

UNIVERSITY OF CALGARY  
DEPARTMENT OF BIOLOGICAL SCIENCES  
COURSE OUTLINE

1. Course: **ZOOLOGY 401 - AN INTRODUCTION TO INVERTEBRATE ZOOLOGY**

Lecture Sections:	L01	MWF	15:00	TI Studio A&B&C	Winter 2017
Labs:	B01/02	T	9:00/12:00	BI 046	
	B05/06	R	9:00/12:00	BI 046	

**Instructor:** Dr. Mindi Summers BI 041 403-220-8761 mindi.summers@ucalgary.ca

**D2L:** ZOOL 401 L01 - (WINTER 2018) - INTRO TO INVERTEBRATE ZOOLOGY (W2018ZOOOL401L01)

Biological Sciences Department BI 186; (403) 220-3140; [biosci@ucalgary.ca](mailto:biosci@ucalgary.ca)

2. **Prerequisites:** Biology 371 or 233 or any two of Biology 231, 241 and 243 and completion of at least 57 units (9.5 full-course equivalents). See section 3.5.C in the Faculty of Science section of the online Calendar (<http://www.ucalgary.ca/pubs/calendar/current/sc-3-5.html>)

3. **Grading:** The University policy on grading and related matters is described in “Academic Regulations, sections F.1 and F.2” of the online University Calendar (<http://www.ucalgary.ca/pubs/calendar/current/f-1.html> and <http://www.ucalgary.ca/pubs/calendar/current/f-2.html>) In determining the overall grade in the course the following weights will be used:

Assignments (11)	15 % (submit on D2L before 14:59 on date due)
Midterm 1 (In-Class on Feb. 2)	12.5 %
Laboratory notebook 1	15 % (submit in lab before 18:00 on Feb 16)
Midterm 2 (In- Class on March 9)	12.5 %
Laboratory notebook 2	15 % (submit in lab before 18:00 on April 6)
Final exam (cumulative)	25 % (scheduled by Registrar)
Group synthesis	2 % (submit on D2L before 08:00 on April 9; present in class on April 9 or 11)
Surveys	3 % (submit on D2L as announced)

Your letter grade for the course will be determined by summing the weighted numerical scores earned for each component listed above and converted using the table on the course outline and posted on the D2L site for the course. **Note:** Letter grades are not determined for any individual component but the table may be used to give you an approximate sense of your standing during the term.

**Final Grade Scale :**

Letter Grade	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Min. Percent Required	95	90	85	80	75	70	65	60	55	52	50

4. **Missed components of term work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in section 3.6: <http://www.ucalgary.ca/pubs/calendar/current/sc-3-6.html>. It is the student's responsibility to familiarize himself/herself with these regulations. See also <http://www.ucalgary.ca/pubs/calendar/current/e-3.html>

5. **Scheduled out-of-class activities:** Dates and times of class exercises held outside of class hours: **None**  
**REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY.**

6. **Online course components:** In the lecture component of the course, we will use the Top Hat Monocle classroom performance system, where you will be asked to use a cell phone to text answers to questions during class. The use of the Top Hat Monocle system is optional, but highly recommended to enhance learning in the classroom. If you answer 85% or more of the in-class questions, your lowest grade on one of your assignments will be replaced by 100%. If you answer less than 85% of the in-class questions, a grade of 0 will be assigned for this course component, and the grade for the lowest assignment will not be replaced. It is your responsibility to ensure that your participation is being properly recorded by the Top Hat Monocle system. In the event of any discrepancy, you must contact the administrators of the Top Hat Monocle system to have them corrected. Correction of any discrepancies must be done prior to 5pm on April 13, 2017. If a student is unable to use the Top Hat Monocle system, please contact Dr. Mindi Summers within the first week of class to make alternate arrangements.

Some teamwork resources are provided by ITP Metrics, a system of secure web-based tools for forming teams.

7. **Examination policy:** No electronic or written aids (e.g. cell phones, tablets, computers, PDAs, notes, textbooks) will be allowed during writing of any exams. Non-programmable calculators will be permitted to answer quantitative questions on exams, if applicable, and permission to do this will be clearly indicated on the examination paper. Students should also read the Calendar, Section G, on Examinations: <http://www.ucalgary.ca/pubs/calendar/current/g.html>.
8. **Writing across the curriculum statement:** In this course, the quality of the student's writing in various written components will be a factor in the evaluation of those components. See also <http://www.ucalgary.ca/pubs/calendar/current/e-2.html>

## 9. ETHICS IN THE BIOLOGICAL SCIENCES

Studies in the Biological Sciences involve the use of living and dead organisms. Students taking laboratory- and field-based courses in these disciplines can expect involvement with and experimentation on such materials. Students perform dissections on dead or preserved organisms in some courses. In particular courses, students experiment on living organisms, their tissues, cells, or molecules. Sometimes field work requires students to collect a variety of living materials by many methods, including humane trapping.

All work on humans and other animals conforms to the Helsinki Declaration and to the regulations of the Canadian Council on Animal Care. The Department strives for the highest ethical standards consistent with stewardship of the environment for organisms whose use is not governed by statutory authority. Individuals contemplating taking courses or majoring in one of the fields of study offered by the Department of Biological Sciences should ensure that they have fully considered these issues before enrolling. Students are advised to discuss any concern they might have with the Undergraduate Program Director of the Department.

10. **Human studies statement:** If you agree, your course work may be used for research purposes. Your responses will remain anonymous and confidential. Grouped data (no individual responses) may be used in academic presentations and publications. Participation in such research is voluntary and will not influence grades in this course. Students' signed consent forms will be withheld from instructors until after final grades are submitted. More information will be provided at the time student participation is requested. See also Section E.5 of the University Calendar.
11. **Lab photographic device policy:** No photography will be permitted in the lab section of this course. If you violate this policy, your device will be confiscated until the end of the lab period. Repeated abuse may result in a charge of misconduct.

## 12. OTHER IMPORTANT INFORMATION FOR STUDENTS:

- (a) **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K. Student Misconduct to inform yourself of definitions, processes and penalties.
- (b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- (c) **Student Accommodations:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at [http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities\\_0.pdf](http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf).

Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Biological Sciences, Dr. H. Addy by email [addy@ucalgary.ca](mailto:addy@ucalgary.ca) or phone 403 220-3140.

- (d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- (e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also <http://www.ucalgary.ca/secretariat/privacy>.
- (f) **Student Union Information:** VP Academic Phone: 403 220-3911 Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca)  
SU Faculty Rep. Phone: 403 220-3913 Email: [science1@su.ucalgary.ca](mailto:science1@su.ucalgary.ca), [science2@su.ucalgary.ca](mailto:science2@su.ucalgary.ca) and [science3@su.ucalgary.ca](mailto:science3@su.ucalgary.ca);  
Student Ombuds Office: 403 220-6420 Email: [ombuds@ucalgary.ca](mailto:ombuds@ucalgary.ca); <http://ucalgary.ca/provost/students/ombuds>
- (g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.

- (h) **U.S.R.I.:** At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses ([www.ucalgary.ca/usri](http://www.ucalgary.ca/usri)). Your responses make a difference - please participate in USRI Surveys.

Department Approval: \_\_\_\_\_ Date: \_\_\_\_\_

Z401 co W18; 13/12/2017 2:53 PM

# ZOOLOGY 401 - AN INTRODUCTION TO INVERTEBRATE ZOOLOGY

## COURSE OUTLINE

### Instructor

Dr. Mindi Summers

Office: BI 041

Phone: 403-220-8761

Email: [mindi.summers@ucalgary.ca](mailto:mindi.summers@ucalgary.ca)

Email is the preferred method of communication for questions and ideas. I will do my best to read and respond to emails within 24 hours Monday-Friday. I will try to respond to emails received during the weekend by the following Tuesday. Please book all in-person appointments to review or discuss work directly at: <https://summers.youcanbook.me/>. To ensure targeted and timely response, please include the following components in all emails: a) appropriate salutation (e.g., "Dear Dr. Summers"); b) description of the problem/question; c) description of the steps you have taken to solve the problem/answer the question; and d) specific feedback that you are requesting.

### TAs

Contact information for the TAs will be posted in D2L and provided at the first laboratory session. Please email your TA if you will miss a laboratory, need additional time to complete laboratory exercises, or with questions specific to laboratory preparation and improving your laboratory notebook. Your TAs are not able to answer questions regarding lecture material or general course expectations and marking. Please use the email format described above when writing to your TAs.

### Peer mentors

Undergraduates who previously took Zoology 401 will be facilitating peer discussion and learning during the lecture component. Their role is to: prompt and encourage your thinking; identify areas of persistent conceptual difficulty or misunderstanding; and discuss instruction and make recommendations to me. The peer mentoring role requires them to NOT say whether an answer is correct or incorrect, even if specifically asked. Undergraduate peer mentors will NOT be involved in any marking or assessment. Any feedback or ideas that you share will peer mentors will be shared (with your agreement) with the instructional team anonymously.

### Office hours/open labs

Students are invited to discuss the assignments, lecture, laboratory, and other invertebrate-related topics during office hours held from 8:30-9:30 on Fridays in BI 041. I also welcome discussion immediately after lecture on Monday, Wednesday, and Friday, and by appointment. Please schedule an appointment directly at: <https://summers.youcanbook.me/>.

The lab in BI 046 will also be open for you examine the week's material, with TAs available to answer questions, from 10:00-14:00 on Fridays. The day and times for open labs may change based on student requests – please email your TA to request alternative times. The most up to date open lab times can be found on D2L.

### Required and recommended texts and other supplies

Required textbook: Biology of the Invertebrates, Pechenik, McGraw-Hill, 7<sup>th</sup> edition. ISBN: 0073524182.

Required other supplies: Dissecting equipment.  
Laboratory sketchbook or binder with blank pages.  
Drawing pencils; set of 12 colored pencils or fine-tipped colored markers (recommended).

### Course D2L site

**D2L:** ZOOL 401 L01 - (WINTER 2018) - INTRO TO INVERTEBRATE ZOOLOGY (W2018ZOOL401L01). This website will have the most updated schedule, assignments, readings, and slides and materials. You will also use D2L to complete and turn-in your assignments.

### Course description and themes

Understanding animal biodiversity requires the study and appreciation of invertebrates. Invertebrates are found within every animal phyla and include a far greater number of species and span a vaster range of diversity (in morphology, structure, development, reproduction, etc.) than vertebrates (a sub-phylum). Invertebrates are also model organisms for biological study, play both positive and negative roles in human and animal health, and are key indicators of environmental health. Studying invertebrates will broaden your career options in environmental monitoring/management, environmental consulting, environmental toxicology, invasive species monitoring/management, conservation and resource management, fisheries biology, basic research, and graduate studies in ecology, evolution, and organismal biology.

This course will explore the diversity of invertebrates, emphasizing evolutionary, structure-function, and ecological relationships. We will explore the following four themes:

- 1) Invertebrate diversity is the result of ongoing **evolution**.

- 2) Observing **structure/function** relationships highlights that the basic requirements for animal life have been met in many different ways.
- 3) The **ecology** of invertebrates is complex, diverse, and fundamental to many ecosystems.
- 4) Knowledge of invertebrates has countless **applications** – they are important model organisms, impact human health, provide information on environmental health, and inspire engineering.

### Course goals

By the end of this course, you will be able to:

- 1) Identify and explain the morphological characteristics, including synapomorphies, of the major clades of animals (as shown in Dunn et al. 2014) and the well-supported clades of Bilateria, Deuterostomia, Protostomia, Spiralia, and Ecdysozoa.
- 2) Compare and contrast the structure and function relationships found in different invertebrate groups for feeding, mechanics and movement, respiration, excretion, ionic and osmotic regulation, reproduction and lifecycles, and buoyancy, defense, development, and control systems (e.g., nervous systems).
- 3) Use an evolutionary framework, basic taxonomy, and phylogenetic theory to critically compare different evolutionary hypotheses, map traits and present arguments for evolution of key (given) features, and identify homologies and synapomorphies among invertebrate groups.
- 4) Communicate scientific observations of live, preserved, and sectioned organisms in the form of scientific drawings and descriptions, which include accurate scalebars, labels, and identifications.
- 5) Find, analyze, interpret, and discuss primary and popular literature, particularly graphs, tables, and figures, on topics in invertebrate zoology.
- 6) Discuss invertebrate biology and ecology in the context of conservation problems, scientific investigation using model organisms, design, and environmental monitoring.
- 7) Engage as an undergraduate researcher in zoology with professional skills that include self-directed learning and inquiry, an understanding of how you learn, confidence in taking risks and embracing challenges, independent problem solving, personal goal setting, collaboration with others, and email and professional etiquette.

### Course organization

The course is designed so that you are engaging as a scientist in lecture, laboratory, and out-of-class assignments. Concepts, ideas, and skills developed in lecture will be practiced and assessed in laboratory sessions and vice versa. Although hands-on work with animals will be restricted to laboratory sessions, all other techniques to foster learning – peer discussions, reading primary literature, writing, problem-solving, and regular feedback – will be interwoven throughout lecture, laboratory, and assignments. I expect you to teach and learn from each other in all of these settings and your full participation in all of these activities will help you succeed in this course.

Each week we will focus on a different group of organisms. All lecture, lab, and assignments outside of class are designed to help you more fully understand and apply the material. You will first be exposed to the organisms through independent exploration as part of the assignments and lab preparation. During lecture, you will actively explore the research literature on evolution, ecology, morphology, and functional biology (e.g., development, feeding, movement). You will be expected to engage in activities and assignments, including but not limited to, responding to writing prompts, answering clicker questions, engaging in discussion, and completing worksheets and assignments. During lab, you will carefully observe the form and consider the function of anatomical features, identify the diagnostic morphology of groups, observe developmental stages, and develop skills in scientific drawing, slide preparation, microscope use, and observation. You will synthesize and apply this knowledge to critical problem-solving and evaluation in the exams.

### Learning groups

In the lecture section of this course, you will be working within five to eight person learning-groups. After solving problems as individuals, the group will engage in peer-instruction and collaboration to answer questions, solve problems, and develop learning strategies – a technique that has been shown to increase learning compared to instructor lecture and explanation only (see Smith et al., 2011). You will take all exams using this peer-instruction format – first individually, and then as a group. As a learning group, you will also synthesize and share knowledge for one invertebrate group during the last week of the term.

You will be sent a link before the first day of class to complete a survey on ITP Metrics. ITP Metrics will design lecture learning-groups to maximize student diversity.

### Exams

There will be two midterm exams held during the regularly scheduled lecture time and one final exam during the exam period. These exams are opportunities to synthesize and apply your knowledge of material covered in previous lectures, laboratory periods, and assignments. In the event of a university-sanctioned absence on the day of a midterm exam, you will be given the option to complete an alternative 35-minute oral-exam on the material covered.

*Midterm exam 1 – Friday, February 2<sup>nd</sup>* – 12.5% of overall course grade

This exam is cumulative and will cover all information discussed in the course (**in lecture, lab, assignments, and readings**), with a major focus on weeks 1-3. This exam will be first taken individually (worth 90% of the midterm grade) and then as a group

(worth 10% of the midterm grade). If your individual score is higher than the group score, your individual score will be 100% of your midterm grade.

**Midterm exam 2 – Friday, March 9<sup>th</sup>** – 12.5% of overall course grade

This exam is cumulative and will cover all information discussed in the course (**in lecture, lab, assignments, and readings**), with a major focus on weeks 4-7. This exam will be first taken individually (worth 90% of the midterm grade) and then as a group (worth 10% of the midterm grade). If your individual score is higher than the group score, your individual score will be 100% of your midterm grade.

**Final exam – Scheduled by the Registrar** – 25% of overall course grade

This exam is cumulative and will cover all information in the course (**in lecture, lab, assignments, and readings**), with half of the exam having a major focus on weeks 11-12. This exam will be first taken individually (worth 90% of the exam grade) and then as a group (worth 10% of the exam grade). If your individual score is higher than the group score, your individual score will be 100% of your midterm grade.

### **Laboratory notebook**

You will record and communicate your observations during each laboratory section in a laboratory notebook that will remain in the laboratory space. Your laboratory notebook will be marked for points twice following the completion of the laboratory during the week of Feb 12 (Annelida lab) (15% of overall course grade) and April 2 (Hemichordata and Craniata lab) (15% of overall course grade). Late or missing laboratory notebooks will not be marked. Knowing the names of the animals, their body parts, and laboratory procedures during the lab period will allow you to better engage with the animals, make useful observations, more easily communicate your findings, and complete all components within the given lab time periods.

Attendance in all laboratory sessions is required for full points on the laboratory notebook (see marking scheme on D2L). Unless you have a university-sanctioned absence from your laboratory period, you will not be able to complete the laboratory notebook assignment outside of or in a different laboratory period. Access to material will only be available during the lab's scheduled week and the week following; live material will only be available during the week of the scheduled lab.

### **Assignments**

There will be eleven assignments in this course. **All assignments are to be submitted on D2L before the start of class (14:59) on Mondays.** Late assignments will not be graded. Assignments are intended to prepare you to engage in lecture and laboratory activities and will consist of two parts:

- 1) Questions that guide your reading of the textbook and primary articles in preparation to engage in lecture and laboratory activities. You will answer a sub-set of these questions online on D2L.
- 2) You will find a video, newspaper report or popular science article, AND a primary research or review article related to the focus organisms in the upcoming week's lecture and lab. You will post links to the material with a one paragraph description to the discussion forum on D2L. You will also briefly (more than three sentences) respond to at least two other student's posts on the discussion forum.

### **Group synthesis**

During the last week of class, your team will present to the class a five-minute synthesis of an assigned group of invertebrates. Your synthesis is an opportunity to be creative and have fun discussing invertebrates. It must include examples of current scientific research that address each of the four course themes and an example synthesis-level exam question, but otherwise can be self-designed by your group. You will complete activities to help you prepare this synthesis on April 2 or 5 (in lab) and April 6 (in lecture). You will submit your synthesis materials (e.g., powerpoint, handout, poster, videos, interactive poster) on D2L before 08:00 on April 9. Late or missing materials will not be marked. Your presentation will be marked during the class periods on April 9 and 11. In the event of a university-sanctioned absence on the day of the presentation, you will be given the option of an individual five-minute oral presentation on the assigned invertebrate group.

### **Surveys**

There will be surveys announced throughout the course that will be available on D2L. These surveys will be marked for completion only. These surveys are designed to improve instruction in this course and your effort on these surveys is important. You are asked to not use outside resources when completing these surveys. To ensure use of the survey information, there will not be opportunities for late submissions once each survey has closed.

### **Invertebrate book club (optional)**

There are many non-fiction and fiction works that star invertebrates. You have the option of choosing a book that features invertebrates (>200 pages), writing a one-page review AND participating in a discussion held outside of class during the weeks of February 26-March 9. The one-page review article should be written following the format of a book review to the journal *Nature* or *Science*. This one-page review article is due Monday, February 26 at 08:00; late reviews will not be marked. Following submission of your one-page review, you will be sent an invitation to join a book club meeting. Participating in the invertebrate book club is optional, but highly recommended to expand your thinking about invertebrates. If you participate (by reading a book, completing a review, AND joining a discussion), your mark in the invertebrate book club (up to 50% of a midterm grade) will be added onto your lowest grade for one of the midterms to a maximum midterm score of 100%. For example, if your lowest midterm

grade was 45% and your grade for the invertebrate book club was 100%, your midterm grade would increase to 95%. If you do not participate in the invertebrate book club, a grade of 0 will be assigned for this course component and the grade for the lowest midterm will not be modified.

**Resources for further investigation into invertebrates**

- 1) Web of Science is an excellent search engine to find primary articles in invertebrate zoology.
- 2) The World Register of Marine Species (WoRMS - <http://www.marinespecies.org/>) provides updated taxonomic information.
- 3) The Encyclopedia of Life (EOL - <http://eol.org/>) gives descriptions for many groups.
- 4) Paleos is another great resource for information on invertebrates (<http://palaeos.com/>).
- 5) AskNature is a website that provides biomimicry examples.
- 6) *The zoology coloring book* - Lawrence M. Elson. ISBN: 978-0064603010 – includes some of the groups we cover in this class.
- 7) Other textbooks on invertebrates include:
  - Custom Adaptation from General Zoology Laboratory Guide, Lytle & Meyer. McGraw-Hill. 16<sup>th</sup> edition. ISBN: 9781259938405.
  - Invertebrates* - Richard C. Brusca, Wendy Moore, Stephen M. Shuster. ISBN: 978-1605353753.
  - Invertebrate zoology: a functional evolutionary approach* - Edward E. Ruppert, Richard S. Fox, and Robert D. Barnes. ISBN: 978-0030259821.
  - The invertebrates: a synthesis* - R.S.K. Barnes, Peter P. Calow, P.J.W. Olive, D.W. Golding, J.I. Spicer. ISBN: 978-0632047611.

**Tentative Schedule for Zoology 401.**

The most up-to-date class topics, readings, and assignment information can be found on D2L.

WEEK	TOPIC	WEEKLY READINGS
Jan 8-12	M Introduction and overview *W Natural history and classification F Ctenophora LAB Introduction to scientific observation & record-keeping	Pechenik – Biology of Invertebrates Chapters 1, 2, 7 & 24
Jan 15-19	*M Porifera 1 W Porifera 2 F Porifera 3; Placozoa LAB Porifera	Chapter 4
Jan 22-26	*M Cnidaria 1 W Cnidaria 2 F Synthesis; Xenacoelomorpha; Chaetognatha LAB Cnidaria	Chapters 5, 6, 18(part) & 22
Jan 29-Feb 2	*M Platyhelminthes 1 W Platyhelminthes 2 F <b>Midterm 1</b> LAB Platyhelminthes	Chapter 8
Feb 5-9	*M Mollusca 1 W Mollusca 2 F Mollusca 3 LAB Mollusca	Chapter 12
Feb 12-16	*M Annelida 1 W Annelida 2 *F Annelida 3 *LAB Annelida	Chapter 13
Feb 19-23	Reading Week	
Feb 26-Mar 2	*M Rotifera (incl. Acanthocephala); Bryozoa; Entoprocta; Cycliophora W Nemertea; Brachiopoda; Phoronida F Gnathostomulida; Micrognathozoa; Orthonectida; Dicyemida; Gastrotricha LAB Rotifera; Acanthocephala; Bryozoa; Brachiopoda; Phoronida; Nemertea TBD Invertebrate Book Club Discussion	Chapters 9, 10, 11, 18(part) & 19
Mar 5-9	*M Tartigrada; Onychophora W Nematoda & Nematomorpha; Priapulida; Kinorhyncha; Loricifera F <b>Midterm 2</b> LAB Tartigrada; Onychophora; Nematoda; Nematomorpha	Chapters 15, 16 & 17
Mar 12-16	*M Arthropoda 1 W Arthropoda 2 F Arthropoda 3 LAB Arthropoda I	Chapter 14
Mar 19-23	*M Arthropoda 4 W Arthropoda 5 F Arthropoda 6 LAB Arthropoda II	Chapter 14
Mar 26-30	*M Echinodermata W Echinodermata F No class – university holiday LAB Echinodermata	Chapter 20
April 2-6	*M Hemichordata W Cephalochordata; Urochordata; Craniata F Synthesis *LAB Cephalochordata & Urochordata	Chapters 21 & 23
April 9-13	*M Synthesis *W Synthesis F Synthesis	
April 14-26	TBD <b>Final Exam</b>	

(\* ) Indicate due dates for assignments, pre/post surveys, laboratory notebooks, and group synthesis materials. All assignments must be submitted before class on Mondays (14:59). The class surveys must be submitted before class on Wednesday, January 10, Friday, February 16, and Wednesday, April 11 (14:59). The lab portfolio is due twice on Friday, February 16 and Friday, April 6 (18:00). The group synthesis materials must be submitted by 08:00 on Monday, April 9 and presented in class on Monday, April 9 or Wednesday, April 11.