**Vertebrate Structure & Development Laboratory, 2 Cr ZOO 4690L**

# Coreq Zoo4690

# pre req BSC 1010, BSC 1011, BSC 1010L, BSC 1011L

# Fall 2018 Wednesday and Friday

# Dr. Jeanette Wyneken

# Office hrs wed 11:30-2:30 [jwyneken@fau.edu](mailto:jwyneken@fau.edu) ph: (561) 297- 0146

# SC 266

**Sec: CRN: Room: Day/Time: Teaching Assistant \_ Email:**

1. 20858 SC115 WF 11:00 AM - 12:50 PM TBA
2. 20859 SC115 WF 1:00 PM - 2:50 PM TBA

# Required texts and materials:

* ***The Dissection of Vertebrates****.* ***A laboratory manual*** (2rd Edition) 2011 by Gerardo De Iuliis and Dino Pulerà (I&P in schedule)
* ***Vertebrates: Comparative Anatomy, Function and Evolution,*** 7th Edition, 2015 by K.V. Kardong, (This book is also used Lecture. It is an extremely useful reference.)
* ***Blank sketch book or drawing book (Please do not use loose paper and folders)***
* ***Dissection kit, a box of disposable gloves, and many extra scalpel blades***

**Recommended Text**

* ***A Photographic Atlas of Developmental Biology*** 2005 S. J. Wright (W in schedule) Lab exercises, lab handouts & recommended resources will be posted on Canvas.

**Course Description:**

* A laboratory examination of early development, fertilization through organogenesis, major developmental staging, experimental vertebrate embryology techniques, anatomy and functional relationships of vertebrate animals through microscopic observation, demonstrations, skeletal preparations, and dissection of preserved specimens.

# The laboratory course is designed to provide students with an understanding of:

* The diversity of vertebrates and their relatives, development of vertebrates
* The diversity and evolution of vertebrate body forms and functions
* Developmental stages, stage-specific organization and form of characteristic organs, tissues and other structures of chordates with particular emphasis on vertebrates
* Major developmental processes and techniques for study of vertebrate development
* External and internal anatomy including skeletal structures and organ systems
* Prossections of preserved chordates demonstrating comparative anatomical diversity/adaptations.
* Basic comparative gross anatomy of 3 major vertebrate groups: primitive fish represented by the dogfish shark *Squalus acanthias*- a basal vertebrate; primitive tetrapods represented by the mudpuppy *Necturus maculosus*- a neotenic amphibian, and advanced tetrapod mammals represented by the cat *Felis domesticus*. We will compare birds and reptiles using common vertebrate species. We will emphasize identification, developmental and evolutionary shifts in structural, homologies among structures, major patterns, and functions.

Each student is expected to *emphasize* development of cooperation, develop fine dissection skills, pay attention to detail in his or her work, develop a working vocabulary of the necessary anatomical terms, and keep a notebook of your own drawings of structures.

**Grading and Exams:** You will be graded on 3 laboratory practical exams, dissection proficiency and quality, your drawing notebook, as well as laboratory quizzes at the start of each class, attendance and participation. Laboratory exams will test your knowledge of anatomy, anatomical terminology, identification of embryonic structures and their fates, function, homology and association. More will be discussed about this in the laboratory when each system is introduced. Each timed practical emphasizes the most recent material covered since the previous exam. There is redundancy implicit in the material, so we may ask questions on any subject in any format!

***Note: The final lab practical is held during finals week***. **THE FINAL PRACTICAL IS GIVEN FOR BOTH LABS ON THE SAME DAY. You must attend the final lab practical at that designated time and day. Following the final lab practical, there is mandatory lab cleanup and inventory.**

# Lab Procedures.

*Microscopy:* It is your responsibility to make sure that slides are returned in good condition to their appropriate boxes and trays.

*Dissection* of preserved specimens is a **requirement** in this laboratory. You usually will work in pairs for dissections. The animals you dissect are those traditionally used in most comparative developmental and functional anatomy courses (shark, mudpuppy, and cat). All are preserved in phenol solution. This means that they are safe to handle within reason (although the odor may remain on your clothing and hands for a while after lab). **If you feel that you need protective clothing, you may bring your lab coat and/or disposable protective gloves to class. We DO NOT supply lab coats or gloves. You are expected to supply your own dissection kit and bring it to class**. The dissection kit should include adequate scissors, forceps (we highly recommend rat-tooth and serrated tip forceps), blunt and pointed probes, a scalpel handle and scalpel blades (you will use several blades during the semester).

* Used blades must be *safely removed* and deposited in a biohazard “sharps” container provided in the lab.
* You must make sure dissection specimens are stored securely between lab sessions, and dissected tissues are disposed of in the special biohazard containers.
* You must clean your work area and dissection trays at the end of each lab.
* Paper towels and used gloves go in the trash, **NOT** the biohazardous waste bin.

*Applied Study*. Several labs require you to collect morphologic data from embryos or skeletons and apply the data so you understand key concepts and processes in vertebrate morphogenesis and evolution. You will collect the data in lab and do your analyses together in your lab group.

*Drawing notebooks.* Your TA will specify format and identify structures to illustrate and correctly label for each lab. Color is optional. Clarity is essential. You do not have to be a great artist, but your work must demonstrate the time and effort you put into observing and that you understand what you are observing. The term is divided roughly into thirds, each ending in a practical. You must turn in your notebook BEFORE the beginning of each practical. It will be returned to you at the next lab.

***Attendance Policy***. Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student’s responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student’s final course grade as a direct result of such absence.

***Excused absences*:** If you need to miss lab because you are sick or have a legitimate (University

-approved) excuse, you must notify your teacher and teaching assistant by email (you may also call in addition to the email). Because material used on lab exams are typically destroyed by subsequent class work, missed lab practicals are prorated. If you have a legitimate excuse, your grade will be prorated and be based upon your performance on the other two exams.

***Religious Accommodations***: Students who wish to be excused from coursework, class activities or examinations must notify the instructor well in advance of their intention to participate in religious observation and request an excused absence.

***Classroom etiquette****.* University policy on the use of electronic devices states: “In order to enhance and maintain a productive atmosphere for education personal communication devices such as cellular phones and pagers, are to be disabled during class session.” If you use a tablet or computer, turn off your e-mail and various forms of messaging, video, etc., during class. Please share your questions in class; someone else likely has the same question.

***E-mail communication***–If you e-mail your professor, be sure to use proper salutations and titles (Dr. or Prof.). “Texting” abbreviations should not be part of your professional e-mails. The subject should be in the subject line.

***Disability policy***–In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) — in Boca Raton, SU 133 (561-297-3880); in Davie, LA 203 (954-236-1222); or in Jupiter, SR 117 (561-799-8585) — and follow all SAS procedures*.*

***Ethics***– Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001 [http://www.fau.edu/ctl/4.001 Code of Academic\_Integrity.pdf](http://www.fau.edu/ctl/4.001%20Code%20of%20Academic_Integrity.pdf)  
All students must adhere to the Honor Code for academic honesty is expected of all students. ANY act of dishonesty that violates the honor code and misrepresents your efforts or ability may be grounds for immediate failure of a course, or may result in dismissal from the University.

**Advice.** READ THE LABORATORY EXERCISE BEFORE COMING TO LAB! To do well,you must come prepared. **Use your time wisely. If you finish a section early, review past material or start the next section.** To do well you need to stay up to date and review well in advance for each exam. You should plan to spend AT LEAST 8 HOURS/WEEK studying for this laboratory course outside of regularly scheduled class time. In addition to assigned pages in the Dissection of Vertebrates text, you will find that the Appendices in Wright’s *Photographic Atlas*, and related topics in Kardong’s *Vertebrates* are helpful.

**Grading** (+/- grades are based on grade distribution statistics) Drawing Notebook (25 Pts/third) 075 Pts

3 Lab Practicals (100 Pts each) 300 Pts 462-514 A

Attendance & Participation (2 pts each day) 052 Pts 411-461 B

Quizzes (3pts each day) 072 Pts 359-410 C

Proficiency & Quality

015 Pts 308-358 D

# Total Possible: 514 Pts <307 F

**Tentative Lab Schedule *Tentative Lab Schedule* (Classes vary in their proficiency and speed. If material is learned quickly or slowly we may adjust this schedule.)**

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| **Date** | **Lab** | **Topic** | **Readings: lab handouts, materials on Canvas, & assigned readings** |
| 8/22 W | 1 | Anatomical terminology, phylogeny, & diversity, Microscopy techniques review | **I&P:**Intro pg xvii-xix, 1-16; **K:**21-29, 48-54, 61-73,  Fig. 2.23, 736-739, 740-742 |
| 8/24 F | 2 | Gametogenesis & Fertilization | **K:** 163-164 (Fig. 5.2) |
| 8/29 W | 3 | Sea urchin fertilization | Work on Drawing notebook to Format and identify structures to illustrate and correctly label for each lab |
| 8/31 F | 4 | Chordate development | Work on Drawing notebook to Format and identify structures to illustrate and correctly label for each lab |
| 9/5 W | 5 | Biogenesis | **K**: 201-204 |
| 9/7 F | 6 | Early chick embryology | Work on Drawing notebook to Format and identify structures to illustrate and correctly label for each lab |
| 9/12 W | 7 | Chick development 24-48 h | Work on Drawing notebook to Format and identify structures to illustrate and correctly label for each lab |
| 9/14 F | 8 | Chick development 56-96 h | Work on Drawing notebook to Format and identify structures to illustrate and correctly label for each lab |
| 9/19 W |  | Comparative development review | Work on Drawing notebook to Format and identify structures to illustrate and correctly label for each lab |
| 9/21 F |  | **Practical Exam 1** |  |
| 9/26 W | 9 | Cell types and the integument | **K**: 212-229, 233-240 |
| 9/28 F | 11 | Comparative skeletal anatomy | **I&P:** Lamprey: 19-20 (Fig. 2.1); Shark: 27-34 (3.1-3.4,  3.7, 3.8-3.11); Necturus: 89-96 (5.1-5.4); Cat: 148-157  (Fig. 7.1, 7.2, 7.6), 164-176; **K:** 240-242 (Fig. 7.1, 7.3,  7.4; Table 7.1, 7.2), 250-251, 294-297, 307-308 (Fig.  8.19, 8.20), 313-315, 337-338 (Fig. 9.16, 9.17), 345 |
| 10/3 W |  | Comparative skeletal anatomy cont. | Work on Drawing notebook to Format and identify structures to illustrate and correctly label for each lab |
| 10/5 F | 12 | Biomechanics | **K:** 137-148 |
| 10/10 W | 13 | Transitional forms | **K:** 31-32 (Fig. 1.34), 45, 104-107 (Fig. 3.23), 341 |

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| 10/12 F | 14 | Shark external anatomy and musculature | **I&P:** 39-45 (Fig. 3.17-3.20) |
| 10/17 W |  | Shark musculature cont. | Work on Drawing notebook to Format and identify structures to illustrate and correctly label for each lab |
| 10/19 F | 15,  16 | Necturus external anatomy and musculature, begin cat external anatomy and musculature | **I&P:** 96-108 (Fig. 5.10-5.24) |
| 10/24 W |  | Cat musculature cont. | **I&P:** 177-202 (Fig. 7.27-7.38) |
| 10/26 F | 17 | Pigeon/iguana external anatomy and musculature | **I&P:** Pigeon: 297-300 (Fig. 9.10-9.12); Iguana: supplemental handout |
| 10/31 W |  | **Practical exam 2** |  |
| 11/2 F | 18,  19 | Shark body cavity, necturus body cavity | **I&P:** Shark: 45-49 (Fig. 3.22-3.25), 59-63 (Fig. 3.33,  3.34); Necturus: 110-117 (Fig. 5.26-5.30); **K:** 196-197  (Fig. 5.34, 5.35), 550-553 |
| 11/7 W | 19 | Pigeon/iguana body cavity | **I&P:** Pigeon: 300-309 (Fig. 9.13-9.18); Iguana: supplemental handout **K:** Fig. 11.36 |
| 11/9 F |  | **NO CLASS - Veterans day** |  |
| 11/14 W | 20 | Cat body cavity | **I&P:** 204-220 (Fig. 7.39-7.50), 239-244 (Fig.  7.68-7.72) |
| 11/16 F | 21 | Shark circulatory circulation, necturus circulation | **I&P:** Shark: 50-58 (Fig. 3.27-3.32); Necturus: 117-125  (Fig. 5.31-5.38) |
| 11/21 W |  | Cat circulation and sheep heart dissection | **I&P:** 220-238 (Fig. 7.51-7.67) |
| 11/23 F |  | **NO CLASS - Thanksgiving** |  |
| 11/28 W | 22 | Comparative circulation | **K:** Fig. 12.17, 12.38, 12.39; supplemental handout |
| 11/30 F | 23 | Comparative nervous system | **I&P:** Shark: 63-77 (Fig. 3.35-3.45); Necturus, Pigeon, Iguana: Supplemental handout; Cat: 244-252 (Fig.  7.73-7.80); **K:** 644-645, Fig. 16.26, 16.35-16.37 |
| 12/TBDM |  | **Final practical exam** |  |

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**FALL 2018**

# I HAVE READ AND UNDERSTAND THE SYLLABUS FOR THIS COURSE.

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