Animal Development Zool. 430 course syllabus  
Spring 2016  
Fayetteville State University  
College of Arts and Sciences: Department of Biological Sciences  
Animal Development Zool. 430 course syllabus  
Spring 2016

I. **Locator Information**

Instructor: Eid Haddad, PhD  
Assistant Professor of Physiology  
Course name and number: Animal Development - 2335 - ZOOL 430 – 01 & 2336 - ZOOL 430 – 02  
Number of Credits: 4.0 semester hrs of credit  
Office location: Science & Technology Building #426  
Office phone: 910-672-2436  
Email: ehaddad@uncfsu.edu  
Office hours: MTWR: 8:00 am – 9:30 am, MF: 1:30 pm – 2:30 pm or by appointment. Also, I have an open door policy, please use Canvas calendar to make an appointment outside the above dates/times.

Day and time class/lab meet:

<table>
<thead>
<tr>
<th>Section</th>
<th>Type</th>
<th>Time</th>
<th>Days</th>
<th>Where</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZOOL 430-01</td>
<td>Class</td>
<td>10:00 am - 11:15 am</td>
<td>MW</td>
<td>LS 113</td>
</tr>
<tr>
<td></td>
<td>Lab</td>
<td>2:00 pm - 3:50 pm</td>
<td>W</td>
<td>LS 113</td>
</tr>
<tr>
<td>ZOOL 430-02</td>
<td>Class</td>
<td>3:45 pm - 5:00 pm</td>
<td>TR</td>
<td>LS 113</td>
</tr>
<tr>
<td></td>
<td>Lab</td>
<td>12:00 pm - 1:50 pm</td>
<td>W</td>
<td>LS 113</td>
</tr>
</tbody>
</table>

Abbreviations: M (Monday), T (Tuesday), W (Wednesday), R (Thursday), (F) Friday, LS (Lyon Science Building)

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**FSU Policy on Electronic Mail:** Fayetteville State University provides to each student, free of charge, an electronic mail account ([username@uncfsu.edu](mailto:username@uncfsu.edu)) that is easily accessible via the Internet. The university has established FSU email as the primary mode of correspondence between university officials and enrolled students. Inquiries and requests from students pertaining to academic records, grades, bills, financial aid, and other matters of a confidential nature must be submitted via FSU email. Inquiries or requests from personal email accounts are not assured a response. The university maintains open-use computer laboratories throughout the campus that can be used to access electronic mail. Rules and regulations governing the use of FSU email may be found at: [http://www.uncfsu.edu/PDFs/EmailPolicyFinal.pdf](http://www.uncfsu.edu/PDFs/EmailPolicyFinal.pdf)

II. **Course Description:**

A study of principles of animal development including cellular and tissue assembly, embryogenesis, and reconstitutive development, with two (2) hours of laboratory studies of the development of representative invertebrate and vertebrate embryos. **Prerequisite:** ZOOL 370.

III. **Disabled Student Services:**

In accordance with Section 504 of the 1973 Rehabilitation Act and the Americans with Disabilities Act (ACA) of 1990, if you have a disability or think you have a disability to please contact the Center for Personal Development in the Spaulding Building, Room 155 (1st Floor); 910-672-1203.

IV. **Title IX – Sexual Misconduct**

Fayetteville State University (University) is committed to fostering a safe campus environment where sexual misconduct — including sexual harassment, domestic and dating violence, sexual assault, and
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stalking - is unacceptable and is not tolerated. The University encourages students who may have experienced sexual misconduct to speak with someone at the University so that the University can provide the support that is needed and respond appropriately. The Sexual Misconduct policy can be found at the following link: http://www.uncfsu.edu/Documents/Policy/students/SexualMisconduct.pdf

Consulting with a Health Care Professional - A student who wishes to confidentially speak about an incident of sexual misconduct should contact either of the following individuals who are required to maintain confidentiality:

Ms. Dionne Hall  
Licensed Professional Counselor  
Spaulding Building, Room 167  
(910) 672-2167  
dhall9@uncfsu.edu

Ms. Linda Melvin  
Director, Student Health Services  
Spaulding Building, Room 121  
(910) 672-1454  
lmelvi10@uncfsu.edu

Reporting an Incident of Sexual Misconduct - The University encourages students to report incidents of sexual misconduct. A student who wishes to report sexual misconduct or has questions about University policies and procedures regarding sexual misconduct should contact the following individual:

Title IX Coordinator  
Barber Building, Room 242  
(910) 672-1141

Unlike the Licensed Professional Counselor or the Director of Student Health Services, the Deputy Title IX Coordinator is legally obligated to investigate reports of sexual misconduct, and therefore cannot guarantee confidentiality, but a request for confidentiality will be considered and respected to the extent possible.

Students are also encouraged to report incidents of sexual misconduct to the University’s Police and Public Safety Department at (910) 672-1911.

V. Textbooks:

Textbook: Gilbert, Scott F, DEVELOPMENTAL BIOLOGY, 10th ed., Sinauer Associates, Inc. 2014. http://10e.devbio.com/. The textbook is available at the bookstore. The link provides you with additional resources such as full copies (or abstract) as well as PubMed links of referenced articles.

Laboratory Manuals:

- Tyler, Mary S. & Ronald N. Kozlowski, VADE MECUM3: AN INTERACTIVE GUIDE TO DEVELOPMENTAL BIOLOGY (online only) – Edition 3. http://labs.devbio.com/index.html. You can purchase access at the bookstore; use the provided information to create your own account. You will have access to the lab manual, animations, videos, and many other helpful resources.

- Wright, Shirley J. A PHOTOGRAPHIC ATLAS OF DEVELOPMENT BIOLOGY, Morton Publishing Co., 2005, also available at the FSU bookstore. This will be used heavily during throughout the lab.

VI. Course objectives and student learning outcomes:

Upon successful completion of this course, students will be able to:

1. Relate contributions made to embryology and developmental biology from at least 12 classical or outstanding experiments and by 10 outstanding scientists, as assessed on quizzes and exams.
2. Explain at least 12 fundamental concepts in development, evaluated by performance on quizzes and exams.

3. Explain the process by which a germ cell becomes a mature, properly organized, functional gamete, and demonstrate knowledge on quizzes and exams.

4. Describe fully the fertilization process, its physiological and structural results, with assessment through tests and special assignments.

5. Differentiate between the types of cleavage common to vertebrate and selected invertebrate embryos with assessment through laboratory and lecture tests.

6. Discuss the contemporary theories of the molecular basis for information storage and utilization in early development. This will be evaluated through Selected Reading Reports and tests.

7. Explain how the prospective definitive areas of selected representative vertebrate and other representative embryos originate, become identified and become structurally and chemically oriented toward their ultimate destination. Evaluation will be done through tests, exams, or class presentations.

8. Relate the sequence of activities that are responsible for the development of the functional organs of the adult vertebrate body from the primary organ rudiments. Assessment to be made by lecture tests and exams.

9. Trace and explain the complete development of the systems of vertebrate embryos when given visual presentations of representative stages. Evaluated by lab tests and lab reports and lecture tests.

10. Identify representative organ primordial and developmental stages in sea urchin and drosophila embryos and in larval forms and of the 24, 33, and 72 hr chick embryos. Evaluated by lab tests performance.

11. Recall and interpret the basic vocabulary of animal development. Assessment will be determined using all evaluations in the course.

12. Exhibit knowledge of the major problems involved in development, control and maintenance of cytodifferentiation in animals. Evaluations made via tests, quizzes, class presentations, and reading reports.

13. Identify and discuss at least five developmental processes that occur after embryonic development has been completed. Success evaluated by tests and quizzes.

14. Read typical developmental biology research articles with understanding, as evidenced in Reading Reports and Web assignment presentations.

15. Communicate knowledge of development through well organized, correctly spelled, and correctly structured written presentation of question responses and reading reports. Assessment will be made in all evaluation instruments.

Disclaimer: Policies outlined below are subject to change if the instructor deems necessary. You will be informed of these changes.

VII. Evaluation criteria and grading scale

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture quizzes (one /chapter at the completion of each chapter)</td>
<td>15 %</td>
</tr>
<tr>
<td>Lecture exams (three: see below)</td>
<td>30 %</td>
</tr>
<tr>
<td>Lecture final exam (comprehensive)</td>
<td>15 %</td>
</tr>
<tr>
<td>Lab quizzes (one / lab)</td>
<td>10 %</td>
</tr>
<tr>
<td>Lab manual including pre-lab questions and lab reports</td>
<td>10 %</td>
</tr>
<tr>
<td>Lab exams (2)</td>
<td>20 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>

Grading scale

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90% +</td>
</tr>
<tr>
<td>B</td>
<td>80% - 89%</td>
</tr>
<tr>
<td>C</td>
<td>70% - 79%</td>
</tr>
<tr>
<td>D</td>
<td>60% - 69%</td>
</tr>
<tr>
<td>F</td>
<td>≤ 59%</td>
</tr>
</tbody>
</table>
Lecture quizzes. These will be 25 questions (multiple choice, matching, fill-in the blank, labelling etc.), with a time limit of 30 minutes, single attempt, online posted on CANVAS. Must be completed by the due date/time. There will be no makeup for these quizzes. Quizzes will be available for review immediately after due date/time and will stay open for review for 24-hour post-due date/time.

Lecture exams. These will be 50 questions (same types as above), one-hour time limit, paper (ScanTron). No makeup unless you have a valid reason. Final lecture exam (100 questions, 2 hrs) will be comprehensive with the majority of the questions from post exam 3 chapters.

Laboratory (lab) quizzes & exams. Quizzes are short, paper (no online). You will be told about the lab exams in due time but will include all types of questions (no online)

Pre-lab questions, lab notebook, and lab reports. Pre-lab questions (your lab manual at the end of each chapter) for each laboratory exercise must be completed and submitted prior to each lab at the beginning of the respective lab (25% penalty for late submission). You will answer all questions, print and submit the printed copy (clearly hand written answers will also be accepted) (include your name, course/section #, date of the lab, and lab exercise number/title). I will grade and return to you at the subsequent lab meeting.

Lab reports should be prepared according to the format specified in your laboratory manual (Chapter 1: Getting started). I will go over it during our first lab meeting. I expect you to follow these format; any deviation will earn you a “0” grade for that report. Lab reports are DUE ONE WEEK AFTER COMPLETION OF THE LAB. They will be graded and returned to you at the subsequent lab meeting.

Your lab notebook is for you to take notes during the lab and document observations/data/results. Again, I expect you to follow the format listed in Chapter 1 of your lab manual. I will check them for compliance at random during any lab period.

Students are expected to take all quizzes/exams on the scheduled dates/times. Excused absences from test will be very rare and make-up quizzes/exams will be discouraged. In addition to the above, there will be NO MAKE-UP laboratory quizzes/exams.

Grading (written materials, lab and lecture exams/quizzes) will be completed in one-week time period form submission or completion date.

FSU attendance and grading policy

1. Class Attendance: You are expected to attend all class meetings, laboratories, and other instructional sessions. You are expected to arrive to class on time and remain in class for the entire scheduled period. If you must miss a class(es) for unavoidable reasons - i.e., illness, family emergencies, or participation in official university sponsored activities – you are responsible for informing me of the reason(s) for the absences, in advance if possible, and you must complete all missed assignments.

2. Grading policy:
   a. During the first half of the semester/term, I will assign an interim grade of "EA,” (Excessive Absences) for students whose class absences exceed 10% (three class/lab meetings) of the total contact hours for the class. Students who receive EA interim grades must either withdraw from the class or resume attendance. Students who resume attendance must consult with me about completion of missed assignments. The EA is not a final grade, so students who are assigned an interim grade of EA, but do not withdraw from the class, will receive a final grade based on the evaluation criteria for the class.
b. A final grade of “FN” (F due to non-attendance or excessive Absences) is given to a student whose class absence exceeds 10% class/laboratory periods in a semester and does not withdraw but instead remains on the roster. Lab periods are considered class periods.

c. New type of grade: Interim Grade. An Interim Grade of “X” (no show) will be given early in the semester as a warning to the student. Interim Grades do not influence GPA. They are reminders to the student to decide whether to withdraw or to increase attendance.

d. I do not give “I” (incomplete) grade, or extra credit work so do not ask me about them.

Classroom policies and Student Behavior Expectations:

1. **Food**: Food is forbidden in the lecture room, and OSHA regulations forbid both food and drink in the lab.

2. **Bringing children to the class or lab**: This is against FSU policy.

3. **Disruptive behavior**: The professor will use his own judgment as to whether, in response to disruptive behavior, he will merely ask the student to stop, ask the student to leave for the rest of the class period, or take other action. In extreme or repeated cases, the instructor may report the student to the Dean of Students for disciplinary action according to the FSU Code of Student Conduct. Disruptive behavior includes food consumption, playing music with headphones, popping gum, texting, answering a phone, holding a private conversation, or any other behavior that the professor or students find distracting or rude.

4. The instructor will respect all students and will make every effort to maintain a classroom climate that promotes learning for all students. Students must accept their responsibility for maintaining a positive classroom environment by abiding by the following rules:
   a. Students are expected to attend and be active participants in ALL class lecture and laboratory sessions. Attendance will be taken at each class session. Students missing more than 4 class sessions (10%) may have an XF final grade.
   b. Students are expected to arrive for class on time, remain in class until dismissed by the instructor, and refrain from preparing to leave class until it is dismissed.
   c. Students must refrain from any activities that will disrupt the class; this includes use of cell phones and pagers. Cell phones and pagers must be put in bags or backpacks during tests.
   d. Students will follow all laboratory safety guidelines.

VIII. **Academic support resources**

University College Learning Center: Check 216C, ph: 910-672-1864. Tutoring, proofreading, etc. Also, check CANVAS for any additional resources. Check with me if you need any assistance.

**Academic Integrity**

Each student must be familiar with the Academic Integrity Policy of the University. In accordance with the policy, cheating, plagiarism, misrepresentation, any other acts of academic dishonesty including submission of work that is the work of another student will be a violation of the academic integrity policy and will be addressed accordingly. Cheating on tests/exams will result in an automatic zero for that test/exam. Cheating could also result in course failure.

For additional information (e.g. experimental details, historical information, medical implications, commentaries, text updates, links to other sites,) on topics in this course you are referred to the web site as listed above. Another helpful link is [http://www.swarthmore.edu/NatSci/sgilber1/DB_lab/DB_lab.html](http://www.swarthmore.edu/NatSci/sgilber1/DB_lab/DB_lab.html). I will post other links on CANVAS.
IX. **Course outline and assignments** *(dates subject to change):*

<table>
<thead>
<tr>
<th>Week of</th>
<th>Chapter / Lecture Topics</th>
<th>Chapter / Laboratory Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/11/2016</td>
<td>Ch. 1. Comprehending development: Generating new cells and organs</td>
<td>Syllabus and lab biosafety orientation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ch. 1. Getting started</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ch. 2. Embryological tools</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ch. 12. Histology</td>
</tr>
<tr>
<td>1/18/2016</td>
<td>Ch. 2. Differential gene expression in development</td>
<td>Ch. 3. Using the compound microscope</td>
</tr>
<tr>
<td>1/25/2016</td>
<td>Ch. 3. Cell – cell communication in development</td>
<td>Ch. 5. Gametogenesis <em>(Skip Ch. 4 of lab manual)</em></td>
</tr>
<tr>
<td>2/01/2016</td>
<td>Ch. 4. Fertilization: Beginning a new organism</td>
<td>Ch. 6. Echinoid fertilization and development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ch. 7. <em>Sea Urchins development - Effects of ultraviolet radiation</em> <em>(pre-lab report only)</em></td>
</tr>
<tr>
<td>2/08/2016</td>
<td>Ch. 5. Early development: Rapid specification in snails and nematodes</td>
<td>Lecture Exam 1 Ch. 1-4 of textbook</td>
</tr>
<tr>
<td>2/15/2016</td>
<td>Ch. 6. The genetics of axis specification in <em>Drosophila</em></td>
<td>Lab Exam #1 <em>(1-3, 5-7, 12)</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ch. 8. Development of the fruit fly <em>(introduction)</em></td>
</tr>
<tr>
<td>2/22/2016</td>
<td>Ch. 7. <em>Sea Urchins and Tunicates: Deuterostome Invertebrates</em></td>
<td>Ch. 8. Development of the fruit fly</td>
</tr>
<tr>
<td>2/29/2016</td>
<td>Ch. 8. Early development in vertebrates: Amphibians and fish</td>
<td>Ch. 9. Early development of the chick</td>
</tr>
<tr>
<td>3/14/2016</td>
<td>Ch. 9. Early development in vertebrates: Birds and mammals</td>
<td>Ch.10. 33- hours chick embryo</td>
</tr>
<tr>
<td></td>
<td><strong>Exam 2 Ch. 5-8</strong></td>
<td></td>
</tr>
<tr>
<td>3/21/2016</td>
<td>Ch. 9. Early development in vertebrates: Birds and mammals</td>
<td>Ch.10. 33- hours chick embryo</td>
</tr>
<tr>
<td>3/28/2016</td>
<td>Ch. 10. The emergence of the Ectoderm: Central Nervous System and Epidermis</td>
<td>Ch.10. 72- hours chick embryo</td>
</tr>
<tr>
<td>4/04/2016</td>
<td>Ch. 11. Neural crest cells and Axonal specificity</td>
<td>Ch.10. 72- hours chick embryo</td>
</tr>
<tr>
<td>4/11/2016</td>
<td>Ch. 12. Paraxial and intermediate mesoderm</td>
<td>Ch.11. The living Embryo and making a whole mount</td>
</tr>
<tr>
<td>4/18/2016</td>
<td>Ch. 13. Lateral plate mesoderm and Endoderm</td>
<td>Lecture Exam 3 Ch. 9-12</td>
</tr>
<tr>
<td></td>
<td>Ch. 14. Development of the tetrapod limb</td>
<td></td>
</tr>
<tr>
<td>4/25/2016</td>
<td>Ch. 15. Sex determination</td>
<td>Lab Exam #2 <em>(8-11)</em></td>
</tr>
<tr>
<td></td>
<td>Ch. 17. The saga of the germ line</td>
<td></td>
</tr>
<tr>
<td>4/28/2016</td>
<td>Last day of classes: graduating senior final exam.</td>
<td></td>
</tr>
<tr>
<td>5/02/2016</td>
<td>Final exam <em>(Comprehensive)</em> – See “final exam semester calendar at FSU website.”</td>
<td></td>
</tr>
</tbody>
</table>

1. **Instructor has the right to revise course calendar, but will inform students in due time.**
2. **Both lectures and labs are fully independent of each other.**
3. Due to the lab being mostly on live specimens, availability of these specimens may dictate changes in lab activities; be prepared to switch activities on a short notice, possibly the night before the scheduled lab.
4. Certain sections of some of the textbook chapters will not be covered during lecture; you will be told of them and will not be included in exams/quizzes.
X. Instructional style:

This course is designed to provide a general study of major concepts of animal development. It will combine a study of descriptive, experimental and molecular approaches to understanding the developmental processes that occur in the life cycle of selected vertebrates and invertebrates. The descriptive study will rely heavily on the laboratory work where identification of structural change will be made. The experimental study will be used to guide students toward an understanding of how development is controlled and what factors affect the control mechanisms. The molecular study will emphasize the cellular and biomolecular mechanisms that are basic to development. Emphasis will be placed on the use of selected readings from scientific journals, internet assignments, course-related websites including your textbook and lab manual websites, and other study aids.

The laboratory activities will focus on the student’s ability to recall, identify, and associate the theories and concepts of development and apply them to the study of developmental stages of selected invertebrate and vertebrate embryos. The laboratory will use simulations, microscope slide studies, live embryonic studies of sea urchins, fruit flies, fish (possible), and chick embryos.

XI. Bibliography:

Selected references from the reference list at the end of each chapter will be recommended. Current issues of the following journals should be reviewed regularly:

1. American Scientist
2. American zoologist
3. Cell
4. Cell Differentiation
5. Development
6. Journal of Embryology and Experimental Morphology
7. Journal of Experimental Zoology
8. Nature
9. Science
10. Scientific American
11. Developmental Biology
12. Genes and Development
13. In Vitro Cellular & Developmental Biology
14. Journal of Cell Biology
15. Molecular Biology & Evolution
16. Proceedings of the National Academy of Science