

EEB 263F—Comparative Vertebrate Anatomy
Department of Ecology & Evolutionary Biology
University of Toronto

COURSE SYLLABUS SEPTEMBER 2014

COURSE DESCRIPTION

The lectures in this course provide a brief introduction to the classification and diversity of vertebrates, and consider the structural evolution of the different organs and organ systems of the vertebrate body, mentioning the functional significance and evolutionary importance of the various changes. The evolutionary history of the vertebrates is known in far more detail than that of any other comparable group of organisms, and thus much of our thinking, both past and present, about phylogeny, structural evolution, and evolutionary changes in function is based on knowledge of vertebrate morphology.

The laboratory work focuses mainly on two examples: the dogfish and the cat. These are studied in some detail, while other forms are treated only briefly. The work gives practice in dissection, provides material illustrating many of the points covered in lectures and, most important, provides a background of information on how vertebrates are constructed. Such a background, besides having considerable intrinsic interest, is important in considering evolution, as in lectures, and in other zoological fields, such as physiology.

At the end of the course, a student should be able to dissect any vertebrate, recognize most of the structures found, and gain some idea of how the animal as a whole functioned. He or she should also have some appreciation of the general course of vertebrate evolution and the major changes in their structure, and thus be better able to understand our ideas on evolutionary theory and the many physiological and behavioural problems that depend, in part, on the past evolutionary history of the vertebrates.

TIMES AND LOCATIONS

Lecture: Tuesdays, 6-8 pm, RW 117.

Labs: Thursdays, 6-9 pm, RW 013.

COURSE STAFF

Instructor: Gerry De Iuliis (gerry.deiuliis@utoronto.ca).

TAs (Lab instructors): Ida Conflitti (ida.conflitti@utoronto.ca) and Ryan Schott (ryan.schott@utoronto.ca).

COURSE REQUIREMENTS/RECOMMENDATIONS

Lecture

Although there is no required text, **I suggest (but do not require)** that you have one for reference and for clearing up ambiguities in your notes. The recommended text is:

- Kardong, K.V. 2011. Vertebrates: Comparative Anatomy, Function, Evolution. 6th ed., McGraw-Hill, New York. 794 pp.

Laboratory

Required:

- De Iuliis, G. & D. Pulerà. 2010. *The Dissection of Vertebrates*, 2nd Edition. Academic Press, Amsterdam. 332 pp.
- A dissecting kit. I recommend that it contains:
- 2 pairs of scissors, one large and one fine,
- 2 pairs of forceps, one large and one fine,
- 2 scalpels, one with changeable blades,
- 1 dissecting needle, and
- 1 blunt probe.

Recommended:

- A lab coat and gloves.

BIBLIOGRAPHY

The texts cited above contain bibliographies of the standard reference books. At this time I will call your attention to only a few of the more general books on vertebrate zoology.

- Benton, M. J. 2005. *Vertebrate Palaeontology*, 3rd Edition. Blackwell Science, Malden. 455 pp.
- Liem, K. F., Bemis, W. E., Walker, W. F. Jr., and Grande, L. 2001. *Functional Anatomy of the Vertebrates. An Evolutionary Perspective*. 3rd Edition. Harcourt College Publishers, Fort Worth. 703 pp.
- Pough, F. H., Janis, C. M., and Heiser, J.B. 2009. *Vertebrate Life*, 8th Edition. Benjamin Cummings, San Francisco. 688 pp.

OFFICE HOURS

Official weekly office hours will be announced in the first lecture. Also, I should almost always be in (or near) my laboratory Tuesday and Thursday evenings. You can catch me before and after lectures and labs. If you have a quick question or problem, it can be handled then – if we need more time, we can arrange a meeting at a time convenient to both of us. You can, of course, always try to find me in my laboratory in the Ramsay Wright Zoological Labs, but I am not always easy to find. Messages can be left for me in **my mailbox on the 4th floor**, on my door (**RW 014**), or via **e-mail (gerry.deiuliis@utoronto.ca)**. **Email is the most reliable way to reach me.** Note that I will not answer questions on course material via email. When wishing to see me, give me both a contact phone number and a time when you expect to be available or will revisit my laboratory.

MARKING SCHEME

- **Midterm Test:** Multiple choice and short answer style questions of lecture material from Lectures 1 to 6.
- **Final Exam:** Multiple choice and short answer style questions of lecture material from Lectures 8 to 12.
- **Practical Tests:** A number (usually 40–50) of specimens are set out with structures to identify. You play musical chairs and identify the structures. Each is on roughly half the Semester's work. The second may include microscope slides as well as gross specimens.

- **Lab Participation:** A mark achieved as a consensus of the individual opinions of your laboratory work by me and by your TAs (based on participation, quality of dissection, and completeness of dissections).

Grades are distributed as follows:

- Midterm Test: 20%
- Final Examination: 30%
- Practical Test 1: 20%
- Practical Test 2: 20%
- Lab Participation: 10%

ACCESSIBILITY NEEDS

The University of Toronto is committed to accessibility. If you require accommodations for a disability, or have any accessibility concerns about the course, the classroom or course material, please contact Accessibility Services as soon as possible:

disability.services@utoronto.ca or <http://studentlife.utoronto.ca/accessibility>.

ACADEMIC INTEGRITY

Academic integrity is fundamental to learning and scholarship at the University of Toronto. Participating honestly, respectfully, responsibly, and fairly in this academic community ensures that the U of T degree that you earn will be valued as a true indication of your individual academic achievement, and will continue to receive the respect and recognition it deserves. For further information, use the following link: www.artsci.utoronto.ca/osai/students. Familiarize yourself with the University of Toronto's Code of Behaviour on Academic Matters (<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>). It is the rule book for academic behaviour at the U of T, and you are expected to know the rules.

SCHEDULE

The schedule given here is tentative and may be changed. The page references for each laboratory are to De Iuliis & Pulerà, 2010. See the **Summary Lab Outline** and the **Detailed Lab Outline** for more detailed information. **You are required to read the relevant section before coming to lab.** The page references for each lecture are to Kardong. However, I will **not** follow any of these exactly; almost all will include material that I do not cover and will omit points that I include. A quick check of your textbook before the lecture will show you what diagrams are there and save you much unnecessary effort in note taking during the lecture. The exact details of the lectures are not set, so I cannot give absolutely accurate references. Please note that these are references and not assignments – you are responsible for the material I present in lecture, but not for readings unless they are specifically assigned in one of the lectures.

Week beginning:

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| Sept. 8 | Lecture: | Introduction, Lower Chordates and Agnathans: 1–3, 14–20, 48–94. |
| | Lab: | Lab 1. Introduction (xvii–xix), Cephalochordates (Handouts), Lamprey Skeleton (19–20), Dogfish Cranium and Dogfish Postcranial Skeleton (27–35). |
| Sept. 15 | Lecture: | Anamniotes—Cartilaginous Fishes, Bony Fishes, Lower Tetrapods: 61–89, 90–108. |

- Lab: **Lab 2.** Cat Skull and Cat Skeleton (148–175), Miscellaneous Skeletons: Perch (81–82), Mudpuppy (93–96), Frog (131–133), Pigeon (291–294).
- Sept. 22 Lecture: **Amniotes—Reptilia and Synapsida:** 108–126.
Embryology: 161–175.
- Lab: **Lab 3.** Vertebrates, External Features: Lamprey (20–21), Dogfish (35–39), Perch (82–84), Mudpuppy (96), Frog (133–134), Cat (176–177); Dogfish Muscles (39–45).
- Sept. 29 Lecture: **Integument:** 212–237.
Skeleton, General: 180–186, 240–241.
Skeleton, Postcranial skeleton: 294–299.
- Lab: **Lab 4.** Cat Muscles (179–186).
- Oct. 6 Lecture: **Skeleton, Skull I:** 241–43, 247–252, 262–265.
Skeleton, Skull II: 266–267, 273–282. 505.
- Lab: **Lab 5.** Dogfish Digestive, Respiratory, and Urogenital Systems (45–49, 59–63).

Weekend Review Labs on Saturday and Sunday.

- Oct. 13 Lecture: **Muscles, General:** 372–376, 388–397.
Muscles, Cranial: 393, 405–410.
- Lab: **Lab 6.** Practical Test 1; covers material from Labs 1 through Lab 5.
- Oct. 20 Lecture: **Midterm Test.** 90 minutes, covering lecture material up to and including lectures from Week beginning Sept. 8 to Oct. 13.
- Lab: **Lab 7.** Cat Digestive, Respiratory (204–218), and Urogenital Systems (239–244).
- Oct. 27 Lecture: **Respiratory system:** 413–417, 424–438.
Digestive System, Digestive tract: 503–504, 520–531.
- Lab: **Lab 8.** Miscellaneous Vertebrates: Digestive, Respiratory, and Urogenital Systems; Lamprey (21–24); Perch (84–87); Mudpuppy (109–117); Frog (134–140); Pigeon (297–308).
- Nov. 3 Lecture: **Digestive System, Mouth and Pharynx:** 506–519, 531–533.
Digestive System, Miscellaneous viscera: 195–197, 533–540.
Veins: 451–456, 466–472.
- Lab: **Lab 9.** Dogfish (50–58) and Cat (220–231) Cardiovascular Systems.
- Nov. 10 Lecture: **Heart and lymphatics:** 473–489, 496–499.
Aortic Arches: 461–466.
- Lab: **Lab 10.** Dogfish Brain and Sense Organs (65–76).
- Nov. 17 Lecture: **November Break:** No Lecture.
- Lab: **Lab 11.** Sheep Brain (244–251) and Review.

Weekend Review Labs on Saturday and Sunday.

- Nov. 24 Lecture: **Kidneys and urogenital ducts:** 545–553, 563–576.

Lab: **Nervous System, General:** 625–630, 641–642.
Lab 12. Practical Test 2; covers material from Labs 7 through Lab 11.

Dec. 1 Lecture: **Nervous System, Brain:** 652–662.
Nervous System, Cranial Nerves: 630–641.

Lab: **No Lab.**

Dec. Exam Period: Final Exam: 180 minutes, covering material from all the course lectures.

SUMMARY OF IMPORTANT DATES, IN CHRONOLOGICAL ORDER

DATE	EVENT	MATERIAL COVERED
Sat., Oct. 11	Weekend Review Lab	Review of lab material covered in Labs 1–5
Sun., Oct. 12	Weekend Lab Review	Review of lab material covered in Labs 1–5
Thurs., Oct. 16	PRACTICAL EXAM 1	On lab material covered in Labs 1–5
Tues., Oct. 21	MIDTERM TEST	On lecture material covered in Lecture 1 to Lecture 6
Sat., Nov. 22	Weekend Review Lab	Review of lab material covered in Labs 7–11
Sun., Nov. 23	Weekend Review Lab	Review of lab material covered in Labs 7–11
Tues., Nov. 25	PRACTICAL EXAM 2	On lab material covered in Labs 7–11
Dec Exam Period	FINAL EXAM	On lecture material covered in all lectures