



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

1. Course: ZOOLOGY 515 – COMPARATIVE VERTEBRATE ANATOMY

Lecture Section:	L01	MWF	09:00-09:50	ENE 243	WINTER 2017
Lab Section(s):	B01,02,03 B04,05,06	T R	09:00/12:00/3:00 09:00/12:00/3:00	BI 044 BI 044	
Course					
Coordinator/Instructor:	Dr. J. Theodor		BI 353	210-9819	jtheodor@ucalgary.ca
Course Technician:	Mr. W. Fitch		BI 037	220-5269	fitch@ucalgary.ca

Course D2L website: ZOOL 515L01 – (Winter 2017) – Comparative Vertebrate Anatomy
Biological Sciences Department BI 186; (403) 220-3140; biosci@ucalgary.ca

2. PREREQUISITE(S): Biology 379

ANTI-REQUISITE(S): Credit for Zoology 515 and 377 will not be allowed.
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 sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Midterm lecture exam #1	15%	In-Class	Feb. 6, 2017
Midterm lecture exam #2	15%	In-Class	March 15, 2017
Midterm lab exam	15%	In-Lab	week of Feb. 27, 2017
Graded dissection (group project)	10%		
Final lab exam	20%		
Final lecture exam	25%		

(Both final exams will be scheduled by the Registrar's office.)

Each piece of work completed by the student will be assigned a numerical score (a percentage), and appropriately weighted for that course component (see above). A final aggregate numerical value will be calculated from this and converted to a letter grade that will represent the overall performance in the course. The ranges for the aggregate numerical scores that will equate to each letter grade are as follows:

Grading Scale

A+	93
A	83
A-	80
B+	77
B	73
B-	70
C+	67
C	63
C-	60
D+	55
D	50
F	<50

COURSE OUTCOMES:

- Describe the anatomical systems of vertebrates and their interactions
- Explain the organismal function of anatomical systems
- Identify the anatomical structures of vertebrates

- Compare anatomical differences among major clades of vertebrates
 - Explain the embryonic and evolutionary origin of anatomical structures
 - Predict the 3 D relationships of structures based on 2D sections
 - Communicate effectively orally and in writing using appropriate terminology
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 with these regulations. See also [Section E.6](#) of the University Calendar
5. **Scheduled out-of-class activities:** N/A
REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY. If you have a clash with this out-of-class-time-activity, please inform your instructor as soon as possible so that alternative arrangements may be made for you.
6. **Course Materials:** TEXTS: Required: a) Liem et al. 2001 [Functional Anatomy of the Vertebrates](#). 3rd Edition. Brooks/Cole.
 b) Zoology 515 Laboratory Workbook – D2L.

Other Supplies: Dissection kit, surgical gloves, lab coat, protective eyewear are all required.

7. **Examination Policy:** No electronic or written aids (eg. Cell phones, tablets, computers, PDAs, notes, textbooks) will be allowed during writing of the 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. **Writing across the curriculum statement:** In this course, the quality of the student's writing in laboratory reports will be a factor in the evaluation of those reports. See also [Section E.2](#) of the University Calendar.
9. **Human studies statement:** If you agree, your course work may be used for research purposes. Your responses will remain anonymous and confidential. Grouped data (no individual responses) may be used in academic presentations and publications. Participation in such research is voluntary and will not influence grades in this course. Students' signed consent forms will be withheld from instructors until after final grades are submitted. More information will be provided at the time student participation is requested. See also Section E.5 of the University Calendar.

STUDIES IN THE BIOLOGICAL SCIENCES INVOLVE THE USE OF LIVING AND DEAD ORGANISMS. Students are expected to be familiar with <http://www.ucalgary.ca/pubs/calendar/current/sc-5-1.html> of the on-line calendar.

See also <http://www.ucalgary.ca/pubs/calendar/current/e-5.html>.

10. OTHER IMPORTANT INFORMATION FOR STUDENTS:

- (a) **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties.
- (b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- (c) **Academic Accommodation Policy: Student Accommodations:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf.
 Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Biological Sciences, Dr. H. Addy by email addy@ucalgary.ca or phone 403 220-3140.
- (d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- (e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also <http://www.ucalgary.ca/secretariat/privacy>.

- (f) **Student Union Information:** VP Academic Phone: 403 220-3911 Email: suypaca@ucalgary.ca
SU Faculty Rep. Phone: 403 220-3913 Email: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca;
Student Ombuds Office: 403 220-6420 Email: ombuds@ucalgary.ca; <http://ucalgary.ca/provost/students/ombuds>
- (g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.
- (h) **U.S.R.I.:** At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference - please participate in USRI Surveys.

Department Approval _____ ORIGINAL SIGNED _____ Date _____

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ZOOLOGY 515 – Winter 2017 Lecture Schedule

DATE	LECTURE TOPIC		LAB TOPIC	LAB
Jan	M	09	Course introduction	
	W	11	Phylogenetics and inference	
	F	13	Vertebrate body plan	
	Lab		Intro, Lamprey anatomy, shark skeleton*	Lab 1
	M	16	Axial and appendicular skeleton	
	W	18	—	
	F	20	—	
	Lab		Cat skeleton	Lab 2
	M	23	Appendicular skeleton & skull	
	W	25	—	
	F	27	—	
	Lab		Shark musculature 1	Lab 3
	M	30	Skull	
Feb.	W	01	—	
	F	03	—	
	Lab		Shark musculature 2	Lab 4
	M	06	Midterm exam 1	
	W	08	Muscular system	
	F	10	—	
	Lab		Cat musculature 1	Lab 5
	M	13	Nervous system	
	W	15	—	
	F	17	—	
	Lab		Cat musculature 2	Lab 6
	M	20	NO CLASS READING WEEK	
	W	22	—	
	F	24	—	
	Lab		NO LAB – READING WEEK	
	M	27	Nervous system	
Mar.	W	01	—	
	F	03	—	
	Lab		LAB EXAM IN LAB SECTION	
	M	06	Digestive system	
	W	08	—	
	F	10	—	
	Lab		Shark sense organs and nervous system	Lab 7
	M	13	Respiratory systems	
	W	15	Midterm exam 2	
	F	17	Respiratory systems	
	Lab		Shark digestive, respiratory and urogenital systems	Lab 8
	M	20	Urogenital systems	
	W	22	—	
	F	24	—	
	Lab		Cat digestive, respiratory and urogenital systems	Lab 9
	M	27	Circulatory systems	
	W	29	—	
	F	31	—	
	Lab		Shark circulation	Lab 10
Apr.	M	03	Circulatory systems	
	W	05	—	

	F	07	—		
	Lab			Cat circulation	Lab 11
	M	10	Circulatory systems		
	W	12	—		
	Lab			No lab	

* Everyone must wear safety goggles, gloves, and lab coats during dissection labs

- Please Note:
1. Refer to chapters 1-3, 5, 22, and the Glossary throughout the course.
 2. Follow up points of interest by using the "References" section at the end of each chapter of your textbook.
 3. There will be no lectures on February 20, 22, and 24 (Reading Week).

These laboratories are designed primarily to give you some idea of the range of structure and function of the major organ systems of vertebrates. In order to fully comprehend the implications of variation in structure it is necessary to constantly cross-refer to the text and lecture material and also to make use of specific demonstrations. The demonstrations have been designed to exemplify principles and to fill in the morphological and functional gaps between the cat and the shark.

The laboratory should be the place where you observe the features discussed in lecture and where you develop the comparative approach. **Pay particular attention to function, homology, and developmental patterns.** Also, think of the organisms as if they were alive in their natural surroundings - only then will you be able to fully appreciate the particular structural attributes of a feature.

With respect to the pre-lab Powerpoint slides and the pages designated from the laboratory workbook, it is imperative that you read these before coming to the lab. It is essential that you read all designated pages - teaching assistants will clarify exactly what is to be achieved in each laboratory session at the beginning of the session. Please be in your lab seat with your specimen on the bench by the start of the lab. You will be at a disadvantage if you miss any part of the lab introduction given by the teaching assistant.

MID-TERM LAB EXAM

Week of Feb 27, 2017. The Mid-term lab exam will cover Labs 1-6.

FINAL LAB EXAM

Exam to be scheduled by Registrar. The lab final will cover Labs 7-11, and will build upon information carried over from Labs 1-6.

Lab Introduction

Laboratory work is a vitally important portion of this course. With the experience you will have gained in the analysis and recognition of anatomical form, you should at the end of the course be competent (with the aid of manuals or anatomical papers) to explore and comprehend the anatomy of any vertebrate. If you have learned that much, you will have gained from the course. It is not our intention, nor is it in our power, to teach you all the anatomy of all kinds of vertebrates; it is designed only to provide you with a basis for understanding vertebrate anatomy as you encounter it.

In order to accomplish this objective, however, it is necessary that you be at all times comparison-minded. The extent of the differences will on occasion baffle you, and you will demand an intermediate type to help you bridge the apparent gaps.

We will attempt to bridge these gaps for you in three ways:

1. by demonstrations of intermediate conditions in selected forms
2. by requiring you to read in parallel with your lab work the pertinent sections of the lecture text
3. by keeping the lecture portion of the course as far as possible in step with the lab

Plan of Work

The technique we have adopted for guiding you through the anatomies of the cat and the shark is that of "verification". The laboratory workbook describes or pictures for you the morphology of these animals. We expect you to ascertain for yourself the accuracy of these pictures and descriptions and to acquaint yourself with the actual structures in such a manner that you will be able to recognize them when you see them again.

Organize your time so as to complete the assigned work during the designated lab period. **You must prepare for each lab period by reading the on line pre-lab material and the relevant workbook module before you arrive in the lab.** You are urged to outline, prepare an abstract, underline, or prepare the portions of your workbook in any way that will facilitate your work during the brief lab period. Please note that the pages assigned delimit the "required" lab work, but realize that additional reading will prove helpful. For the cat you will be working in pairs - for maximum benefit you must both contribute equally to the effort.

General Comments

1. There will be no smoking, eating or drinking in the laboratories.
2. The lab operates on an "open-ended" system. You must always come to your scheduled laboratory period but, from past experience, you will probably need to come back during the week at some time to review your dissection. This you may do at any time during the normal working day (if the lab is locked please ask the museum technician to open it).

During regular lab hours those students scheduled at that time have priority on space and equipment and you must wait until they have all of their requirements before getting yourself organized. **IT IS IMPERATIVE THAT YOU KEEP THE LABORATORIES TIDY - WORKING PRIVILEGES OUTSIDE SCHEDULED LABORATORY HOURS WILL BE WITHDRAWN IF THE LABORATORIES BECOME INORDINATELY UNTIDY.**

3. **You must provide yourself with a dissecting kit** and must realize that poor quality or poorly maintained instruments will result in poor dissections. Learn not to be afraid of touching the specimens and come quickly to the realization that your fingers are some of the best and most sensitive dissection instruments available. You must also provide your own eye protection.
4. **Get to know your lab TA and ask questions frequently.** Questions such as "Can you find 'x' for me?" will not be accommodated. The TAs are there to give you help and instruction and to clarify points but are not there to do all of the manual work for you. **Learn early to correlate the lectures and labs.** The lecture material only becomes meaningful when you have seen the real thing. Use the demonstrations as a bridge between the practical experiences of the laboratory and the theoretical approaches of the lecture.

SUMMARY

1. Labs missed because of illness must be made up by appointment with the Teaching Assistant. It is possible to attend a lab later in the week.
2. Specimens are not to be removed from the lab.
3. Each student is responsible for their own dissection material, work area, and demonstration material.
 - a) Dissection specimens must be labelled with your name and section, kept in good condition, and stored in the proper storage facility.
 - b) Work areas must be cleared, dissecting trays washed, and waste disposed of properly at the end of each period.
 - c) Demonstration material and other teaching material must be returned to the appropriate location at the end of each lab period.
4. There will be one shark per person and one cat between two students. Each student is responsible for examining both sexes of the animals being studied. We strongly advise you to examine multiple dissections (with permission) in order to get a feeling for anatomical variation.