

Syllabus Biology 441 Vertebrate Embryology Albert Harris Spring 2019

MWF 9:05-9:55 Wilson 107

Office: Room 103 Wilson Hall

Office Hours: 10-12 Monday and Wednesday, or at other times by appointment

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No textbook is required.

Lecture notes, videos, review questions, and other material needed for exams will be posted on this web site throughout the semester. Please check it frequently for updates.

The Biology 441L lab is NOT required for students taking the lecture course. It is a separate 1-hour course. Labs will begin on January 16-17.

Grading

There will be three 1-hour exams, and a 3-hour final exam.

Review questions will be posted prior to each hour exam, and before the final.

Formation of study groups prior to the exam is encouraged. No notes or computers are allowed during the exams, and adherence to the honor code is expected.

You can drop the lowest hour exam grade... alternatively, you can count the final less. I will calculate which of these options gives you the higher grade.

exam 1	exam 2	exam 3	final
20%	20%	20%	40%
0%	25%	25%	50%
25%	0%	25%	50%
25%	25%	0%	50%

If you miss an hour exam because of an excused illness or conflict, e.g. travel for a job interview or for an athletic team, you may either drop that exam, or make it up within a few days.

Lecture Topics

- 1) Wed. Jan 9 Mammal Embryology in Contrast with Sea Urchin Embryology
- 2) Friday Jan 11 Subdivision of Vertebrate Embryos into Ectoderm, Mesoderm & Endoderm
- 3) Monday Jan 14 Morphogenetic Movements and Shape Formation
- 4) Wednesday Jan 16 Amoeboid locomotion, Electro-osmosis and Fluid-filled Spaces
- 5) Friday Jan 18 Embryology of Teleost Fish. Why are zebra-fish good "model organisms"?

- Monday Jan 21 ****** Holiday in Honor of Martin Luther King Jr. ******
- 6) Wednesday Jan 23 Embryology of Amphibians (Salamanders & Frogs). Advantages for Experiments
- 7) Friday Jan 25 Embryonic Development of Birds, Reptiles & Mammals; Extra-embryonic Membranes
- 8) Monday Jan 28 Regulative vs. Mosaic Development, Experimental Embryology
- 9) Wednesday Jan 30 Experimental Embryology continued
- 10) Friday Feb 1 Review for first examination
- 11) Monday Feb 4 **First Examination**
- 12) Wednesday Feb 6 Some Mathematical Concepts that Are Needed to Understand Shape Formation:
Pressures, Surface Curvatures, and Tensions
- 13) Friday Feb 8 How Do Physical Forces Cause the Shapes of Anatomical Structures?
- 14) Monday Feb 11 Symmetries of Causes Control Symmetries of Anatomical Shapes

- 15) Wednesday Feb 13 Reaction-Diffusion Systems: Instabilities that Create Geometric Patterns
- 16) Friday Feb 15 Somites and Other Structures that Develop From Mesoderm
- 17) Monday Feb 18 Ovaries and Testes; Primordial Germ Cells and Gamete Formation; Ectoderm
- 18) Wednesday Feb 20 Retino-tectal projections
- 19) Friday Feb 22 Chemotaxis
Stomodeum and Endoderm
- 20) Monday Feb 25 Heart Development
- 21) Wednesday Feb 27 Review for Second Examination
- 22) Friday Mar 1 **Second Examination**
- 23) Monday Mar 4 Sponge Aggregation and Cell Sorting
- 24) Wednesday Mar 6 Lessons from the History of Cell Sorting
- 25) Friday Mar 8 Limb Buds
- March 11-15 spring break**
- 26) Monday Mar 18 Programmed Cell Death; Liesegang Rings: Geometrical Patterns Formed by Chemical Reactions
- 27) Wednesday Mar 20 More on Limb Buds, the Apical Epidermal Ridge, and Regeneration
- 28) Friday Mar 22 Atherosclerosis
- 29) Monday Mar 25 Immunology, Allergies, and Autoimmune Diseases in Relation to Embryology
- 30) Wednesday Mar 27 Immunology, continued
- 31) Friday Mar 29 Immunology, continued

- 32) Monday Apr 1 Discussion and review
- 33) Wednesday Apr 3 Review for Third Examination
- 34) Friday Apr 5 **Third Examination**
- 35) Monday Apr 8 Embryology of Plants
- 36) Wednesday Apr 10 Resting Potentials, Fertilization, and Galvanotaxis
- 37) Friday Apr 12 Metamorphosis
- 38) Monday Apr 15 Aging
- 39) Wednesday Apr 17 Cancer as Disruption of Embryological Mechanisms
- Friday Apr 19 ******* Holiday *******
- 40) Monday Apr 22 Cancer, continued
- 41) Wednesday Apr 24 Evolutionary Developmental Biology, the so-called "Evo-Devo"
- 42) Friday Apr 26 Review of How Development Works

FINAL EXAM: Monday, May 6, 8:00 am