Bi 355: Evolution of Development. Fall, 2010

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Course Description: We will explore how the vertebrate body forms, describe how evolution has shaped life on earth, and aim to gain the tools necessary to read primary literature in the exciting field of evolution of development. We will examine the modern synthesis of classic evolutionary thought with recent advances in genetics and molecular biology to explain the amazing biodiversity found in the subphylum vertebrata. You should come out of this course convinced that your friends are most accurately described as a terrestrial form of Sarcopterygian fish.

Course Objectives: Our aim in this course is to provide the information necessary for you to become proficient in Vertebrate Biology, and the tools necessary to move forward in the emerging fields of gene evolution, comparative genomics, and evolution of development.

Grading  
Group Reading Presentation 80 pts  
Poster Session 120 pts  
Exam 1 (Midterm) 100 pts  
Exam 2 (Final) 100 pts  
Lab exercises (7 X 20 pts) 140 pts  
Lab participation 10 pts  
Lab Practical 100 pts  
Extra Credit Opportunity 25 pts

Total 650 pts
Description of assignments:

*Group Reading Assignment* (80 pts): You will work in groups of 4 to synthesize the assigned reading for a 1-week period of your choosing (you will sign up for 1 week on the first day of lab). You will carefully read, synthesize, and outline the assigned readings, and then prepare an outline of the most important points for your classmates. You will present your outline in a 20-minute presentation to the class, and then give a brief 5-10 question quiz on the material. At least one of your quiz questions will appear on the midterm or final exam. I will post a grading rubric for your presentations on blackboard. 60 pts of your grade will come from me, 5 points from yourself, and up to 5 pts/each from your group members. Total: 80 pts.

*Poster Session* (120 pts): In your working group of 4, you will design 2 posters, each poster with a theme about 1 side of a current controversy in evolution of development. You will have to research the controversy, and then present data in support of the view your poster defends. I expect your group of 4 will break into two groups of two, but you can tackle this assignment however your group deems appropriate. Your grade will be decided by 50 pts from Kristin, 50 pts from me, and 5 pts/ from each group member. Total: 120 points. The poster session will take place on the last day of lab.

*Extra Credit Opportunity*: (25pts). Get outside. One goal of Evo Devo is to describe how the vast array of forms have come to be in the animal kingdom. I would like you to describe a field trip or outdoor activity that future classes could do. In your field trip description, include a work sheet or activity the students could perform, including learning objectives. Be creative. I expect this assignment to take you 5-10 hours.

**Blackboard**: I am a frequent user of Blackboard. I will post information frequently and expect that you check the site DAILY for updates and information.

**Labs**: All lab exercises will be posted on Blackboard at the start of the term. You are responsible to download and print each exercise. There are NO LAB MAKE-UPS. If you fall very ill or have an emergency I would encourage you to do the extra credit assignment to make up the points.

**Texts: Required**: Both are available at the Duck Store.

Texts Recommended:

**Accommodating students with disabilities:** The University of Oregon is working to create inclusive learning environments. Please notify me if there are aspects of the instruction or design of this course that result in barriers to your participation. You may also wish to contact Disability Services in 164 Oregon Hall at 346-1155 or disabsrv@uoregon.edu

**Other accommodations:** I believe that college is not just about the classroom. It is about independent thinking, learning, and living. Part of this experience includes sports, music festivals, grandmother’s birthdays, camping trips, and trips to Fiesta Bowls to support the Duck Football Team. I will do my best to accommodate you if you must be absent for any reason for a lab, lecture, or exam. However, the agreement is that you must notify me 1 week in advance. If there is an emergency and you miss an important assignment, notify me as soon as possible and I will work with you.

**A note about email:** I will respond to all emails within 24-48 hours. Emails sent after 5pm or on a weekend will be answered during the next business day. Plan accordingly and pose questions by Friday 5pm ahead of our Monday 10/25 exam. In most cases, I prefer that you come to office hours or call my office phone for quick questions.
<table>
<thead>
<tr>
<th>Week</th>
<th>Theme</th>
<th>Lecture Topics</th>
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| 1    | The small toolkit and the vertebrate form | 1) small toolkit  
2) 3 syntheses  
3) Vertebrate Body | Intro to studying Anatomy | Schubin Ch. 1  
A &S Intro & Ch. 2 |
| 2    | Vertebrate radiations and homology | 1) Radiations  
2) Homology  
3) Homeobox and selector genes | Vertebrate Bauplans: Amphioxus to Zebrafish | Shubin Ch. 2  
H&S Ch. 3  
Carroll Ch. 2 (H.O) |
| 3    | Phylogenetics, Gene Evolution | 1) Phylogenetics  
2) Gene Duplications  
3) Gene Evolution | MacClade: Build a tree | Shubin Ch. 3  
H&S Ch. 4&5 |
| 4    | The organizer, Axis formation, Hox Cluster Evolution | 1) Germ layers and the organizer  
2) Axis Organizers  
3) Hox Cluster Evolution | Vertebrate Developmental Stages: Chicks & Fish | Shubin Ch. 6 & 7  
Primary Lit (H.O) |
| 5    | Teeth, Jaws, Bones, Skeletons | 1) **Exam 1 (10/25)**  
2) Teeth and Jaws  
3) Bones and Skeletons | Bone Development and Skeletal Anatomy | Shubin Ch. 4  
H&S Ch. 1 |
| 6    | Physiological Systems: Hearts & Brains | 1) Cardiovascular A&P  
2) EVo of 4 chambers & Intro to CNS  
3) EVo of CNS | Hearts and Brains: Gory Glory | Shubin Ch. 5  
H&S Ch. 6 |
| 7    | Modes of Evolution of Development & Case studies | 1) Modularity & Evolvability  
2) Heterochrony  
3) Case study: Birds and Whales | Lab Practical & Bioinformatics Worksheets (BML) | Shubin Ch. 8  
H &S Ch. 8 &9 |
| 8    | Morphological Novelty, variation, and speciation | 1) Morphological Novelty  
2) Morphological variation and species divergence  
3) U of 0 research | Quacks & Glowing Fish | Shubin Ch. 9  
H.O Primary Lit |
| 9    | Evo Devo at U of O: Current research | 1) U of O researcher  
2) U of O researcher  
3) Turkey Day | Stickleback Lab (Mark Currey hosts) | Shubin Ch. 10  
H &S Ch. 10 |
| 10   | Sensory Systems: Eyes, Ears, Nose | 1) Evo Devo of Eyes  
2) Evo Devo of Ears  
3) Evo Devo of Noses | Poster Session! | Shubin Ch. 11  
H.O Caroll Ch. 8 |

**Final Exam:** Monday, December 6th 10:15 am