

Syllabus: BIO 441

Vertebrate Embryology (Fall 2020)

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Lab TA: Chris Cunningham | email: chris_cunningham@med.unc.edu

Class Times: On Time Tuesdays: 9:45 – 11:00 (Zoom ID: 919 6885 1047) / Prerecorded Thursdays

*All lessons will be recorded and available on Sakai (under the Warpwire tab)

DIVERSITY STATEMENT: The Department of Biology values the perspectives of individuals from all backgrounds reflecting the diversity of our students. We broadly define diversity to include race, gender identity, national origin, ethnicity, religion, social class, age, sexual orientation, political background, and physical and learning ability. We strive to make this classroom and this department an inclusive space for all students. Personally, I will add that I am a proud member of the National Organization of Gay and Lesbian Scientists and Technical Professionals (<https://www.noglstp.org/outtoinnovate/>), 500 Queer Scientists (<https://500queerscientists.com/>), and oSTEM (<https://ostem.org/>)

Course Description: You used to be one cell, then two, then four, until eventually you became trillions of cells—but you aren't a big blob of cells, you're a well-organized, highly efficient organism. How? Where are the plans for that kind of organized growth? The secrets begin in the embryo! In vertebrate embryology, you'll explore the history of embryology, how gametes are formed, how organ systems develop in vertebrate and invertebrate organisms, and learn the power of embryo research regarding basic biology and translational medicine.

Learning Objectives: By the end of this course you should be able to:

- Describe how gametes are made and how they form an embryo
- Compare vertebrate and invertebrate embryo development
- Describe how body plans and organ systems emerge and diseases associated with when things go wrong
- Apply your new knowledge to predict how evolution may influence embryo development

Course Grade: EXAMS (85%): 1 mini-midterm (5%) / 3 exams (20% each) / 1 cumulative final exam (20%)

If you miss an exam, you will get a zero and the final exam will count double. If miss more than one exam, you will receive a zero for your second missed exam—the final only replaces one exam grade. Because exams will be online you must complete them in the allotted time to receive credit. Exams must be taken on the dates indicated in syllabus. **PARTICIPATION (15%):** As an incentive to come to class prepared and be engaged, 15% of your grade will come from guided reading questions and class activities (these will often be 5-questions at the beginning of class or an assignment after class). Topics may cover material from the previous class, the coming class, and the GRQs.

GRADING SCALE: Grades will be assigned based on the total number of points for the entire semester: A (100-93), A-(92-90) / B+ (89-87), B (86-83), B-(82-80) / C+ (79-77), C (76-73), C-(72-70) / D+ (69-66), D (65-60) / F(<60)

Textbook: NOT REQUIRED because I will provide online resources. If desired: Principles of Development, 5th edition, Wolpert and Tickle (\$12-\$15 used on Amazon). Google Doc Shared Resources Link:

<https://docs.google.com/document/d/1tAAOv2oXhgHRJKAEFpEwLul7KqRgxs17XNdsbM65sUk/edit?usp=sharing>

All Google Docs here:

<https://docs.google.com/document/d/1tAAOv2oXhgHRJKAeFpEwLul7KqRgxs17XNdsbM65sUk/edit?usp=sharing>

SAKAI: <https://sakai.unc.edu/x/Q3FJIV>

The Sakai site will have postings from lectures such as slides. We will also post announcements regarding student concerns on this site. It is your responsibility to check it regularly

PIAZZA: Find our class page at: <https://piazza.com/unc/fall2020/441/home>

WEEK	Date	TOPIC	GRQs (Due before Class)
1	8/11/20	Introduction	All about you!
	8/13/20	Embryology: History and Basics	Women / Minorities of embryology
2	8/18/20	Germ Cell Development: Spermatogenesis	Mitosis and Meiosis
	8/20/20	EXAM 1 (mini midterm)	
3	8/25/20	Germ Cell Development: Oogenesis	Other Species: sperm and Egg
	8/27/20	Fertilization	Embryology in the News
4	9/1/20	Cleavage and Implantation	Other Species: Cleavage Patterns
	9/3/20	Gastrulation and the three germ Layers	Endo, Ecto, Meso
5	9/8/20	Invert: Nematode, urchin, ascidian	Model Organisms
	9/10/20	Invert: Plant Dev	Seeds
6	9/15/20	EXAM 2	
	9/17/20	Establishing Body Plan: Drosophila	Volhard, Lewis, Wieschaus
7	9/22/20	Establishing Body Plan: Human	Future Human Body
	9/24/20	Developmental Disorders	Disease Models
8	9/29/20	Placenta and Extraembryonic Membrane Development	Extraembryonic Importance
	10/1/20	Integumentary, Skeletal, and Muscle Development	Somites
9	10/6/20	EXAM 3	
	10/8/20	Limb Development	Thalidomide
10	10/13/20	Nervous System Development	Santiago Ramón y Cajal
	10/15/20	Sense Organs: Ears, Eyes, Nose	Coloboma
11	10/20/20	Head and Neck	Teeth
	10/22/20	Digestive and Respiratory System Development	Deuterostomes
12	10/27/20	EXAM 4	
	10/29/20	Cardiovascular System Development	Sinoatrial Node
13	11/3/20	Urogenital System Development	Nephrons
	11/5/20	Mechanisms of Sex Determination	Sex is not gender
14	11/10/20	Fetal Period and Birth	Premies
	11/12/20	Regeneration / Evolution	Evo-Devo
15	11/17/20	FINAL REVIEW	*LDOC/no reading days
	TBD	FINAL EXAM	
	11/26/20	Thanksgiving RECESS	

HONOR CODE: You must sign a pledge on all graded work certifying that no unauthorized assistance has been given or received. You are not to divulge any information about an exam to a student who has not yet taken that exam. You are responsible for consulting with your professor if you are unclear about any particular act on your part constitutes plagiarism.

COPYRIGHT POLICY: All course materials including your notes, assignments, and Zoom lectures are covered by University Copyright Policy: <https://aux-services.unc.edu/printing/copyright-campus-community/>

This means it is illegal to share any course materials with anyone not directly affiliated with this class.

Community Standards in Our Course and Mask Use

This fall semester, while we are in the midst of a global pandemic, **all enrolled students are required to wear a mask covering your mouth and nose at all times in our classroom.** This requirement is to protect our educational community — your classmates and me — as we learn together. If you choose not to wear a mask, or wear it improperly, I will ask you to leave immediately, and I will submit a report to the Office of Student Conduct. At that point you will be disenrolled from this course for the protection of our educational community. An exemption to the mask wearing community standard will not typically be considered to be a reasonable accommodation. Individuals with a disability or health condition that prevents them from safely wearing a face mask must seek alternative accommodations through the Accessibility Resources and Service. For additional information, see Carolina Together.

Tentative Lab Schedule:

Week	Date	Topic
1	8/11/20	Intro Discussion / No lab activity
2	8/18/20	Worm handling / CRISPR Project
3	8/25/20	Fertilization: Urchins
4	9/1/20	Cell division/lineage: Urchins
5	9/8/20	Embryos: <i>C. elegans</i> /wild nematodes
6	9/15/20	Embryos: Tardigrades
7	9/22/20	Genetics: <i>Drosophila</i> Staining
8	9/29/20	Genetics: <i>Drosophila</i> Staining
9	10/6/20	Regeneration: Planaria
10	10/30/20	Regeneration: Planaria
11	10/20/20	Bone and Cartilage staining: Chameleon and Turtle
12	10/27/20	Free Lab: Work on Projects and Submit Micropublications
13	11/3/20	Free Lab: Work on Projects and Submit Micropublications
14	11/10/20	Presentations

****THE PROFESSOR RESERVES THE RIGHT TO MAKE CHANGES TO THE SYLLABUS, INCLUDING TEST DATES. THESE CHANGES WILL BE ANNOUNCED AS EARLY AS POSSIBLE****