



UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

1. **Course:** ZOOL 576, The Invertebrates -- Fall 2018

| Instructor Name | Email | Phone | Office | Hours |
|--|--------------------------|--------------|--------|----------------|
| <i>L01:</i> (MWF 11:00 - 11:50 in SA 247) | | | | |
| Mindi Summers | mindisummers@ucalgary.ca | 403-220-8761 | BI 041 | Fri 9:30-10:30 |

Course Site:

D2L: ZOOL 576 L01-(Fall 2018)-The Invertebrates

Department of Biological Sciences:

Office: BIO 186
Phone: 403 220-3140
Email: biosci@ucalgary.ca

Note:

Students must use their U of C account for all course correspondence.

Labs: B01/02 - Tuesday - 9:00/13:00 - BI 046

2. **Requisites:**

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

Prerequisite(s): One of Zoology 375, 401 or 435. Also known as: (formerly Zoology 475)

3. **Grading:**

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the online University Calendar. In determining the overall grade in the course the following weights will be used:

| Component(s) | Weighting % | Date |
|-------------------------------------|-------------|---|
| Research portfolio (w/ 4 exercises) | 30% | Exercises due on D2L as announced; Final portfolio due Dec 7 on D2L |
| Laboratory record keeping | 30% | Due in lab sessions as announced |
| Methodology assignments (9) | 18% | Due on D2L as announced |
| Reading assignments (5) | 10% | Due in lecture as announced |
| Biodiversity research symposium | 10% | Due on D2L as announced and in class Dec 3 & 5 |
| Surveys | 2% | Due on D2L as announced |

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

| | A+ | A | A- | B+ | B | B- | C+ | C | C- | D+ | D |
|---------------------------|------|------|------|-----|-----|------|------|-----|-----|------|------|
| Minimum % Required | 95 % | 90 % | 85 % | 80% | 75% | 70 % | 65 % | 60% | 55% | 52 % | 50 % |

This course has a non-registrar scheduled final component.

Student must attempt all course components or a course grade of F may be assigned.

Students must pass Laboratory record keeping and Biodiversity research symposium components to earn a passing grade in the course overall.

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](#). It is the student's responsibility to familiarize himself/herself/themself with these regulations. See also [Section E.3](#) of the University Calendar.

5. **Scheduled out-of-class activities:**

There are no scheduled out of class activities for this course.

6. **Course Materials:**

Required other supplies:

1) Laboratory notebook with carbon-copy pages: UofC bookstore: Chemistry Self Duplicating Student Lab Notebook 100 Set; ISBN: 978-1-930882-00-3; \$15.95

2) Dissecting equipment (for lab).

3) Lab coat (for lab).

4) Safety goggles (for lab).

5) At least two different coloured pens (for lab)

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.

8. **Approved Mandatory and Optional Course Supplemental Fees:**

There are no mandatory or optional course supplemental fees for this course.

9. **Writing across the Curriculum Statement:**

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section [E.2](#) of the University Calendar.

10. **Human & living organism studies statements:**

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.

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.

Students are expected to be familiar with [Section SC.4.1](#) of the University Calendar.

11. **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.

1. **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 re-assessment of the work if, and only if, the student has sufficient academic grounds. See sections [I.1](#) and [I.2](#) of the University Calendar
2. **Final Exam:** The student shall submit the request to Enrolment Services. See [Section I.3](#) of the University Calendar.

12. 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](tel: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](tel: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](tel: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](tel: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.

ZOOLOGY 576- THE INVERTEBRATES COURSE OUTLINE

COURSE OVERVIEW

Welcome to Zoology 576! In this course we will explore the topic of invertebrate biodiversity. You will engage in authentic collaborative research to learn more about the invertebrates that we share our city and campus with, and use this research experience to explore what we know about invertebrate biodiversity, how we know it, what the limitations of our knowledge are, and the societal outcomes of biodiversity research.

Learning outcomes - by the completion of this course, you will be able to:

- 1) Identify a select group of invertebrates using morphological and/or molecular techniques, including DNA extraction, PCR amplification, Sanger sequencing, and bioinformatics analysis (e.g., BLAST, distance, and phylogenetic inference).
- 2) Design a research question exploring biodiversity, collect and analyze evidence, and produce publishable scientific findings (e.g., DNA sequences, scientific photographs) that can be contributed to a scientific manuscript and/or biodiversity database (e.g., BOLD, GenBank, online digital collection).
- 3) Describe the context and implications of a research study by finding, critically evaluating, and discussing research findings produced by others.
- 4) Communicate and disseminate research findings to other audiences, including scientific, academic, and the general public.
- 5) Coordinate, manage, and contribute to a collaborative team-based scientific investigation of biodiversity.

What to expect in an inquiry-driven, authentic research course

As an inquiry-based course, Zoology 576 differs from Zoology 401 in its organization, learning outcomes, and form of assessment. You will likely notice the following:

1) *Skill-based learning outcomes:* Zoology 576 focuses on **skill development** and **the process of scientific research**. In Zoology 401, the course was organized around content themes (different phyla each week), conceptual learning outcomes, and scientific skills (e.g., record keeping, tree-thinking) were developed to explore and learn more about the content each week. In Zoology 576, the goal of the course is for you to learn the skills required to conduct and share research on the biodiversity of invertebrates in our city.

2) *Flexible course schedule:* Zoology 576 uses an **inquiry-driven teaching model**. The course schedule is organized so that you learn the parts and methodologies of a scientific paper - allowing you to replicate and share findings for one style of biodiversity survey. While some of the content of each lecture and lab is therefore set, other time has been purposively left available to be modified in real-time to respond to your needs as researchers. For example, your interests will drive what papers we read and discuss, and what additional skills we spend time developing (e.g., advanced analyses, time and project management). Your curiosity, inquiry, and research projects are therefore the underlying driver of our course.

3) *Repetition of experimental procedures with critical analysis and troubleshooting.* You will learn a set of general methods during this course and then repeat, modify, trouble-shoot, and question their relevance and effectiveness for your specific project. There is unfortunately not one set of procedures that will work for all groups or all types of biodiversity questions. You will think of the methods as a starting point to exploration in this course, and then question and redesign them to best fit your questions and research aims.

4) *Teams and collaboration:* In Zoology 576, you will **collaborate** on three to four person research teams throughout the course. Collaboration is different from informal group work (like you experienced in Zoology 401), in that it requires shared goal setting, project and time management, and time to be invested in developing the collaboration as well as the team's research outcome. How well your team works together greatly influences your experience in the course and the outcomes of your research project - so we will spend time discussing and learning collaboration skills.

5) *Assessment of research effort and development:* Your skill development and learning in this course will be assessed through evidence that you collect of your progress. Instead of a midterm and final exam, you will compile a **research portfolio** that includes evidence of your progress and development as a researcher. This evidence can include, but is not limited to: skill self-assessment, reflections, independent learning, career connections, the development of a CV or resume, samples of research updates or laboratory notebook entries throughout the term. As a result, **you are not assessed in this course on whether or not you achieve results**, but instead on how you worked through the research process, solved problems, explored the field, and developed your research practice.

6) *High student involvement:* This course is driven by your inquiry and research and requires your **attendance in lecture and labs, preparation and exploration outside of class, and commitment to your research team's goals and schedule**. Zoology 576 requires weekly tasks: completion of assignments to develop skills, reading and searching the literature, and work towards your group's goals outside of class. It is not possible to develop all of the skills required or complete your research project in a few weeks - this project will require continual effort throughout the term. To help maintain momentum, you will regularly discuss your progress and work with the instructional team and share your work with your peers for support and guidance. Likewise, activities completed in all lectures and labs will build your skills and become part of your research portfolio. Missing lectures and labs will significantly impact your progress and ability to complete this course.

7) *"Failure" (=opportunity) is a productive and regular occurrence:* In research, and in this course, **"failure" (=opportunity) occurs regularly and provides important feedback for improvement**. While very important, set-backs and unexpected results are also challenging. The instructional team and all of your peers are here to help you problem-solve and persist through these moments of opportunity.

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 research with you this term! As the instructor and coordinator for the course, I have designed or co-designed with previous students and GTAs all of the lectures, labs, assignments, and other components in this course. 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 9:30-10:30am. I will also meet weekly with each research team during lab, and also regularly check in on your team's progress during lectures. These are both excellent times to meet with me individually to discuss your individual development plan and progress in the course. Please email me if you would like to meet outside of scheduled lab or office hour times.

Email: I have found that I typically give the best feedback face-to-face, and I encourage you to meet with me in person during lab or office hours whenever possible. If a question or idea cannot be brought up during my "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.

Lab technician

Arminty Clarke - The lab materials and equipment you will work with are set-up, monitored, and maintained by Arminty Clarke, our course technician. 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. Arminty will also assist you with acquiring any needed supplies for your research project and should be consulted with during the design of your research project. Please also thank her for all of the work that she does each week to make your research experience a success!

Graduate teaching assistant (GTA)

Your teaching assistant (GTA) in Zoology 576 is a graduate student who is developing their teaching practice. Your GTA will act as a coach to help you develop your research skills and problem solve with your research project. Please ask your GTA for feedback on your progress.

Your GTA will provide you with contact information at the first laboratory session. Be sure to 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! I welcome feedback 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 576 will include facilitating student learning in lecture, (sometimes in 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!

Please remember that our peer mentors are undergraduate students and this is likely their first experience mentoring and facilitating learning in an undergraduate setting. Please direct feedback to me so that I can best mentor them in developing their teaching practice.

Class representatives

Please volunteer to be a class representative! Class reps are Zoology 576 students who volunteer to collect and share student feedback on the course – 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 ORGANIZATION

Overview of weeks

Zoology 576 is designed so that you are spending **approximately 15 hours per week** engaging as a scientist in lecture, laboratory, and out-of-class assignments. Please note that the time commitment for this course is higher than for Zoology 401, but this time commitment includes time to generate your research portfolio, which is in place of midterm and final exams.

During weeks 1-9, we will discuss and produce the components of a scientific manuscript and most scientific presentations:

Introduction (week 1): we will describe biodiversity, establish collaborative norms and expectations, identify skills that you would like to develop during the course, and review searching the literature and reading scientific articles.

Methods (weeks 2-7): we will learn about and develop methods to survey invertebrate diversity, identify invertebrates using morphological and molecular approaches, and analyze biodiversity data using phylogenetics.

Results (weeks 8-9): you will digitally photograph your specimens with the library to contribute to our online digital collection, explore different methods of analyzing and presenting your findings, and story-board your research narrative around visualizations of your findings.

During weeks 10-13, you will have the opportunity to share your findings and prepare to engage further in the scientific community. We will combine all of our work into a class manuscript and you will upload any data that you produce to online public databases. We will engage in scientific peer review, you will attend a research symposium on campus, you will present your findings at our own symposium, and if time allows we will explore how to prepare for future opportunities in science.

Recommended time management for a typical week in Zoology 576 (~15 hours)

Engagement in scheduled lecture and lab (6 hours). During lecture and lab, you will actively work with your team to conduct research and investigate biodiversity.

Methodology assignments (~1 hour). Before Monday lectures, you will first read about a set of methodologies for collecting, analyzing, or sharing data. After you have read and studied the materials, you will complete a short D2L quiz. Each quiz is timed and you will have two attempts to answer the questions. Materials and instructions are posted on D2L so that you can prepare at a time that works best for you.

Laboratory preparation, record keeping and updates, and contributing to your team's goals (~4 hours). While completing the weekly methodology assignment, you will also read and review the laboratory procedures for each week and prepare any questions to ask in Monday's lecture. As part of your pre-lab preparation, you will generate a project update, annotate the methods, prepare a schematic of your experimental procedures, and prepare your individual laboratory notebook. In lab, you will record each step of your work, label and organize all materials, and generate lab updates and next steps. At the beginning of the course, and with revisions throughout, your team will decide on project goals and a timeline for deliverables that best suites the needs of the project and individual team members. It is your responsibility to meet deadlines set by the team and contribute to the project as agreed upon.

Reading the literature (~1.5 hours). As a class, we will read and discuss four scientific articles during Friday "journal club" discussions. When reading these articles, you will take notes and annotations on the article and summarize the figures and main findings on a separate sheet. In addition to these readings, you will also spend time searching the literature and compiling other articles as part of your team project. Setting aside time each week will ensure that your work is always well-situated within what we already know and what we still need to know.

Reflection and compilation of evidence for research portfolio (~2 hours). Throughout the term, you will be collecting and reflecting on evidence of your progress in the course, exploring and refining your goals, and reflecting on your research experience. It is recommended that you spend approximately 2 hours each week working on portfolio exercises, reflecting on your experience, and compiling evidence to include in your portfolio.

Completion of surveys (~30 minutes for each). You should plan approximately 30 minutes to complete each survey during the course.

MARKING AND EVALUATION

I have developed a range of assignments and assessment methods for Zoology 576 to maximize your exposure to the course content and research experience, provide you with constructive real-time feedback, and allow you to showcase and provide evidence of your learning through multiple avenues.

Methodology assignments. You will complete nine assignments during the term that will introduce you to collecting, analyzing, and sharing invertebrate biodiversity data. After you have read and studied the materials, you will complete a short D2L quiz or assignment that will be marked for percent correct. Each D2L quiz is timed and you will have two attempts to answer the questions; your mark will be based on the percent correct on your last attempt. **Assignments are due by 8am on Monday mornings.** Late assignments will not be accepted or marked.

Reading assignments. As a class, we will read and discuss nine scientific articles together as part of a Friday "journal club" discussion. When reading these articles, you will take notes and annotations throughout and summarize the figures and main findings on a separate sheet. A copy of your annotated article and your summary sheet must be brought to class on the Friday that the article is discussed. Your effort on these articles and summary sheet will be marked for completion. **Your assignment must be printed for the start of class on the date that it is due.**

Laboratory record keeping. Before lab, you will generate a project update, annotate the methods, prepare a schematic of your experimental procedures, and prepare your individual laboratory notebook. In lab, you will record each step of your work, label and organize all materials, and generate lab updates and next steps. Your work will be peer reviewed and then marked weekly by the GTA. Detailed instructions and marking schemes for laboratory expectations are posted on D2L.

Biodiversity research symposium. Your team will prepare and present on your work during a research symposium held during lecture on December 3 and 5. Marking schemes for the symposium will be posted on D2L prior to reading week. You will have the opportunity to peer review and practice your presentations during lab in week 11.

Research and professional development portfolio. You will collect and assemble evidence of your research process and continual inquiry, and your skill development over the duration of the course. This evidence can include, but is not limited to: survey responses, work completed in class in lab, assignment results, readings, and personal reflections. You will prepare and receive feedback on your Portfolio through four exercises due throughout the term. Portfolio exercises will be marked for completion and a marking scheme is provided on D2L for your final portfolio. **Your final portfolio is due by 8am on Friday, December 7.** An optional peer review session for portfolios will occur during the last laboratory period.

Surveys. You will complete sets of surveys that ask you to reflect on your professional goals, skills, and development, as well as provide feedback and ideas to help us improve this course. Your mark will be based on completion of these surveys.

Final mark

Your letter grade for the course will be determined by summing the weighted numerical scores earned for each component listed above and converting them using the table on the course outline and posted on the D2L site for the course.

Due to the research nature of this course, there are three differences in how grades are assigned compared to Zoology 401:

- 1) To ensure that you meet the learning outcomes and are consistently engaged in the research process, you must attempt all course components or a course grade of F may be assigned.
- 2) To ensure that everyone contributes to and prioritizes team components, you must pass Laboratory record keeping and Biodiversity research symposium components to earn a passing grade in the course overall.
- 3) There is no final exam; the research portfolio is your opportunity to showcase and provide evidence of your learning in this course.

COURSE INFORMATION & RESOURCES

Course D2L site

D2L: ZOO 475 L01 - (Fall 2017) - THE INVERTEBRATES (F2017ZOO475L01).

D2L will have the most updated schedule, assignments, readings, and slides and materials. You will also use D2L to complete and submit your assignments. Material on D2L is organized by: 1) assignments and marking schemes and rubrics; and 2) week. It is advised that you review the assignments and marking schemes at the start of the course. Please also look one week ahead to ensure that you are aware of upcoming deadlines and assignments.

Important items to locate on D2L:

Lab procedures. We have created lab procedures specifically for Zoology 576. I recommend that you read, annotate, and become familiar with lab procedures BEFORE attending lab.

Research methodology and dissemination assignments. These assignments will consist of readings and activities that you must complete. After reading or completing an exercise, you will answer a set of "quiz questions" and sometimes upload your work. As assignments are due on Monday morning, be sure to look one week ahead!

Marking schemes. Marking schemes for course components are posted together in a folder and also with each assignment. Please review these schemes to ensure that you are meeting expectations and targeting your work towards the goals of the course.

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, draw and write in class in real-time, and 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.

Required supplies

Required textbook: None

Required other supplies:

- 1) Laboratory notebook with carbon-copy pages: UofC bookstore: Chemistry Self Duplicating Student Lab Notebook 100 Set; ISBN: 978-1-930882-00-3; \$15.95
- 2) Dissecting equipment (for lab).
- 3) Lab coat (for lab).
- 4) Safety goggles (for lab).
- 5) At least two different coloured pens (for lab)

Recommended resources

Searching the literature:

- a) Web of Science
- b) Google Scholar
- c) Scopus

DNA barcode databases:

- a) Barcode of Life
- b) GenBank

Insect identification:

- a) Discover Life
- b) A field guide to the insects of America north of Mexico. D.J. Borror & R.E. White. Latest edition; Peterson Field Guide Series, Houghton Mifflin

Professional skills, writing support, and career exploration:

- a) Student Success Centre
- b) Career centre

ADDITIONAL OPTIONAL OPPORTUNITIES

Present your work at the University of Calgary Undergraduate Research Symposium

The University of Calgary Undergraduate Research Symposium (URS) will be held on 27 November this year. You will attend the symposium as part of the laboratory component of Zoology 576. In addition to attendance, your team can also submit an abstract to present your work at the conference. Please be aware that although each proposal can have multiple authors, URS requires that only one person present the work. More information on the conference and application process are here: <https://www.su.ucalgary.ca/programs-services/academic-research/undergrad-research-symposium/>.

The deadline to submit an abstract for URS is 12 October at 4pm. If you plan to submit an abstract, you must send me your abstract to review by **5 October**. On your abstract, you will need to include all members of your research team (the presenter listed first), followed by the GTA, technician (A Clarke), and lastly me (MM Summers) as co-authors. If you are interested in presenting in this conference, please talk to me before October so that we can best prepare an abstract.

Submitting an abstract or presenting at URS will not directly impact your mark (positively or negatively) in Zoology 576; however you can use the abstract submission and/or presentation experience as evidence of your research development and dissemination in your Research Portfolio.

Present your work in BioScience first floor display cabinets

We are currently working to renovate the display cabinets on the first floor of BioScience to highlight student work in zoology. We would greatly appreciate contributions to these cabinets from your team. Examples of work to display could include photographs of your specimens, your actual specimens, or information about biodiversity written for the general public. Please talk to me about your ideas for this space!

Share your work beyond Zoology 576

There are many opportunities to share your work or your learnings outside of the course. These include, but are not limited to, outreach with community groups, blogs, Facebook, Twitter, etc. I encourage you to share your knowledge broadly and seek out opportunities to be more engaged in biodiversity conversations in our city. When sharing any new findings or discoveries, I will ask that you discuss your plans with me prior in order to follow best practices. In our setting, most of what we find will fine to share out in real-time with anyone. In most biology labs however, your Principal Investigator will want to be aware of what information is shared and when.

TENTATIVE SCHEDULE FOR ZOOLOGY 576

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

| WEEK | LECTURE TOPIC | LAB TOPIC | Due |
|-------------------|---|---|---|
| 1 Sept 6-14 | Introduction: Biodiversity research and collaboration | Collaboration and insect survey | M - Surveys M - Portfolio exercise 1 |
| 2 Sept 17-21 | Methods Part 1: Invertebrate biodiversity surveys | Insect sampling and preparation of collections Research question generation | M - Methods Ass. 1 F - Reading Ass. 1 |
| 3 Sept 24-28 | Methods Part 2: DNA barcoding I | DNA extraction and PCR | M - Methods Ass. 2 F - Reading Ass. 2 |
| 4 Oct 1-5 | Methods Part 2: DNA barcoding II | Gel electrophoresis & sequencing preparation | M - Methods Ass. 3 F - Reading Ass. 3 |
| 5 Oct 8-12 | University holiday on Monday - no class Research progress report | Self-directed project work | W - Portfolio exercise 2 |
| 6 Oct 15-19 | Methods Part 3: Phylogenetic diversity | Self-directed project work | M - Methods Ass. 4 F - Reading Ass. 4 |
| 7 Oct 22-26 | Methods Part 3: Phylogenetic diversity | Self-directed project work | M - Methods Ass. 5 F - Reading Ass. 5 |
| 8 Oct 29-Nov 2 | Results: Presenting and discussing evidence | Self-directed project work *Last week to send sequences* (Digitization of specimens for online collection) | M - Methods Ass. 6 F - Portfolio exercise 3 |
| 9 Nov 5-9 | Research progress report | Disseminating biodiversity data *Last week for data analysis* (Digitization of specimens for online collection) | M - Methods Ass. 7 |
| Nov 12-16 | Reading Break - no classes or lab | | |
| 10 Nov 19-23 | Discussion: scientific contributions to biodiversity impediments | Writing an abstract/presentation preparation | M - Methods Ass. 8 |
| 11 Nov 20-24 | Scientific peer review | Peer review | M - Methods Ass. 9 |
| 12 Nov 26-30 | Dissemination of scientific findings | UofC undergraduate research symposium (URS) | M - Portfolio exercise 4 |
| 13 Dec 3-7 | Zoology 576 research symposium | (Optional drop-in) Research portfolio peer review | M/W - Biodiversity research symposium F - Surveys F - Portfolio final |

Department Approval:

Electronically Approved

Date: 2018-08-30 14:24

Associate Dean's Approval for out of regular class-time activity:

Electronically Approved

Date: 2018-08-30 16:56

