Instructor: Dr. Laurel Fohn, MD, PhD
Email: laurel.fohn@angelo.edu
Phone: 486-6644
Office: 107 Cavness Science Building

Office Hours: As posted on Blackboard and office door and by appointment. Office hours will predominantly be virtual via telephone or Blackboard Collaborate, or held outdoors.

Course Information

Class Meeting Times: Tuesday and Thursday 11:00 am - 12:15pm and lab on Tuesday 2:00- 4:50pm

Course Description
A study of the molecular and genetic mechanisms regulating the development of animals. Specific topics include gametogenesis, embryogenesis, and tissue development. Lab emphasizes the application of knowledge gained in lecture to design experiments, predict their outcome, and understand the importance of normal and abnormal development on physiology and pathophysiology. Laboratory also explores the development of various invertebrate and vertebrate model organisms and the application of techniques used in these model systems.

Prerequisite Courses
Credit for Biology 3301 and 3403; Completion of lab biosafety training on Bb and chemical safety and hygiene on Bb.

Prerequisite Skills
Accessing Internet websites, using ASU Library resources, ASU email and ASU Blackboard, using Respondus Lockdown Browser and Monitor, and proficiency with Microsoft Word and/or PowerPoint are expectations of the course.
Course Objectives/ Student Learning Outcomes

IDEA COURSE OBJECTIVES:

Primary:
1. Gaining factual knowledge (terminology, classifications, methods, trends)

Secondary:
2. Learning to apply course material (to improve thinking, problem solving, decisions)
3. Developing specific skills, competencies, and points of view needed by professionals in the field most closely related to this course

STUDENT LEARNING OUTCOMES:

By the end of this course, students that successfully complete this course should be able to:

A. Correctly define and use concepts, terminology, classifications, and methods used in developmental biology. (Course Objectives 1&2)
B. Explain the advantages of conducting research with each of the various model organisms used in this course, and the contribution that experiments in these model organisms have made to our understanding of developmental biology. (Course Objective 1-3)
C. Given an observation, write a testable hypothesis, and design an appropriate experiment to test the hypothesis. (Course Objectives 1-3)

Course Delivery

This is a blended course that is predominantly face-to-face with roughly 15% of the course delivered online only via Blackboard\(^1\). The online component is important for some exams, homework assignments and learning resources and supplemental materials. The face-to-face component comprises the majority of the course and is where most information will be conveyed, points earned, and some exams taken.

To maintain academic quality while accommodating social distancing needs this semester, this course will use a split delivery model that combines face-to-face teaching with remote instruction. The goal is to provide face-to-face instruction to students who want to return to campus, while also allowing students who may need to learn remotely to participate via virtual class sessions as often as possible. When you are not in the physical class, you will attend live remote sessions at the same time as our scheduled course. You will also be expected to complete coursework via Blackboard\(^2\). Lab sessions and some lecture sessions will require in person attendance. Please refer to this Health and Safety web page\(^3\) for updated information about campus guidelines as they relate to the COVID-19 pandemic.

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1. Blackboard
2. Lab
3. Health and Safety
Required Texts and Materials


3. Marble composition notebook for lab (not a 3 ring binder)

4. Flash (USB) drive, access to P drive or free cloud storage

Technology Requirements

To successfully complete this course, students need to have access to laptop or smartphone and be able to access the internet. Access to some exams and quizzes will be through Respondus Lockdown Browser and will be video recorded via Respondus Monitor. Respondus requires a desktop computer or laptop (not a Chromebook) and a webcam and microphone. For best results, use an ethernet cable to connect to your Internet source instead of relying on Wifi. Refer to the Blackboard course for Respondus installation instructions.

Lectures will be in person and live-streamed and virtual office hours will occur via phone or Blackboard Collaborate (which requires a web cam if you want to be seen and microphone or phone in to be heard).

Communication

Faculty will respond to email and/or telephone messages within 48 hours during working hours Monday through Friday. Weekend messages may not be returned until Monday.

Written communication via email: All private communication will be done exclusively through your ASU email address and Blackboard. Check frequently for announcements and policy changes. In your emails to faculty, include the course name and section number in your subject line.

Virtual communication: Office hours and/or advising may be done with the assistance of the telephone or Blackboard Collaborate.

Grading/ Assessment of Student Learning Outcomes

The course objectives and student learning outcomes will be assessed through a combination of exams, a presentation, study guides, problem sets and lab notebook/activities and will be based on a point system.

| 2 exams (mid-term & final) (150 points each)- March 23 in lab & Tues, May 11 at 10:30 am | 300 points |
### Grading Scale:

Please keep record of all of your points so you may monitor your progress throughout the semester.

- 900-1020 points = A
- 800-899 points = B
- 700-799 points = C
- 600-699 points = D
- 0-599 points = F

### EXAMS:

Exams will help you determine your progress on Course Objectives 1 & 2 and SLOs A-C.

Exams will be composed of practical questions arising from lecture material or laboratory experiments. Approximately 65-75% of each exam will be composed of questions requiring primarily a “recall” of lecture/laboratory information. The remaining 25-35% of each exam will be composed of questions that will require a “synthesis” of information or an “application” of knowledge to solve an unknown situation.

### LAB PRESENTATION:

The lab presentation will help you progress on Objectives 1-3 and SLOs A-C.

Understanding scientific knowledge, evaluating experimental data and publications, and orally presenting data (both that of others and that of your own) are key scientific skills. More details regarding the requirements of the lab presentations will be discussed in lab and posted on Bb.

### PROBLEM SETS:

The problem sets will help you determine your progress on Course Objectives 1-3 and SLOs A-C. The problem set format consists of a guided short answer question. Each guided short answer question starts with an observation. You will be expected to write a hypothesis (based on a causal explanation) to explain the phenomena in
the observation, design an experiment to test the hypothesis, predict possible outcomes of the experiment, and discuss the results. See Blackboard (Bb) in Problem Sets for an example guided short answer question and sample student answer.

Policy on missed problem sets: Due dates are FIRM. There are no makeup problem sets. This is because we will discuss the problem sets in class on the day that they are due.

LAB NOTEBOOK:
The lab notebook will help measure your progress on Objectives 1-3 and SLOs A-C. Keeping accurate, detailed notes in your lab notebook is an essential first step to communicating your findings to others. To encourage you to keep your lab notebooks updated, I collect and grade them randomly throughout the semester. I will announce prior to the end of class that notebooks are due by the next class period. Only 210 lab notebook points are allowed, but you may have the opportunity to earn more points, depending on whether you perform additional experiments. I will only include the 6 lab notebook entries/experiments with the highest grades. The guidelines are available on Bb in Lab notebooks.

Policy on missed or late Lab Notebook: I do NOT accept lab notebooks for grading after the due date. Please bring lab notebooks with you to every class to avoid missing a lab notebook collection.

CLASS PARTICIPATION:
Class participation activities will help you progress on Course Objectives 1-3 and SLOs A-C. Class participation includes attending class (in person or virtually) and participating in group discussions. Students will be given 6 cards. Each time a student answers (at an acceptable level) a question/s presented by the instructor, the student may hand in a card. Each card is worth 5 points. Only one card per student may be submitted per lecture session. This will be discussed in more detail on the first day of class.

STUDY GUIDES, etc:
Study guides and other activities will help you progress on Course Objectives 1-3 and SLOs A-C. Study guides are designed to help you keep up with the course material. They will cover readings for lecture AND lab. They are intended to help you prepare for any in-class activities related to the material. These are individual assignments, but you may use any resource available to you including your textbook, reliable internet sources, or the library. These are take-home assignments- not take-Dr. Fohn assignments. I will not answer these questions for you. In addition to being announced in class, they will also be posted on Bb in Study Guides. Additionally class activities, homework, or journal club presentations/discussions in lecture or lab may fall into this category.
**Policy on missed or late study guides:** Due dates are FIRM. I do not accept late study guides. However, there will be multiple activities through the semester and there are additional points built into the system, in case there is a lecture you are unable to attend. However, you are still responsible for any information in a missed or incomplete study guide/activity.

**LIFELINE POLICY:** I realize that unforeseen minor circumstances occasionally arise. Therefore, there are 20 extra points built into the system to enhance your grade, and extra lab/ homework assignment(s). This is sufficient to compensate for a deficit in a lab notebook, a class participation card, or study guide/class activity.

**THREE BEFORE ME POLICY:** Since this is a senior level course, I expect you to find answers to common questions in the syllabus, on Bb, or other handouts I provide. Before asking me this type of question (for example, deadlines, reading assignments, or format), please consult at least 3 resources. You are always strongly encouraged, however, to ask questions to help clarify something you have found in one of the resources available for this course.

**Attendance**

Roll will be taken at each class meeting. Lectures will be live-streamed to assist with virtual attendance related to COVID-19. Lab will be in-person and some lectures will include follow-up lab work and require in-person attendance. Please arrive on time and plan to stay the duration of the class period. Please don’t schedule appointments, vacation, work, or medical/graduate school interviews during class time. However, I do realize that emergencies and circumstances beyond your control can arise (see lifeline policy above). **Policy on Observance of Religious Holy Day is stated below:** Please let me know in advance in writing (email is acceptable) if you intend to miss class due to a religious holy day so that you can complete missed in-class assignments and/or activities.

**Make-up Work**

Students are required to take all exams and to complete all assignments on time. Exceptions will be made only in rare and unusual circumstances and ONLY BY PRIOR ARRANGEMENT. THERE ARE NO EXCEPTIONS TO THIS RULE. Make-up exams, when rarely justified, will be given at a mutually convenient time.

**Drop/ Withdrawal Policy:**

The last day a student may drop/withdraw from class is **Friday, April 30, 2021** (ie. these students will receive a W on their transcript). Any student remaining on the official role after this date will receive a grade.
REQUIREMENTS FOR GRADUATE CREDIT

Students expecting graduate credit will be required to prepare a formal research report on any topic relevant to developmental biology (if currently working on a thesis topic, this subject should be of ancillary interest). For graduate students, these papers will alter the grading scale as depicted in the table below. Papers should be type written, include a minimum of seven (7) primary references and demonstrate an understanding and integration of these references. Papers may be turned in for preliminary review on or before Monday, April 12. Papers will be critiqued, graded and returned within the next two weeks. If the student is satisfied with that grade, it will be recorded. If the student wishes to improve his/her grade, the paper should be revised and turned in no later than Monday, May 10 for a final grade.

***Graduate students must score a minimum of 80% on this paper and turn in at least 4 participation cards below to receive graduate credit.***

<table>
<thead>
<tr>
<th>Activity</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 exams (mid-term &amp; final) (150 points each)</td>
<td>300</td>
</tr>
<tr>
<td>1 Lab Presentation</td>
<td>70</td>
</tr>
<tr>
<td>3 problem sets (hypothesis, experimental design, etc.) (70 pts each)</td>
<td>210</td>
</tr>
<tr>
<td>6 highest lab notebook entries (40 points each)</td>
<td>240</td>
</tr>
<tr>
<td>class participation - (8 answer cards; only 1 in a given lecture) (first 4 expected for grad credit, final 4 @10 pts each)</td>
<td>40</td>
</tr>
<tr>
<td>Study guides, Reviews, Homework, Class/Lab activities, Journal Club</td>
<td>140</td>
</tr>
<tr>
<td>Research report for graduate credit (must score 80% or higher)</td>
<td>70</td>
</tr>
<tr>
<td>Total available points</td>
<td>1040</td>
</tr>
</tbody>
</table>

General Policies Related to This Course

All students are required to follow the policies and procedures presented in these documents:

- Angelo State University Student Handbook
- Angelo State University Catalog

Academic Integrity

Students are expected to maintain complete honesty and integrity in all work. Any student found guilty of any form of dishonesty in academic work is subject of disciplinary action and possible expulsion from ASU.

The College of Science and Engineering adheres to the university’s Statement of Academic Integrity.
Accommodations for Students with Disabilities

ASU is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs or activities of the university, or be subjected to discrimination by the university, as provided by the Americans with Disabilities Act of 1990 (ADA), the Americans with Disabilities Act Amendments of 2008 (ADAAA) and subsequent legislation.

Student Disability Services is located in the Office of Student Affairs, and is the designated campus department charged with the responsibility of reviewing and authorizing requests for reasonable accommodations based on a disability. It is the student’s responsibility to initiate such a request by contacting an employee of the Office of Student Affairs, in the Houston Harte University Center, Room 112, or contacting the department via email at ADA@angelo.edu. For more information about the application process and requirements, visit the Student Disability Services website. The instructor must receive a letter from Student Affairs describing the accommodations to be made at least one week prior to the assignments the student is requesting accommodation for. The employee charged with the responsibility of reviewing and authorizing accommodation requests is:

Dallas Swafford
Director of Student Disability Services
Office of Student Affairs
325-942-2047
dallas.swafford@angelo.edu
Houston Harte University Center, Room 112

Incomplete Grade Policy

It is policy that incomplete grades be reserved for student illness or personal misfortune. Please contact faculty if you have serious illness or a personal misfortune that would keep you from completing course work. Documentation may be required. See ASU Operating Policy 10.11 Grading Procedures for more information.

Plagiarism

Plagiarism is a serious topic covered in ASU’s Academic Integrity policy in the Student Handbook. Plagiarism is the action or practice of taking someone else’s work, idea, etc., and passing it off as one’s own. Plagiarism is literary theft.

In your discussions and/or your papers, it is unacceptable to copy word-for-word without quotation marks and the source of the quotation. It is expected that you will summarize
or paraphrase ideas giving appropriate credit to the source both in the body of your paper and the reference list.

Papers are subject to be evaluated for originality. Resources to help you understand this policy better are available at the ASU Writing Center.¹⁰

**Student Absence for Observance of Religious Holy Days**
A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. See ASU Operating Policy 10.19 Student Absence for Observance of Religious Holy Day¹¹ for more information.

**Title IX at Angelo State University**
The University prohibits discrimination based on sex, which includes pregnancy, sexual orientation, gender identity, and other types of Sexual Misconduct. Sexual Misconduct is a broad term encompassing all forms of gender-based harassment or discrimination including: sexual assault, sex-based discrimination, sexual exploitation, sexual harassment, public indecency, interpersonal violence (domestic violence and/or dating violence), and stalking. As a faculty member, I am a Responsible Employee meaning that I am obligated by law and ASU policy to report any allegations I am notified of to the Office of Title IX Compliance.

Students are encouraged to report any incidents of sexual misconduct directly to ASU’s Office of Title IX Compliance and the Director of Title IX Compliance/Title IX Coordinator at:

Michelle Miller, J.D.
Special Assistant to the President and Title IX Coordinator
Mayer Administration Building, Room 210
325-486-6357
michelle.boone@angelo.edu

You may also file a report online²⁴ 24/7.

If you are wishing to speak to someone about an incident in confidence you may contact the University Health Clinic and Counseling Center at 325-942-2173 or the ASU Crisis Helpline at 325-486-6345.

The Office of Title IX Compliance also provides accommodations related to pregnancy (such as communicating with your professors regarding medically necessary absences, modifications required because of pregnancy, etc.). If you are pregnant and need
assistance or accommodations, please contact the Office of Title IX Compliance utilizing the information above.

For more information, visit the [Title IX website].

**Required Use of Masks/Facial Coverings by Students**
As a member of the Texas Tech University System, Angelo State University has adopted the mandatory [Facial Covering Policy] to ensure a safe and healthy classroom experience. Current research on the COVID-19 virus suggests there is a significant reduction in the potential for transmission of the virus from person to person by wearing a mask/facial covering that covers the nose and mouth areas. Therefore, in compliance with the university policy students in this class are required to wear a mask/facial covering before, during, and after class. Faculty members may also ask you to display your daily screening badge as a prerequisite to enter the classroom. You are also asked to maintain safe distancing practices to the best of your ability. For the safety of everyone, any student not appropriately wearing a mask/facial covering will be asked to leave the classroom immediately you will also lose 5% from your semester grade (a half letter grade). The student will be responsible to make up any missed class content or work. Continued non-compliance with the Texas Tech University System Policy may result in disciplinary action through the Office of Student Conduct.

**Modifications to the Syllabus**
This syllabus, including grade evaluation and course schedule, is subject to modification. In particular, the COVID-19 pandemic may require significant changes in course delivery and content on potentially short notice.

### Course Schedule

<table>
<thead>
<tr>
<th>Week/dates*</th>
<th>Lecture Topics</th>
<th>Readings$</th>
<th>LabTopics- TUESDAYS</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Introduction , Questions of Developmental Bio Dev</td>
<td>Syllabus, Textbook intro</td>
<td>Intro/ lab safety/ microscope use</td>
<td>Bb</td>
</tr>
<tr>
<td>Jan 26, 28</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Week 2</td>
<td>Approaches to Address Developmental Biology Observation, Experimental Design, Developmental Genetics overview</td>
<td>Chapter 1 &amp; overview of Ch 3 &amp;4</td>
<td>Modeling and visualizing embryos</td>
<td>Ch 3 &amp;4; lab material</td>
</tr>
<tr>
<td>Feb 2&amp;4</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Week 3</td>
<td>History of DB</td>
<td>Chapter 1</td>
<td>Techniques Toolbox</td>
<td>Ch 1, 3 &amp;4; lab material</td>
</tr>
<tr>
<td>Feb 9 &amp; 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week</td>
<td>Dates</td>
<td>Topic</td>
<td>Chapter</td>
<td>Notes</td>
</tr>
<tr>
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</tr>
<tr>
<td>Week 4</td>
<td>Feb 16 &amp; 18</td>
<td>Fertilization, Cleavage &amp; Gastrulation cell fate</td>
<td>Chapter 1</td>
<td>Sea Urchin: fertilization, cleavage, &amp; early development; Ch. 7 &amp; Bb</td>
</tr>
<tr>
<td>Week 5</td>
<td>Feb 23 &amp; 25</td>
<td>Specification and Differentiation</td>
<td>Chapter 2</td>
<td>Sea Urchin: experiments- Ch. 10 &amp; Bb</td>
</tr>
<tr>
<td>Week 6</td>
<td>Mar 2 &amp; 4</td>
<td>Molecular Genetics, Gene Expression and Signaling Pathways in Development</td>
<td>Chapters 3</td>
<td>Problem Set 1 Due with Discussion Lab Presentations and Prep</td>
</tr>
<tr>
<td>Week 7</td>
<td>Mar 9 &amp; 11</td>
<td>Signaling pathways: (FGF) Shh, Wnt, TGF Beta; EGF; Hippo</td>
<td>Chapter 3</td>
<td>Lab Presentations Group 1</td>
</tr>
<tr>
<td>Weeks 8</td>
<td>Mar 16, 18</td>
<td>Early development in mammals Cell-Cell Communication</td>
<td>Chapter 4</td>
<td>Lab Presentations Group 2</td>
</tr>
<tr>
<td>Week 9</td>
<td>March 23 &amp; 25</td>
<td>EXAM 1 Stem Cells</td>
<td>Chapter 4 &amp; 5</td>
<td>March 23- EXAM 1</td>
</tr>
<tr>
<td>Week 10</td>
<td>March 30 &amp; April 1</td>
<td>Stem Cells, Axis Specification</td>
<td>Ch 5 &amp; 9</td>
<td>Mar 28- Problem Set 2 due Discuss Problem Set 2</td>
</tr>
<tr>
<td>Week 11</td>
<td>April 6 &amp; 8</td>
<td>CNS Development, Neural Crest Cells, Organogenesis</td>
<td>Ch 13 &amp; 14 &amp; 15</td>
<td>Normal Chick Devo - histology Ch. 12 &amp; Bb</td>
</tr>
<tr>
<td>Week 12</td>
<td>Apr 13, 15</td>
<td>Organogenesis/ Sex Determination</td>
<td>Ch 6 &amp; TBD</td>
<td>Candling/ Windowing Eggs &amp; early development</td>
</tr>
<tr>
<td>Week 13</td>
<td>Apr 20, 22</td>
<td>Organogenesis, Sex Determination &amp; Developmental Bio, Stem cells and Medicine/ Cancer</td>
<td>Ch. 6 &amp; TBD</td>
<td>Experiments of classical DB Ch. 17 &amp; 19 &amp; Bb</td>
</tr>
<tr>
<td>Week 14</td>
<td>Apr 27, 29</td>
<td>Developmental Bio, Stem cells and Medicine/ Cancer/ Regeneration Problem Set 3 due on Apr 27 in lecture</td>
<td>Ch 22 &amp; TBD</td>
<td>Experiments designed by students Ch 18 &amp; Bb</td>
</tr>
<tr>
<td>Friday, April 30</td>
<td></td>
<td>Last day to withdraw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 15</td>
<td>May 4, 6</td>
<td>Evo-Devo</td>
<td>Ch. 25</td>
<td>TBD</td>
</tr>
<tr>
<td>Tues, May 11</td>
<td>10:30AM-12:30PM</td>
<td>FINAL EXAM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*This is a tentative schedule for the semester; however, exam and assignment due dates are firm. Not all homework assignments are depicted on this schedule. Since we are working with living organisms, I cannot guarantee that they will be viable and/or fertile at the times we are scheduled to use them for lab. I will notify you of changes in lecture and/or via Bb/email.*

$ Chapter numbers refer to Gilbert’s textbook. Additional reading for lab will be from the lab manual and videos from Vade Macum website [http://labs.devbio.com](http://labs.devbio.com). Websites refersto the website accompanying the textbook. Bb refersto readings available on the Blackboard website. Check the assignments folder in Bb for details.
https://blackboard.angelo.edu
https://angelo.blackboard.com/
https://www.angelo.edu/covid-19/returning-to-campus/health-and-safety.php
https://www.angelo.edu/current-students/student-handbook/
https://www.angelo.edu/academics/catalog/
https://www.angelo.edu/current-students/disability-services/
https://www.angelo.edu/content/files/14197-op-1011-grading-procedures
https://www.angelo.edu/current-students/writing-center/academic_honesty.php
https://www.angelo.edu/content/files/14206-op-1019-student-absence-for-observance-of
http://www.angelo.edu/incident-form
https://www.angelo.edu/title-ix