe the basic characteristics of organisms classified within Phylum Platyhelminthes. | 149-151 |
| 2. Discuss the organ-system level of organization exhibited by free-living flatworms and identify the major organ-systems that are possible. | 151-156 |
| 3. Describe the classification scheme used in classifying platyhelminths.
-Class Turbellaria
-Class Cestoda
-Class Monogenea
-Class Trematoda | 151-170 |
| 4. Discuss the possible adaptations to parasitism demonstrated by certain parasitic flatworms. | 157-161 |
| 5. Identify the numerous possible larval stages for trematode flatworms. | 161-162 |
| 6. Discuss the reproductive cycles for both tapeworms and trematode flatworms. | 157-161 |
| 7. Describe the basic characteristics of organisms classified as rotifers and acanthocephalans. | 183-196 |
| 8. Describe the basic characteristics of organisms classified in Phylum Nemertea. | 203-208 |
| 9. Discuss the classification scheme used in classifying nemertines. | 210 |
| 10. Describe the sexual reproduction and development of nemertines. | 210 |
| 11. Successfully complete assigned laboratory experiences. | Laboratory |

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#4 of 7 units

4
Credits

Name of Unit: The Mollusks

Unit Objective: The student will demonstrate an understanding of the characteristic features of organisms classified as mollusks.

Textbook: Biology of the Invertebrates by Pechenik - 6th edition - Chapters 12

Method of Evaluation: Midterm Exam and Laboratory Practical

Estimated Time To Achieve: Two Weeks

Behavioral Objectives

Recommended Learning Experiences

The Student Will Be Able To:

Class Discussion
Textbook Readings:
Pages:

- | | |
|---|------------|
| 1. Describe the basic characteristics of organisms classified within Phylum Mollusca. | 215-217 |
| 2. Discuss the role of the molluscan mantle in shell formation. | 216 |
| 3. Discuss the classification scheme used in classifying mollusks.
-Class Polyplacophora
-Class Aplacophora
-Class Monoplacophora
-Class Gastropoda
-Class Bivalvia
-Class Scaphopoda
-Class Cephalopoda | 218-256 |
| 4. Identify and describe the characteristic features of mollusks within each class concentrating on chitons, snails and slugs, bivalves and cephalopods. | 218-256 |
| 5. Discuss the reproductive and developmental features of mollusks. | 265 |
| 6. Describe the possible mechanisms of gas exchange available to mollusks. | 266 |
| 7. Discuss the differences between an open circulatory system and a closed circulatory system and identify the mollusks that possess each. | 266 |
| 8. Describe the basic molluscan nervous system. | 266-267 |
| 9. Discuss the digestive system of mollusks. | 268-269 |
| 10. Discuss the excretory structures used by mollusks. | 270-271 |
| 11. Discuss the cephalization of cephalopods and identify the sensory structures present. | 256-263 |
| 12. Discuss the specialized skin cells within the cephalopod body. | 256-263 |
| 13. Successfully complete assigned laboratory experiences. | Laboratory |

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#5 of 7 units

4
Credits

Name of Unit: The Annelids

Unit Objective: The student will demonstrate an understanding of the characteristic features of organisms classified as annelids.

Textbook: Biology of the Invertebrates by Pechenik - 6th edition - Chapters 13

Method of Evaluation: Final Exam and Laboratory Practical

Estimated Time To Achieve: Two Weeks

Behavioral Objectives

Recommended Learning Experiences

The Student Will Be Able To:

Class Discussion
Textbook Readings:
Pages:

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| 1. Describe the basic characteristics of organisms classified within Phylum Annelida. | 295-297 |
| 2. Discuss segmentation and how annelids exhibit it based on their external and internal anatomy. | 295-297 |
| 3. Discuss the excretory structures of annelids concentrating on the function of nephridia. | 297 |
| 4. Describe the characteristic features of polychaete annelid worms. | 297-299 |
| 5. Describe the possible reproductive mechanisms for polychaete annelid worms. | 297-299 |
| 6. Describe the characteristic features of oligochaete annelid worms. | 318-321 |
| 7. Discuss the sexual reproductive process of oligochaete annelid worms. | 321-322 |
| 8. Describe the characteristic features of ectoparasitic leeches within Class Hirudinae. | 322-324 |
| 9. Discuss the sexual reproductive process of leeches. | 325 |
| 10. Identify and describe the organs involved in annelid digestion. | 325-326 |
| 11. Describe the nervous system and sensory organs possessed by annelids. | 327 |
| 12. Describe the closed circulatory system of annelids and discuss its efficiency in oxygen and nutrient circulation and distribution. | 328 |
| 13. Successfully complete assigned laboratory experiences. | Laboratory |

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4
Credits

Name of Unit: The Arthropods, arthropod relatives and the Nematodes

Unit Objective: The student will demonstrate an understanding of the characteristic features of organisms classified as arthropods and nematodes.

Textbook: Biology of the Invertebrates by Pechenik - 6th edition - Chapters 14-16

Method of Evaluation: Final Exam and Laboratory Practical

Estimated Time To Achieve: Three Weeks

Behavioral Objectives	Recommended Learning Experiences
The Student Will Be Able To:	Class Discussion Textbook Readings: Pages:
1. Describe the basic characteristics of organisms classified within Phylum Arthropoda.	341-342
2. Discuss segmentation with regards to the arthropod body.	341-342
3. Identify the numerous appendages present in various arthropod species.	341-342
4. Describe the composition of the arthropod exoskeleton and discuss the the process of molting.	342-343
5. Describe the generalized nervous system of arthropods and discuss variations that exist within the arthropod brain.	344-345
6. Discuss the circulatory system of arthropods.	344
7. Describe the musculature of arthropods.	344
8. Discuss the significance of the compound eye in arthropod visual acuity.	345
9. Describe the possible reproductive mechanisms of arthropods.	349
10. Discuss the classification scheme used in classifying arthropods and identify the basic characteristic features for each group of arthropods. -Class Trilobita -Class Merostomata -Class Arachnida -Class Chilopoda -Class Diplopoda -Class Insecta -Class Crustacea	350-389
11. Differentiate between numerous insect species based on anatomy and life style.	360-370
12. Discuss gradual and complete metamorphosis as it relates to arthropod development.	368-370

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| 13. Describe the basic characteristics of organisms classified within Phylum Tardigrada and Phylum Onychophora. | 421-423 |
| 14. Describe the basic characteristics of organisms classified within Phylum Nematoda. | 431-432 |
| 15. Discuss the body covering and body cavities of nematodes. | 432-433 |
| 16. Discuss the musculature and locomotion of nematodes. | 434-435 |
| 17. Describe the organ systems present within the nematode body. | 436-437 |
| 18. Discuss the sexual reproduction and development of nematodes. | 438 |
| 19. Discuss the significance of beneficial nematodes within the environment. | 444-446 |
| 20. Discuss select species of parasitic nematodes and describe the infections that result. | 438-443 |
| 21. Successfully complete assigned laboratory experiences. | Laboratory |

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4
Credits

Name of Unit: The Lophophorates and the Echinoderms

Unit Objective: The student will demonstrate an understanding of the characteristic features of organisms classified as lophophorates and echinoderms.

Textbook: Biology of the Invertebrates by Pechenik - 6th edition - Chapters 19-20

Method of Evaluation: Final Exam and Laboratory Practical

Estimated Time To Achieve: Two Weeks

Behavioral Objectives	Recommended Learning Experiences
The Student Will Be Able To:	Class Discussion Textbook Readings: Pages:
1. Describe the basic characteristics of organisms classified within Phylum Phoronida, Phylum Brachiopoda and Phylum Bryozoa.	473-487
2. Discuss the basic features associated with lophophorate biology.	488-490
3. Describe the basic characteristics of organisms classified with Phylum Echinodermata.	497-499
4. Discuss the radial symmetry of echinoderms.	497-499
5. Discuss the water vascular system of echinoderms identifying its structures and functions.	497-499
6. Describe the digestive organs of echinoderms.	498
7. Discuss the classification scheme used to classify echinoderms. -Class Crinoidea -Class Asteroidea -Class Ophiuroidea -Class Echinoidea -Class Holothuroidea	500-513
8. Discuss the reproduction of echinoderms and identify the possible larval stages.	518-519
9. Describe the nervous system of echinoderms.	520
10. Successfully complete assigned laboratory experiences.	Laboratory

The syllabus is intended to give student guidance in what may be covered during the semester and will be followed as closely as possible. However, the faculty member reserves the right to modify, supplement, and make changes as the need arises.