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|-------------------|-------------------------------|----------------------------------|
| <b>Course ID:</b> | <b>Course Title:</b>          | <b>Fall 2022</b>                 |
| <b>ZOO 277</b>    | <b>Biology of Vertebrates</b> | <b>Prerequisite: Biology 133</b> |
|                   |                               | <b>Credits: 3</b>                |

| Class Information  |   | Instructor Information |   | Important Dates                                    |          |
|--------------------|---|------------------------|---|--|----------|
| <b>Delivery:</b>   | In-class  | <b>Instructor:</b>     | Lizelle J. Odendaal, PhD, MSc, BSc (Hons), BSc. | <b>First Day of Class:</b>                         | Sept. 7  |
| <b>Days:</b>       | W/F   | <b>Email:</b>          | Lizelle.Odendaal@ambrose.edu                    | <b>Last Day to Add/Drop:</b>                       | Sept. 18 |
| <b>Time:</b>       | 11:15am-12:30pm                                     | <b>Office Hours:</b>   | Fridays 1-3pm, or by appointment                | <b>Last Day to Withdraw:</b>                       | Nov. 21  |
| <b>Room:</b>       | L2084   |                        |   | <b>Last Day to Apply for Coursework Extension:</b> | Nov. 28  |
| <b>Lab</b>         | Wednesday<br>1-4 pm<br>Room A2145                   |                        |   | <b>Last Day of Class:</b>                          | Dec. 9   |
| <b>Final Exam:</b> | Saturday, 17 December 2022. Room L2084, 9am – 12pm. |                        |   |  |          |

### Important Dates and Information

For a list of all important dates and information regarding participating in classes at Ambrose University, please refer to the Academic Calendar at <https://ambrose.edu/academic-calendar>.

### Course Description

This course examines the classification, comparative anatomy, function, and development of the vertebrate groups.

We will explore the diversity and evolutionary history of the vertebrates by highlighting the anatomical innovations that accompanied the exquisite diversification of both living and extinct vertebrate groups. Lectures and hands-on laboratory sessions will enable a deeper understanding of how comparative functional anatomy can give insight into how different animals are adapted to different ways of life and environments.



## Expected Learning Outcomes

As a result of lectures, in class discussions, quizzes, and online games or polls, you should be able to:

- Understand the evolutionary history and diversification of the major vertebrate groups and their closest relatives.
- Understand and use phylogenetic trees to i) infer the evolutionary relationships among vertebrate groups and ii) map the origin of major innovations that arose during the radiation of the vertebrates.
- Be able to use and understand biological classification systems.
- Be able to explain how the structure of vertebrate organ systems is related to their function.
- Understand how pre-existing structure, developmental processes, and the environment all shape the design of each organ system within and among the different vertebrate groups.
- Become proficient in the language and vocabulary of anatomy and physiology.

As a result of laboratory sessions, you will:

- Develop expertise in ethical, methodological animal dissection, by dissecting two representative vertebrates. You will identify major structures and their function and transfer knowledge gained to other vertebrate groups.
- Develop your observation, communication, and inquiry skills.

By completing the term project which entails a written assignment and oral presentation, you will:

- Develop your writing and communication skills.
- Develop your scientific literacy skills by evaluating media accounts of vertebrate history and evolution, and peer-reviewed journal articles.
- Become proficient in communicating biological concepts in a clear and concise manner to different audiences and in different mediums.

## Textbooks

**No textbook is required** for this course. Lecture slides, readings and lab manuals will be available to download from Moodle. Attendance of all classes and labs, taking notes, annotating the lecture slides provided, and reading the additional resources provided on Moodle will be all you need to review for tests and the final exams. If you miss several lectures or are unable to keep up with taking notes, *then* you may need to review a suitable vertebrate textbook. I recommend Vertebrate Life, 11<sup>th</sup> Edition (or 10<sup>th</sup> edition) by Harvey Pough, and Vertebrates: Comparative Anatomy, Function, Evolution, 8<sup>th</sup> edition, by Kenneth Kardong. I used both these texts plus additional resources as the source material for my lecture slides.

## Course Schedule

The following schedule provides a general guideline and timetable for topics, labs, tests, and assignment due dates. It may change depending on the pandemic or progress through the semester.

| Week | Lab schedule      | Date    | Lecture topic   |
|------|-------------------|---------|---|
| 1    | No lab            | 7 Sept  | Introduction to the course, tree thinking                                 |
|      |                   | 9 Sept  | Introduction to Chordates   |
| 2    | Intro to Chordata | 14 Sept | Vertebrate phylogeny and distinguishing innovations of vertebrate classes |
|      |                   | 16 Sept | Tetrapods   |
| 3    | Chondrichthyes 1  | 21 Sept | Key principles 1: Ancestry, development, and the environment              |
|      |                   | 23 Sept | Key principles 2: Energetic concepts, embryology                          |
| 4    | Chondrichthyes 2  | 28 Sept | Midterm 1 (material 7- 23 September)                                      |
|      |                   | 30 Sept | No class- National Day for Truth and Reconciliation.                      |
| 5    | No lab            | 5 Oct   | No class- Deeper Life   |
|      |                   | 7 Oct   | The integument and its derivatives  |
|      |                   |         | Draft written assignment due  |
| 6    | Quiz 1            | 12 Oct  | Support and locomotion- the skeletal system                               |
|      | Chondrichthyes 3  | 14 Oct  | Support and locomotion continued- the muscular system                     |
| 7    | Chondrichthyes 4  | 19 Oct  | Digestive system  |
|      | Osteichthyes      | 21 Oct  | Digestive system continued  |

|    |                      |          |   |
|----|----------------------|----------|---|
| 8  | Amphibia<br>Reptilia | 26 Oct   | Midterm 2 (material from 30 September-21 October) |
|    |                      | 28 Oct   | The respiratory system                            |
| 9  | Quiz 2               | 2 Nov    | The respiratory system continued                  |
|    | Mammalia             | 4 Nov    | The circulatory system                            |
| 10 |                      | 9-11 Nov | No classes or labs - Reading week                 |
| 11 | Mammalia<br>Aves     | 16 Nov   | The circulatory system continued                  |
|    |                      |          | Final written assignment due                      |
| 12 | Mammalia             | 18 Nov   | The nervous system                                |
|    |                      | 23 Nov   | Sense organs                                      |
| 13 | Mammalia             | 25 Nov   | The urogenital system                             |
|    |                      | 30 Nov   | Oral presentations                                |
| 14 | Lab exam             | 2 Dec    | Oral presentations                                |
|    |                      | 7 Dec    | OPEN (review, catch up)                           |
|    |                      | 9 Dec    | Review, final exam prep                           |

### Requirements:

My aim is to create a collaborative and inclusive environment in the classroom. This means that I expect and encourage you to be actively engaged in class discussions, games, and the course material. Your learning will mainly be evaluated by two midterms, a final theory and lab exam, and a term project (includes a written assignment and oral presentation). In class, we will regularly have discussions and online polls and games using the freely available app called Kahoot which will allow me (and you) to assess your general understanding of the material covered on a particular day. Therefore, you will require a mobile device, such as your smart phone, laptop, or tablet.

During labs, I will assess the quality of your dissections, as well as whether you follow adequate laboratory procedures. Two lab quizzes will help you keep up with studying the lab material and practice for the lab exam. **Lab coats and safety goggles are required**, and dissection kits will be provided. I expect all lab safety rules to be followed (these will be communicated to you), and that you take good care of the material and instruments you use and maintain a clean workspace.

**Midterms and final theory exam:** In the two midterms and final exam you will be asked to write short and in-depth answers that will demonstrate your knowledge about the vertebrate systems covered in the course. Questions will also include multiple choice, true/false, and drawing of diagrams and plots. The final exam will be like the midterms, with a combination of question formats. Approximately 70% of the final exam will cover new material (since midterm 2). Approximately 30% of the exam will consist of comprehensive material, with questions that will reflect critical thinking and not memorizing. *Don't worry*- we will practice these kinds of questions and how to answer them!

**Lab exam:** Here you will be asked to identify the components of organ systems in vertebrates from already dissected specimens, skeletons, models, or photographs. You can be asked to identify and classify specimens based on their morphology. The exam will include specimens that you have previously dissected, specimens from the demonstration material, and some specimens that you may not have seen before to determine whether you can apply your knowledge to new situations.

**Term project:** The term project consists of two components- a written component and an oral presentation. Detailed instructions will be provided in a separate document on Moodle which will also include a complete rubric to guide you. Briefly, you will be asked to identify a recent exciting scientific study that gives new insight to our understanding of any aspect of vertebrate evolution that interests you. Examples include the debate around when snakes lost their limbs; which evolved first- bat echolocation or flight; or how dinosaurs were adapted for cold environments. You will research your chosen topic and write a reflective synthesis where you discuss how this research changes and/or enhances our understanding of vertebrate evolution. Afterwards, you will present your chosen topic to your classmates using a PowerPoint presentation.

### Attendance:

Regular attendance of lectures will be essential for success on all tests and assignments. No points will be deducted from your grade for not attending lectures. However, in class assignments cannot be made up and, if missed, will receive a grade of zero. This term, lectures will not be provided over Zoom, unless there is a change in the University policy because of changing pandemic conditions. If you miss a class, it is your responsibility to review the lecture slides provided and discuss the content with your classmates. If anything is still unclear, I am happy to schedule a meeting to assist your understanding of the material.

All students, however, must attend each laboratory session- i.e., **labs are compulsory**. If you are unable to attend due to a valid reason, please communicate with me in writing, prior to the missed lab.

### My commitment to you, and my expectations of you:

I am committed to providing a safe, respectful, and inclusive classroom environment to ensure that you achieve your learning outcomes and develop the skills necessary to excel in future senior courses in the biology program. I hope that my enthusiasm for the subject is contagious, and that you will enjoy the course even if you find some aspects more challenging than others. In turn, I ask that you too remain respectful of me and your classmates, as well as to communicate any special needs you have, so that I can better assist you in achieving your goals.

### Grade Summary:

You will be assessed as follows:

| Activity   | Percent of grade |
|--|------------------|
| Participation in class- discussions, polls, mini quizzes | 5%               |
| Midterm 1  | 15%              |
| Midterm 2  | 15%              |
| Final theory exam  | 20%              |
| Written assignment draft                                 | 4%               |
| Final written assignment                                 | 8%               |
| Scientific presentation                                  | 8%               |
| Lab quizzes (x2)   | 5%               |
| Lab etiquette and dissections                            | 5%               |
| Final lab exam   | 15%              |

The available letters for course grades are as follows:

| Grade | Interpretation | Percentage | GPA  |
|-------|----------------|------------|------|
| A+    | Excellent      | 90-100%    | 4.00 |
| A     |                | 85-89%     | 4.00 |
| A-    |                | 80-84%     | 3.70 |
| B+    | Good           | 77-79%     | 3.30 |
| B     |                | 73-76%     | 3.00 |
| B-    |                | 70-72%     | 2.70 |
| C+    | Satisfactory   | 67-69%     | 2.30 |
| C     |                | 63-66%     | 2.00 |
| C-    |                | 60-62%     | 1.70 |
| D+    | Poor           | 55-59%     | 1.30 |
| D     |                | 50-54%     | 1.0  |
| F     | Failure        | < 50%      | 0.00 |
|       |                |            |      |

Because of the nature of the Alpha 4.00 system, there can be no uniform University-wide conversion scale. The relationship between raw scores (e.g. percentages) and the resultant letter grade will depend on the nature of the course and the instructor's assessment of the level of each class, compared to similar classes taught previously.

Please note that final grades will be available on student registration system. Printed grade sheets are not mailed out.

## Plagiarism policy

Please carefully read Ambrose's statement defining plagiarism and outlining its consequences at the end of this document. Plagiarism will not be tolerated, and the following consequences may apply if plagiarism is suspected:

For a first offence, a grade of zero will be applied and a report on plagiarism will be filed with the Registrar. For a second offence, a F grade for the course will be applied. A recommendation for expulsion to the Registrar may also be applied.

Some examples of plagiarism include (but is not limited to):

1. Submitting someone else's work as your own.
2. Copying directly from a source without citing the source and/or using quotation marks.
3. Copying large amounts of text, word for word (or only changing a few words) and submitting it as your own work.
4. Properly citing sources in text, but not including the full citation in your bibliography.

There are many more examples of plagiarism and it is your responsibility to ensure the academic integrity of your work. If you are unsure about what constitutes plagiarism, please feel free to discuss your concerns with me first.

## Ambrose University Important Information:

### Communication

All students have received an Ambrose e-mail account upon registration. It is the student's responsibility to check this account regularly as the Ambrose email system will be the professor's instrument for notifying students of important matters (cancelled class sessions, extensions, requested appointments, etc.) between class sessions.

### Exam Scheduling

Students who find a conflict in their exam schedule must submit a *Revised Final Exam Time Application* to the Office of the Registrar by the deadline noted in the Academic Calendar. Requests will be considered for the following reasons only: 1) the scheduled final examination slot conflicts with another exam; or 2) the scheduled final examination slot results in three consecutive examination periods. Travel is not considered a valid excuse for re-scheduling or missing a final exam.

### Standards of Behaviour in the Classroom Setting

Learning is an active and interactive process, a joint venture between student and instructor and between student and student. Some topics covered within a class may lead to strong reactions and opinions. It is important that Students understand that they are entitled to hold contradictory beliefs and that they should be encouraged to engage with these topics in a critical manner. Committing to this type of "active learning" significantly increases the learning experience for both teacher and student, and reflects the Christian imperative to pursue truth, which lies at the heart of the Ambrose educational experience. However, active discussion of controversial topics will be undertaken with respect and empathy, which are the foundations of civil discourse in the Classroom Setting. Primary responsibility for managing the classroom rests with the instructor. The instructor may direct a student to leave the class if the student engages in any behaviour that disrupts the classroom setting. If necessary, Ambrose security will be contacted to escort the student

from class. Please refer to your professor regarding their electronic etiquette expectations.

### Academic Integrity

We are committed to fostering personal integrity and will not overlook breaches of integrity such as plagiarism and cheating. Academic dishonesty is taken seriously at Ambrose University as it undermines our academic standards and affects the integrity of each member of our learning community. Any attempt to obtain credit for academic work through fraudulent, deceptive, or dishonest means is academic dishonesty. Plagiarism involves presenting someone else's ideas, words, or work as one's own. Plagiarism is fraud and theft, but plagiarism can also occur by accident when a student fails or forgets to acknowledge to another person's ideas or words. Plagiarism and cheating can result in a failing grade for an assignment, for the course, or immediate dismissal from the university. Students are expected to be familiar with the policies in the current Academic Calendar that deal with plagiarism, cheating, and the penalties and procedures for dealing with these matters. All cases of academic dishonesty are reported to the Academic Dean and become part of the student's permanent record.

### Academic Policies

It is the responsibility of all students to become familiar with and adhere to academic policies as stated in the Academic Calendar. The academic calendar can be found at <https://ambrose.edu/academics/academic-calendar>

### Privacy

Personal information (information about an individual that may be used to identify that individual) may be required as part of taking this class. Any information collected will only be used and disclosed for the purpose for which the collection was intended. For further information contact the Privacy Compliance Officer at [privacy@ambrose.edu](mailto:privacy@ambrose.edu).

### Coursework Extensions

Should a request for a time extension on coursework exceed the end of the term, a *Coursework Extension Application* must be completed and submitted to the Office of the Registrar. The extension (if granted) will be recorded on the student record. Extensions are granted at the discretion of the instructor and registrar. Normally, Course Extension Applications will be considered only when all of the following conditions are met:

- the quality of prior course work has been satisfactory;
- circumstances beyond your control, such as an extended illness or death of a family member, make it impossible for you to complete the course work on time; and
- you submit *Coursework Extension Application* to the Office of the Registrar on or before the deadline specified in the Academic Schedule.

If granted, time extensions do not excuse you from a final examination where one has been scheduled for the course. A temporary grade of TX will be assigned until a final grade is submitted in accordance with the new deadline. A final grade of F will apply to:

- all course work submitted after the end of the semester unless a coursework extension has been granted; and all course work submitted after the revised due date provided by an approved extension to coursework.

## Academic Success and Supports

### Accessibility Services

Academic accommodation is provided to Ambrose students with disabilities in accordance with the Alberta Human Rights Act and the Canadian Charter of Rights and Freedoms. Provision of academic accommodation does not lower the academic standards of the university nor remove the need for evaluation and the need to meet essential learning outcomes. Reasonable accommodations are tailored to the individual student, are flexible, and are determined by considering the barriers within the unique environment of a postsecondary institution. It can take time to organize academic accommodations and funding for disability-related services. Students with a disability who wish to have an academic accommodation are encouraged to contact Accessibility Services as early as possible to ensure appropriate planning for any needs that may include accommodations. Staff can then meet with students to determine areas to facilitate success, and if accommodations are required, ensure those accommodations are put in place by working with faculty.

### Ambrose Writing Services

Ambrose Writing services provides academic support in the four foundational literacy skills—listening, speaking, reading, and writing. It also assists students with critical thinking and the research process. Throughout the academic year, students can meet with a writing tutor for personalized support, or they can attend a variety of workshops offered by Academic Success. These services are free to students enrolled at Ambrose University. Academic Success serves all students in all disciplines and at all levels, from history to biology and from theatre to theology. To learn more, please visit <https://ambrose.edu/sas/writing-services>

### Ambrose Tutoring Services

Ambrose Tutoring Services provides support in specific disciplinary knowledge, especially in high-demand areas such as chemistry, philosophy, math and statistics, and religious studies. These tutors also coach students in general study skills, including listening and note-taking. During the academic year, Ambrose Tutoring Services offers drop-in tutoring for courses with high demand; for other courses, students can book a one-to-one appointment with a tutor in their discipline. These services are free to students enrolled at Ambrose University. To learn more, please visit <https://ambrose.edu/tutoring>.

### Mental Health Support

All of us need a support system. We encourage students to build mental health supports and to reach out when help is needed.

#### On Campus:

- Counselling Services: [ambrose.edu/counselling](https://ambrose.edu/counselling)
- Peer Supportive Listening: One-to-one support in Student Life office. Hours posted at [ambrose.edu/wellness](https://ambrose.edu/wellness).
- For immediate crisis support, there are staff on campus who are trained in Suicide Intervention and Mental Health First Aid. See <https://ambrose.edu/student-life/crisissupport> for a list of staff members.

#### Off Campus:

- Distress Centre - 403-266-4357
- Sheldon Chumir Health Care Centre - 403-955-6200
- Emergency - 911

### Sexual Violence Support

All staff, faculty, and Residence student leaders have received *Sexual Violence Response to Disclosure* training. We will support you and help you find the resources you need. There is a website with on and off campus supports – [ambrose.edu/sexual-violence-response-and-awareness](https://ambrose.edu/sexual-violence-response-and-awareness).

#### Off Campus:

- Clinic: Sheldon Chumir Health Centre - 403-955-6200
- Calgary Communities Against Sexual Abuse - 403-237-5888

**Note:** Students are strongly advised to retain this syllabus for their records.