

UNIVERSITY OF CALGARY
DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

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

Lecture Sections: L01 MWF 15:00 ST 145 Winter 2019

Labs: B01/02/03 T 9:00/12:00/15:00 BI 046
B04 R 12:00 BI 046

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

D2L: [ZOOL 401 L01 - \(WINTER 2019\) - INTRO TO INVERTEBRATE ZOOLOGY \(W2019ZOOL401L01\)](#)

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

NOTE: Students must use their UofC account for all course correspondence.

2. **Prerequisites:** Biology 371 or 233. 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:

Midterm Exam 1	20 % (in lab Feb 12/14)
Midterm Exam 2	20 % (in lab March 26/28)
Final exam	25 % (scheduled by registrar during Final Exam period)
Laboratory notebook (8)	20 % (submit in lab)
Assignments (8)	10 % (submit on D2L)
Minor phyla presentation	3 % (submit on D2L; present in lecture April 8-12)
Surveys	2 % (submit online when announced)

Your letter grade for the course will be determined by summing the weighted numerical scores earned for each component listed above and converting them to a letter grade using the scale below. **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 TopHat classroom performance system, where you will be asked to use a cell phone or other device to text answers to questions during class. The use of the TopHat 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 completed 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 TopHat system. In the event of any discrepancy, you must contact the administrators of the TopHat system to have them corrected. Correction of any discrepancies must be done prior to 5pm on April 12, 2019. If a student is unable to use the TopHat system, please contact Dr. 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 and evaluating 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 factor in the evaluation of those components. See also <http://www.ucalgary.ca/pubs/calendar/current/e-2.html>

9. HUMAN & LIVING ORGANISM STUDIES STATEMENTS:

Students will not participate as subjects or researchers in human studies.
See also Section E.5 of the University Calendar.

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. Students are expected to be familiar with Section SC.4.1 of the University Calendar.

Reappraisal Of Grades:

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See Section I.3 of the University Calendar.

a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **15 days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall immediately submit the Reappraisal of Graded Term work form to the department in which the course is offered. The department will arrange for a reassessment of the work if, and only if, the student has sufficient academic grounds. See sections I.1 and I.2 of the University Calendar

b. **Final Exam:** The student shall submit the request to Enrolment Services. See Section I.3 of the University Calendar.

11. Other Important Information For Students:

a. Mental Health

The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, Mental Health Services Website) and the Campus Mental Health Strategy website (Mental Health).

b. SU Wellness Center:

The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see www.ucalgary.ca/wellnesscentre or call 403-210-9355.

c. Sexual Violence:

The University of Calgary is committed to fostering a safe, productive learning environment. The Sexual Violence Policy (<https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>) is a fundamental element in creating and sustaining a safer campus environment for all community members. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (svsa@ucalgary.ca) or phone at 403-220-2208.

d. 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. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. **These are only examples.**

e. Assembly Points:

In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points.

f. Academic Accommodation Policy:

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 [procedure-for-accommodations-for-students-with-disabilities.pdf](#). Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head, Undergraduate of the Department of Biological Sciences, Heather Addy by email addy@ucalgary.ca or phone 403 220-6979. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See Section E.4 of the University Calendar.

g. Safewalk:

Campus Security will escort individuals day or night (See the Campus Safewalk website). Call 403-220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

h. Freedom of Information and Privacy:

This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). 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 Legal Services website.

i. Student Union Information:

VP Academic, Phone: 403-220-3911 Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: 403-220-3913 Email: sciencerep@su.ucalgary.ca. Student Ombudsman, Email: suvpaca@ucalgary.ca.

j. Internet and Electronic Device Information:

Unless instructed otherwise, cell phones should be turned off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.

k. Surveys:

At the University of Calgary, feedback through the Universal Student Ratings of Instruction (USRI) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.

Department Approval: _____ **ORIGINAL SIGNED** _____ Date: _____

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ZOOLOGY 401 - AN INTRODUCTION TO INVERTEBRATE ZOOLOGY

COURSE OUTLINE

INSTRUCTIONAL TEAM

Instructor & course coordinator

Dr. Mindi Summers

Office: BI 041

Phone: 403-220-8761

Email: mindi.summers@ucalgary.ca

I look forward to discussing and learning about invertebrates with you this term! As the instructor and coordinator for the course, I have designed or co-designed with previous students all of the lectures, labs, assignments, and other components in this course. You will see me in a lead role during the lectures and as a mentor/advisor to the TAs and peer mentors in the lab. Please reach out to ask me any questions that you have regarding the course.

Office hours: I have open, drop-in office hours on Fridays from 8:30-9:30am. Another good way to introduce yourself, discuss the course, and talk about invertebrates is to meet with me during your laboratory period and immediately after lecture. Please email me if you would like to meet outside of scheduled lab or office hour times.

Email: If a question or idea cannot be brought up in person during office hours, email is the next preferred method of communication. 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. To ensure targeted and timely response of your emails, 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

Teaching assistants (GTAs) in Zoology 401 are graduate students who are developing their teaching practice. You will have one TA that facilitates your work in the lab and you may also see the course TAs in lectures. Your GTA will act as a coach to help you achieve and continue improving throughout this course – please ask your GTA for feedback on your progress.

Your GTA will provide you with contact information at the first laboratory session. Please email your GTA if you will miss a laboratory or with questions specific to laboratory preparation and improving your laboratory notebook. Please use the email format described above when writing to your GTAs.

Please remember that our GTAs are developing their teaching skills! Please direct feedback to me so that I can best mentor them in developing their teaching practice.

Peer mentors

Peer mentors are current undergraduates who are enrolled in SCIE 511- Peer Mentoring and Collaborative Learning in Science. As part of this course, students complete a practicum experience in a course that they have previously taken. The practicum in Zoology 401 will include facilitating student learning in lecture, lab, and through drop-in sessions. You will see peer mentors developing their skills at prompting and encouraging discussion, identifying challenging topics on the course, and facilitating discussion and learning. Peer mentors are only in the course as coaches and will NOT be involved with any marking or evaluation. If there are areas of confusion or struggle, please mention these to the peer mentors so that they can organize a drop-in session!

Lab technician

The lab materials you will work with are set-up, monitored, and removed by our course technician – Arminty Clarke. She also ensures that the lab is a safe environment to work. Please follow her advice and recommendations in the lab and ask her questions about general lab safety, proper technique, and working with equipment and specimens. Please also thank her for all of the work that she does each week to make our labs a success!

Class representatives

Please volunteer to be a class representative! Class reps are currently enrolled students in Zoology 401 who volunteer to collect and share student feedback on Zoology 401 – you can attend any meetings at any time (no commitment is required). Class reps meet with me on Mondays after class for approximately 30 minutes (I always bring snacks!). During our weekly meeting, class reps first share out ideas and comments from students and then we discuss ways to improve the course. Class reps will also lead collection and analysis of mid-semester feedback on the course. You will hear updates from the class reps weekly – please take the time to talk with them so that your experiences and ideas are heard!

COURSE OVERVIEW

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 broader 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) Communicate verbally and through writing and visuals, your ability to:
 - a. 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.
 - b. Explain, compare and contrast, and discuss 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).
 - c. Discuss invertebrate biology and ecology in the context of conservation problems, scientific investigation using model organisms, design, and environmental monitoring.
 - d. Use evolutionary trees to identify the relatedness of different invertebrate taxa, propose hypotheses for the evolution of traits, and discuss taxonomic implications.
 - e. Find, analyze, interpret, and discuss primary and popular literature, particularly graphs, tables, and figures, on topics in invertebrate zoology.
- 2) Engage in laboratory and research work with professional skills that include:
 - a. Scientific observation of live, preserved, and sectioned organisms in the form of scientific drawings and descriptions.
 - b. Scientific record-keeping (e.g., accurate scalebars, labels, and identifications).
 - c. Use of compound and dissecting microscopes, including slide preparation.
 - d. Animal dissection following provided protocols.
 - e. Observation and handling of live animals with instruction.
 - f. Reflective practices for continual improvement and growth (e.g., time management, 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 professionalism).

COURSE ORGANIZATION

Each week, we will discuss a major group of invertebrates in lecture and lab. All lecture, lab, and assignments outside of class are designed to help you more fully understand and apply the material – with the goal being that you can synthesize all of the material at the end of the week. 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. You will 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. During the last week of the term, you will be presenting to the class on specific minor phyla.

Recommended time management for a typical week in Zoology 401 (~10 hours)

Zoology 401 is designed so that you are spending **approximately 10 hours per week** engaging as a scientist in lecture, laboratory, and out-of-class assignments.

Preparation before lecture and lab (~2 hours). Before Monday lectures, you will first read about and watch videos on the week's organisms. Materials and instructions are posted on D2L so that you can prepare at a time that works best for you. A set of questions will guide you through collecting basic information about the animals and the discussion board provides you with opportunities to read about and share articles and videos with classmates. You should also read the laboratory plan for the week, make a plan to manage your time in lab, and prepare any questions you have regarding the labs. Knowing the names of the animals, their body parts, and laboratory procedures before the lab period will allow you to better engage with the animals, make useful observations, easily communicate your findings, and complete all components within the given lab time periods.

Discussion of course themes in MWF lectures (3 hours). During lecture, you will actively explore the course themes (evolution, ecology, morphology, and functional biology (e.g., development, feeding, movement)) in small learning groups of approximately four to six students. You will be expected to engage in activities and assignments, including but not limited to, responding to writing prompts, answering TopHat questions, engaging in discussion, and completing worksheets and assignments. Typically, when given a problem, you will first work on it on your own, then your group will engage in peer-instruction and collaboration to problem solve and discuss learning strategies, and then we will talk about the problem as a group – a technique that has been shown to increase learning compared to instructor lecture and explanation only (see Smith et al., 2011). You will complete parts of your 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.

Observation and examination of specimens in T or Th lab (3 hours). 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 also practice and perform dissections on select invertebrates.

Review and synthesis of lecture, lab, and assignments (~2 hours). At the end of each week, set aside time to compile and summarize the material from lecture, lab, assignments, and your own reading and exploration. When doing so, I recommend that you

particularly focus on being able to answer the learning objectives for each week. This will save you time when reviewing material for exams and also allow you to identify and ask us questions. Please bring your questions to my office hours and to the peer mentors.

Other time commitments during the term

Preparation for exams. If you continue to review and synthesize your notes and work throughout the term, you should not need to spend much time reviewing content (be sure to check that you are comfortable with all of the week's learning outcomes). You will want to spend time practicing the type of questions that you will see on the quizzes. Use the questions given in lecture (TopHat, quick-writes, drawings) as example exam questions. Without looking at the answers, try to answer these questions again. Also, take the time to write and answer your own sets of questions similar to those posed for each of the learning outcomes.

Completion of surveys. You should plan approximately 35 minutes to complete surveys given during the term.

Preparation for minor phyla talk. You will be given time during lecture to prepare your minor phyla talk. You may wish to spend a minimal amount of time outside of class looking up information and practicing your presentation.

(Optional) Invertebrate book club. If you are interested, you can read a book on invertebrates during the first half of the course and discuss your reading with others during week 7. Please see the Optional Opportunities section for more information.

COURSE INFORMATION & RESOURCES

Course D2L site

D2L: ZOOL 401 L01 - (WINTER 2019) - INTRO TO INVERTEBRATE ZOOLOGY (W2019ZOOL401L01).

D2L will have the most updated schedule, assignments, readings, and slides and materials. You will also use D2L to complete and turn-in your assignments. D2L is organized by week, following the schedule. It is advised that you look one week ahead to ensure that you are aware of upcoming deadlines and assignments.

Important items to locate on D2L:

Lecture outline slides. I recommend that you download and bring a copy of the lecture slides to class with you to annotate. Lecture slides are incomplete so that you can practice note-taking, drawing, and writing in class in real-time, and also so that you can add relevant information. Some images shown in class may not appear in the lecture outline slides due to copyright restrictions. When this occurs, a link to the image or video will be provided.

Lab exercises. We have created weekly lab exercises specifically for Zoology 401. I recommend that you read, annotate, and become familiar with each lab BEFORE attending.

Assignments and discussion board. Questions and discussion boards are organized by week on D2L. Be sure to look ahead as assignments are due on Monday morning!

Optional readings and videos. Supplementary readings are posted each week, as well as any videos that I think you might find helpful.

Marking schemes. Marking schemes are posted with the assignment. Review these schemes to ensure that you are meeting expectations and targeting your work.

Required supplies

- Drawing sketchbook or binder with blank pages. Minimum size of 8.5 by 11 inches.
- Dissecting equipment.
- (Optional) Drawing pencils; set of 12 colored pencils or fine-tipped colored markers.

Required and recommended texts

There are many resources available to complete the weekly assignments and supplement your learning in lecture and lab. I recommend using textbook and internet websites as resources to answer questions that you have, rather than as something to read cover-to-cover. Information on invertebrates is mostly incomplete and spread across many resources – as a result there is no one textbook or site that will give you all of the information you would like on a topic.

Required textbook (on reserve in TFDL): Biology of the Invertebrates, Pechenik, McGraw-Hill, 7th edition. ISBN: 0073524182.

Biology of the Invertebrates provides a concise overview of the different groups. I provide the chapters that correspond to each week in the tentative schedule below. This text unfortunately does not cover everything that you might want to know about a group or the material covered in lab. Please be aware that the text is also not free of errors; I will try to address these during lecture.

Other recommended resources for information on invertebrates:

1) Textbooks and books:

- a) *Invertebrate Zoology – A laboratory manual* – Wallace & Taylor, 6th ed. ISBN: 0130429376.
- b) *Invertebrates* - Brusca, Moore, & Shuster. ISBN: 978-1605353753.
- c) *Invertebrate zoology: a functional evolutionary approach* - Edward E. Ruppert, Richard S. Fox, and Robert D. Barnes. ISBN: 978-0030259821.
- d) *The invertebrates: a synthesis* - R.S.K. Barnes, Peter P. Calow, P.J.W. Olive, D.W. Golding, J.I. Spicer. ISBN: 978-0632047611.
- e) General Zoology Laboratory Guide, Lytle & Meyer. McGraw-Hill. 16th edition. ISBN: 9781259938405.

f) *The zoology coloring book* - Lawrence M. Elson. ISBN: 978-0064603010 – includes some of the groups we cover in this class.

2) Websites:

- a) YouTube!
- b) The Encyclopedia of Life (EOL - <http://eol.org/>) gives descriptions for many groups.
- c) Tree of life project (tolweb.org)
- d) Wikipedia
- e) Paleos for information on extinct invertebrates (<http://palaeos.com/>).
- f) AskNature is a website that provides biomimicry examples (<https://asknature.org/>).

3) Search engines and databases:

- a) Web of Science, Scopus, and Google Scholar are an excellent search engines to find primary articles in invertebrate zoology.
- b) The World Register of Marine Species (WoRMS - <http://www.marinespecies.org/>) provides updated taxonomic information.

Please let me know if you find other useful resources so that I can add them to the list!

MARKING AND EVALUATION

Midterm Exams

There will be two midterm exams held during your regularly scheduled lab time during **week 5 and week 10**. Each midterm will cover material discussed in the course (**in lecture, lab, assignments, and readings**) during weeks 1-4 (midterm exam 1) or during weeks 5-9 (midterm exam 2). The midterm can consist of multiple choice, written fill-in questions, and short answer questions. Multiple choice and fill-in responses will be first taken individually (worth 90% of your mark for these questions) and then as a group (worth 10% of your mark for these questions). If your individual score is higher than the group score, your individual score will be 100% of your mark for these questions.

Cumulative final exam

The final exam is an opportunity to synthesize and apply your knowledge of material covered in all lectures, laboratory periods, and assignments throughout the term. The exam can include multiple-choice, fill-in, and short-answer questions. The multiple-choice and fill-in section first be taken individually (worth 90% of your mark for these questions) and then as a group (10% of your mark for these questions). If your individual score is higher than the group score, your individual score will be worth 100% of your mark for these questions.

Assignments

There will be eight assignments in this course. **All assignments are to be submitted on D2L before lecture on Mondays (15:00)**. 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) D2L Quiz: questions are provided to guide your reading of the textbook and other sources in preparation for lecture and laboratory activities. You may use any and all resources to answer the questions. You are encouraged to work with others to prepare, but you must complete the quiz on your own and without consultation with others. A time-limit is given and you will have two attempts to answer the quiz questions.
- 2) D2L Discussion Board: you will find a video, newspaper report or popular science article, AND a primary research or review article related to the organisms covered in the upcoming week's lecture and lab. You will post links to the three sources with a one paragraph (~3 sentence) description of one of the links to the discussion forum on D2L. You will also briefly respond to at least two other student's posts on the discussion forum.

Laboratory notebook

You will record and communicate your observations during each laboratory section in a laboratory notebook. During each lab, you will discuss your laboratory notebook with your GTA. After discussion and the opportunity for improvement, you will receive a mark based on your effort and accurate completion of the exercises. Attendance at your assigned laboratory session is required for points to be awarded on your laboratory notebook. Unless you have a university-sanctioned absence from your laboratory period, you will not be excused or able to complete the laboratory notebook in a different laboratory period. Since we use live animals in this course, you will only be able to complete each week's lab during that week; material will not be available during following weeks.

Minor phyla presentation

During the last week of class, your group will present to the class for five-minute on an assigned group of invertebrates. Your presentation is an opportunity to be creative and have fun discussing invertebrates – the only requirement is that you talk about your group! Possible ideas to discuss include: current scientific research, biomimicry or design related to the group, conservation implications, creation of a song, video, etc. You will have time during lecture to prepare your presentation. You must submit your presentation materials (e.g., Powerpoint, handout, poster, videos, interactive poster) on D2L before 08:00 on April 8. Your presentation will be marked during the class periods on April 8 and 10 based on effort, accuracy, and clear communication. In the event of a university-sanctioned absence on the day of the presentation, you will be given the option of creating a one-page infographic 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, but **you must complete ALL surveys to receive credit**. 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. Since the timing of the surveys is important, there will not be opportunities for late submissions once each survey has closed.

OPTIONAL OPPORTUNITIES

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 week 7. 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 25 at 08:00; late reviews will not be accepted. Following submission of your one-page review, you will be sent an invitation to join a book club discussion session. 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), 15% will be added onto your lowest grade for one of midterm exams, up to a maximum score of 100% for your exam. For example, if your lowest midterm exam mark was 65% and you participate in the invertebrate book club, your midterm exam mark will increase to 80%. If you do not participate in the invertebrate book club, a grade of 0 will be assigned for this course component and the mark for your lowest midterm exam will not be modified.

Tentative Schedule for Zoology 401.

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

WEEK	TOPIC	TEXTBOOK READINGS	DUE ON MONDAY
Jan 11	Introduction and overview	Chapters 1 & 7	
1 (Jan 14-18)	Porifera	Chapter 4	Assignment 1; Survey 1
2 (Jan 21-25)	Cnidaria	Chapter 6	Assignment 2
3 (Jan 28-Feb 1)	Platyhelminthes	Chapter 8	Assignment 3
4 (Feb 4-8)	Annelida & Bryozoa	Chapters 13 & 19	Assignment 4
5 (Feb 11-15)	Mollusca		<i>In lab – Midterm 1</i>
Feb 18-22 – Reading Week			
6 (Feb 25-Mar 1)	Mollusca	Chapter 12	Assignment 5 (optional – book club)
7 (Mar 4-8)	Arthropoda	Chapter 14	Assignment 6
8 (Mar 11-15)	Arthropoda & Nematoda	Chapters 14 & 16	Assignment 7
9 (Mar 18-22)	Echinodermata	Chapter 20	Assignment 8
10 (Mar 25-29)	Minor Deuterostomia: Hemichordata; Urochordata; Cephalochordata	Chapters 21 & 23	<i>In lab – Midterm 2</i>
11 (April 1-5)	Minor phyla talk preparation – Ctenophora; Placozoa; Xenacoelomorpha; Chaetognatha; Entoprocta & Cycliophora; Nemertea; Brachiopoda & Phoronida; Gastrotricha; Gnathostomulida & Micrognathozoa; Rotifera (incl. Acanthocephala); Orthonectida & Dicyemida; Priapulida; Loricifera & Kinorhyncha; Nematomorpha; Tartigrada; Onychophora	Chapters 7, 9, 10, 11, 15, 17, 18, 19, & 22	
12 (April 8-12)	Minor phyla talks		Minor phyla talk; Survey 2
April 14-26 (TBD) - Final Exam			