INTRODUCTION
The title “developmental biology” has come into use over the past 40 years or so. Classically this course was called embryology or vertebrate embryology, and the traditional approach was to present descriptive patterns of vertebrate developmental anatomy.

Enter genetics and molecular biology, and new approaches have been applied to the old questions about development. In fact, the study of developmental biology at the molecular and cellular level has influenced many fields of biology and has allowed us to understand the continuing evolution of life on earth. Developmental biology now requires a number of disciplines (and several semesters worth of courses) to even begin to cover the basics, yet we are limited to a single course. Therefore, we will explore an overview of development using a variety of approaches. We will use developmental anatomy as a framework for discussing the cellular, molecular, genetic, and environmental processes that shape and direct development. We will use readings and diagrams in the text and work in the laboratory to develop an understanding of the processes of development. Through readings from the primary literature we will explore the cellular and molecular (and other) techniques currently used to further our understanding of these mechanisms. Additional readings will allow us to explore the multifaceted disciplines, historical context, and ideas that contribute to developmental biology.

The problems addressed by developmental biology are central—how a new individual is deciphered from the universal genetic code. Using genetic and molecular biological techniques, developmental biologists have moved beyond vertebrate developmental anatomy and now study the causal mechanisms of development using a number of invertebrate and vertebrate model organisms. The influences of the environment and ecology in shaping development are also key. Thus, developmental biology has a rich and fascinating history as people, events, and disciplines coalesced to form the field. It continues as a dynamic, wonderful field of study. Studying developmental biology is rigorous and demanding, but the rewards for the student of biology are great. I look forward to discussing, experimenting, and learning with you!

COURSE OBJECTIVES
After completing this course you should be able to:

♦ Understand the mechanisms of development from genes to the formation of an organism.
♦ Understand how evolutionary processes have shaped life in its varied forms.
♦ Explore selected areas of developmental biology in depth.
♦ Critically analyze, present, and discuss scientific material.
♦ Apply concepts in developmental biology to your development as a biologist.
**Canvas**

We will use the Canvas course management system for this class. The Canvas site for Developmental Biology will contain essential material for the course such as readings, laboratory protocols, schedule updates, and announcements. I will post the images I use during class after the given class session. You will also use Canvas to submit your exams and writing assignments.

**Class Sessions**

Class topics will follow the class schedule. The schedule is likely to change throughout the semester; I will post revised schedules on Canvas and announce revisions in class. Your time in class will be most productive if you:

1. Prepare for class by skimming the textbook readings and **thoroughly reading** any additional assigned papers before the class.
2. Come to class on time.
3. Engage in thoughtful, effective **note taking** during class.
4. **Contribute** to class discussions and **ask questions** at any time during the class.
5. **Be prepared** for, and participate fully in, **Journal Club**.
6. Following each class, devote time to carefully **reading** the text material and integrating it with your class notes.

**Laboratory**

Through the laboratory portion of this course you will learn some of the techniques and skills used in developmental research as well as apply concepts covered in class. The laboratory schedule is included in the class schedule and is available on Canvas. Laboratory protocols and exercises will be posted on Canvas. Please read the lab materials and prepare for lab in advance. Some lab protocols may require you to work outside your scheduled lab time. Bring the protocol(s) to lab—you may bring your laptop, electronic device, or a paper copy of the lab protocols; or you may write the protocol in your lab notebook (see below).

Please use a **lab notebook with copy pages** for the lab. If you have a used notebook with pages remaining, you are welcome to use it. You will turn in your notebook copy pages at the end of each lab.

The laboratory component of this course will include several multi-week experiments. We will use a number of different model organisms for these experiments. Using live organisms introduces variability; so while you are encouraged to look ahead at documents for future labs, be aware that the lab protocols and lab schedule may vary throughout the semester.

**Laboratory Reports:** You will write two laboratory reports during the semester. The first laboratory report will present your results from the *Drosophila oogenesis* experiment. You will choose the experiment you would like to write about for your second lab report. Detailed instructions about the format will be provided in lab. The due dates for these reports are noted on the schedules and will be posted on the Canvas calendar. Reports must be submitted via Canvas by no later than 5:00 PM on the due date. Papers submitted after 5:00 PM on the due date will be assessed a penalty of 5% from the total points possible. Papers submitted after the due date will be assessed a penalty of 10% per day.

**Laboratory Practical:** In celebration of the embryological history of developmental biology we **may** (or may not) have one laboratory practical.
**Quizzes and Exams**
Six in-class quizzes, two take-home exams, and an in-class final will be given on the dates indicated on the class schedule. Quizzes will be given during the first 15 minutes of class on the days indicated. You will have the opportunity to drop your lowest quiz score; the remaining five quizzes will constitute 10% of your grade. Each of the two take-home exams will be worth 15% of your grade and will include material covered through the class period indicated on the schedule. Exam questions will be distributed one week before the exams are due. All exams must be submitted on the scheduled day; **NO MAKE-UP QUIZZES OR EXAMS WILL BE GIVEN.**

The final exam will be an in-class exam and will be worth 15% of your grade. According to university policy, the **final exam will be given only** at the time indicated on the schedule. The final exam is scheduled for **Wednesday, May 15, from 8:00 – 10:00 AM.** I will provide more information about the final exam as the time approaches.

**Assessment of Learning**
Components of the class will be worth the following percentages of your total grade:

- Quizzes and Exams: 55%
- Reading and Discussion: 20%
- Lab (including reports): 25%

Grading scale:
- 93-100% A
- 80-82% B-
- 67-69% D+
- 90-92% A-
- 77-79% C+
- 63-66% D
- 87-89% B+
- 73-76% C
- 60-62% D-
- 83-86% B
- 70-72% C-
- <60% F

**Academic Integrity**
The university’s academic integrity policy is clear and comprehensive. It is available online [here](http://www.pugetsound.edu/student-life/student-resources/student-handbook/academic-handbook/academic-integrity/). You are responsible for understanding what constitutes plagiarism and other forms of academic dishonesty. Academic integrity is vital to your work as a student, including in this course. **All assignments must be written individually unless otherwise noted. Cheating, plagiarism, and other forms of academic dishonesty will NOT be tolerated.** Contact me with any questions regarding academic integrity.

**Behavior Expectations**
I expect you to behave in an appropriate manner while attending this class. Use common sense and here are a few guidelines:
- Be punctual—be on time for both class and lab.
- Participate fully in class and lab.
- **Personal technology:** please be respectful of others in class:
  - Switch your phone off before coming to class
  - You may use your laptop, tablet, etc. in class as long as it is not a distraction to others
  - Refrain from using email or text messaging during class
  - You may not listen to any device during class or during an exam.
- You may not make audio recordings of our class or lab sessions without prior consent from me.
- We welcome and respect diversity in this class. Lack of respect for diversity will not be tolerated. Diversity encompasses age, life experiences, profession, race, religion, gender,
lifestyle, social class, learning style, ethnicity, philosophy of life, sexual orientation, personality, mental and physical challenges, customs, and values, among others.

- You may bring food and/or drinks to class as long as the consumption of food and/or drinks is not a distraction to others.
- ABSOLUTELY NO FOOD OR DRINK is allowed in the laboratory. Food and/or drinks can be kept outside the lab door. Wash your hands prior to consuming food or drink.

**CLASS CORRESPONDENCE**
You may contact me by telephone, e-mail, or in person. I check my e-mail periodically throughout the day but usually not often in the evenings or on weekends. **I will use e-mail and/or Canvas to provide information about the class and/or lab.** Make sure you routinely check your Puget Sound e-mail and the Canvas site for this class.

**BEREAVEMENT POLICY**
Upon approval from the Dean of Students’ Office, students who experience a death in the family, including a parent, grandparent, sibling, or persons living in the same household, are allowed three consecutive weekdays of excused absences, as negotiated with the Dean of Students. For more information, please see the Academic Handbook.

**ACCESSIBILITY AND ACCOMMODATION**
If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Peggy Perno, Director of the Office of Accessibility and Accommodation, 105 Howarth, 253.879.3395. She will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential. Please notify me well in advance should you require accommodation in the class or lab.

**EMERGENCY RESPONSE PROCEDURES**
Please review university emergency preparedness and response procedures posted at www.pugetsound.edu/emergency/. There is a link on the university home page. Familiarize yourself with hall exit doors and the designated gathering area for your class and laboratory buildings.

If building evacuation becomes necessary (e.g. earthquake), meet your instructor at the designated gathering area so she/he can account for your presence. Then wait for further instructions. Do not return to the building or classroom until advised by a university emergency response representative.

If confronted by an act of violence, be prepared to make quick decisions to protect your safety. Flee the area by running away from the source of danger if you can safely do so. If this is not possible, shelter in place by securing classroom or lab doors and windows, closing blinds, and turning off room lights. Lie on the floor out of sight and away from windows and doors. Place cell phones on vibrate so that you can receive messages quietly. Wait for further instructions.

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