

BIOL 309 – Developmental Biology

Lectures: Mondays and Thursdays from 1:00-2:20, Cunningham 146 or online
Please check Brightspace frequently for the latest updates on the location for lecture or lab.

Wet labs: Cunningham 240 (will be held in-person starting week of Jan 24th)
Tuesday / Wednesday afternoon: 2:30-5:20 pm
Wednesday evening: 5:30-8:20 pm

Dry labs: ECS 128 or online

Lecturer: Erin Star, estar@uvic.ca
Office hours: Zoom, by appointment or as posted on Brightspace

Lab instructors: Christopher Anderson, christophera@uvic.ca
Alberto Ruiz de Chavez Ginzó, aruizdechavez@uvic.ca
Kristin Hackett, kristinhackett@uvic.ca

Senior lab instructor: Kimberley Curry, kimh@uvic.ca

Course description

This course examines animal development and will focus on the cellular and molecular mechanisms that underlie developmental processes. A solid understanding of basic principles in molecular and cellular biology is required. Effort will be made to highlight relevance of developmental biology to our understanding of disease, and lectures will incorporate recent discoveries from the primary literature. A major goal of this course is to help develop skills to:

- (i) evaluate the primary scientific literature
- (ii) develop hypotheses based on pre-existing knowledge
- (iii) design experiments to test hypotheses.

Reading material

- (i) Textbook: Gilbert Developmental Biology, 12th edition (lectures draw from, but do not strictly follow text)
- (ii) reading material will also be drawn from the primary literature, review articles and other sources, which will be posted on Brightspace.

Evaluation

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| (1) Lab | 40% |
| (2) Midterm exam | 30% |
| (3) Final exam | 30% |

Lab

The lab component is broken down into 2 sections: (i) a practical lab and (ii) a journal article review or “dry” lab. There will be 5 practical labs and 5 journal article review/dry labs. Detailed information (including lab schedule) is posted in the **BIOL 309 Lab Manual**, which can be purchased from the UVic Bookstore.

Breakdown of the lab grade:

<u>Wet lab</u>	<u>17%</u>	<u>Dry lab (journal article review)</u>	<u>18%</u>
In class assignments	5%	Pre-lab quizzes	4%
Lab report	12%	Oral presentation	5%
		Paper/mini-proposal	9%

Wet and dry lab participation grade (5 %) - this grade will cover participation in dry lab (brainstorming questions, involvement in class discussion) and wet labs (i.e., complete all procedure steps, effort made to visualize the specimens provided during the lab period and contribute to laboratory discussions).

Midterm and final exam

The midterm is compulsory and will be held on Monday Feb 14. It will cover material up to Feb 10 (including Vertebrate early development). The final exam will be similar in format and length to the midterm exam and will be held during the exam period. The final exam is NOT cumulative and will cover material starting from Feb 17th through to the end of the course.

Exams will test understanding of fundamentals, concepts and mechanisms underlying developmental systems as well as ability to develop hypotheses and to design experiments to test them. Format for both exams: mostly short answer. The exams will cover anything presented in the lectures.

Medical documentation for short-term absences is not required for this term (Fall 2021 approved by Senate). Attendance is important. Students who can not attend due to illness are asked to notify their instructors immediately. If illness, accident, or family affliction causes a student to miss the final exam or to fail to complete any assignment by the end of the term students are required to submit a request for academic concession.

Students are required to abide by all academic regulations set as set out in the University calendar, including standards of academic integrity. Violations of academic integrity (e.g., cheating and plagiarism) are considered serious and may result in significant penalties.

Important background reading from the textbook

Basic molecular biology:

pp 56-88 of the textbook (Developmental Biology, 12th edition) covers important basic molecular biology background material that will be referred to through the course. This includes a review of the “central dogma” of gene expression, i.e. gene >> transcription [mRNA] >> translation [protein]

Signal transduction pathways:

pp 115-128 describes the major cell-cell signaling pathways that are discussed in the class (e.g., Hedgehog, Wnt, Notch, TGF-beta, FGF, tyrosine receptor kinase, etc....)

Experimental techniques discussed in the course:

- a good description of some of the techniques that will be referred to in the course can be found on pages 20-25, 50-52, 89-95 in the 12th Edition (85-91 in the 11th Edition)

- in situ hybridization
- chromatin immunoprecipitation/sequencing
- deep sequencing, RNA seq
- forward/reverse genetics
- Crispr/Cas9 gene editing
- Gal4/UAS system
- cre-lox system
- single cell RNA sequencing

- also, see **Techniques** folder at bottom of Brightspace site for additional description of techniques

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Please be aware that sessions in this course may be recorded to allow students who are not able to attend to watch later. The recording will be posted in Brightspace. Students who have privacy concerns can contact me and will have the option to limit their personal information shared in the recording. If you have other questions or concerns regarding class recording and privacy, please contact privacyinfo@uvic.ca

A note to remind you to take care of yourself. Diminished mental health can interfere with optimal academic performance. Do your best to engage in self-care and maintain a healthy lifestyle this semester. This will help you achieve your goals and cope with stress. All of us benefit from support during times of struggle. You are not alone. The source of symptoms might be related to your course work; if so, please speak with me. However, problems with other parts of your life can also contribute to decreased academic performance. [The UVic Student Wellness Centre](#) provides cost-free and confidential mental health services to help you manage personal challenges that impact your emotional or academic well-being.

The University of Victoria is committed to promoting critical academic discourse while providing a respectful and supportive learning environment. All members of the university community have the right to this experience and the responsibility to help create such an environment. The University will not tolerate racism, sexualized violence, or any form of discrimination, bullying or harassment. Please be advised that, by logging into UVic's learning systems or interacting with online resources, and course-related communication platforms, you are engaging in a university activity. All interactions within this environment are subject to the university expectations and policies. Any concerns about student conduct may be reviewed and responded to in accordance with the appropriate university policy. To report concerns about online student conduct: onlineconduct@uvic.ca

Please see the Student Code of Conduct:
[tri-fac-student-code-of-conduct.pdf \(uvic.ca\)](#)

We acknowledge and respect the lək'wəŋən peoples on whose traditional territory the university stands and the Songhees, Esquimalt and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day.

(Lecture schedule on next page...)

Tentative lecture schedule:

Date	Topics	10th Edition	11th Edition	12th Edition
Jan 10,13	Fertilization/early cleavage	117-151	218-247	216-240
Jan 17-27	Invertebrate early development	31-45, 69-96, 153-161, 170-173,217-239	11-19, 45-65, 95-139, 238-239, 251-254, 265-268, 311-332	14-25, 39-46, 247-250, 303-323
Jan 27-Feb 10	Vertebrate early development	241-270, 286-318, 319-331	333-364, 380-411, 143-153, 167-179	8-12, 114-115, 263-266, 325-399

Mon Feb 14 Midterm exam

Feb 21, 24	Reading break			
Feb 17-Mar 7	Fly axis specification and patterning	179-213	277-309	48-50, 273-301
Mar 10-21	Eye development	79-81, 359-367	108-111, 520-527	109-112, 122, 493-497, 745
Mar 24, 28	Neural crest and neuronal development	375-414	413-437, 463-508	401-420, 441-480
Mar 31	Vertebrate limb development	489-517	613-651	571-605
Apr 4	Germ cell determination	591-605	181-193	179-198
Apr 7	(open)			