



4. **Missed Components Of Term Work:**

In the event that a student misses the midterm or any course work due to illness, supporting documentation, such as a medical note or a statutory declaration will be required (see [Section M.1](#); for more information regarding the use of statutory declaration/medical notes, see [FAQ](#)). Absences must be reported within 48 hours.

The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in Section 3.6. It is the student's responsibility to familiarize themselves with these regulations. See also Section E.3 of the University Calendar.

5. **Scheduled Out-of-Class Activities:**

There are no scheduled out of class activities for this course.

6. **Course Materials:**

Highly Recommended Textbook: Michael Barresi and Scott Gilbert, *Developmental Biology, 12<sup>th</sup> or 11<sup>th</sup> Edition*: Sinauer. The 9<sup>th</sup> or 10<sup>th</sup> edition of the same textbook will suffice, but the order of chapters is different.

7. **Examination Policy:**

No aids are allowed on tests or examinations.

Students should also read the Calendar, Section G, on Examinations.

8. **Approved Mandatory And Optional Course Supplemental Fees:**

There are no mandatory or optional course supplemental fees for this course.

9. **Writing Across the Curriculum Statement:**

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section E.2 of the University Calendar.

10. **Human & Living Organism Studies Statements:**

Students will not participate as subjects or researchers in human studies.

See also [Section E.5](#) of the University Calendar.

**STUDIES IN THE BIOLOGICAL SCIENCES INVOLVE THE USE OF LIVING AND DEAD**

**ORGANISMS.** Students taking laboratory and field based courses in these disciplines can expect involvement with the experimentation on such materials. Students perform dissections on dead or preserved organisms in some courses. In particular courses, students experiment on living organisms, their tissues, cells or molecules. Sometimes field work requires students to collect a variety of living materials by many methods, including humane trapping.

All work on humans and other animals conforms to the Helsinki Declaration and to the regulations of the Canadian Council on Animal Care. The Department strives for the highest ethical standards consistent with stewardship of the environment for organisms whose use is not governed by statutory authority. Individuals contemplating taking courses or majoring in one of the fields of study offered by the Department of Biological Sciences should ensure that they have fully considered these issues before enrolling. Students are advised to discuss any concerns they might have with the Undergraduate Program Director of the Department.

Students are expected to be familiar with [Section SC.4.1](#) of the University Calendar.

11. **Reappraisal of Grades:**

A student wishing a reappraisal, should first attempt to review the graded work with the Course Coordinator/ Instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See [Section I.3](#) of the University Calendar.

- a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within 15 days of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall immediately submit the Reappraisal of Graded Term work form to the department in which the course is offered. The department will arrange for a re-assessment of the work if, and only if, the student has sufficient academic grounds. See sections I.1 and I.2 of the University Calendar.
- b. **Final Exams:** The student shall submit the request to Enrolment Services. See Section I.3 of the University Calendar.

## 12. Other Important Information For Students:

- a. **Mental Health:** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 30, MacEwan Student Centre, Mental Health Services Website) and the Campus Mental Health Strategy website (Mental Health).
- b. **SU Wellness Center:** The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see [www.ucalgary.ca/wellnesscentre](http://www.ucalgary.ca/wellnesscentre) or call 403-210-9355.
- c. **Sexual Violence:** The University of Calgary is committed to fostering a safe, productive learning environment. The Sexual Violence Policy <https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf> is a fundamental element in creating and sustaining a safer campus environment for all community members. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email ([svsa@ucalgary.ca](mailto:svsa@ucalgary.ca)) or phone at 403-220-2208.
- d. **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K. Student Misconduct to inform yourself of definitions, processes and penalties. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/ fabrication of experimental values in a report. These are only examples.
- e. **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points.
- f. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](#).  
Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head, Undergraduate of the Department of Biological Sciences, Heather Addy by email [addy@ucalgary.ca](mailto:addy@ucalgary.ca) or phone 403 220-6979. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than 14 days prior to the date in question. See Section E.4 of the University Calendar.
- g. **Safewalk:** Campus Security will escort individuals day or night (See the Campus Safewalk website). Call 403-220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

- h. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see [Legal Services](#) website.
- i. **Student Union Information:** VP Academic, Phone: 403-220-3911 Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca). SU Faculty Rep., Phone: 403-220-3913 Email: [sciencerep@su.ucalgary.ca](mailto:sciencerep@su.ucalgary.ca). Student Ombudsman, Email: [ombuds@ucalgary.ca](mailto:ombuds@ucalgary.ca)
- j. **Internet and Electronic Device Information:** Unless instructed otherwise, cell phones should be turned off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.
- k. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction (USRI) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.
- l. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or non-academic misconduct, in addition to any other remedies available at law. Note that either the 11<sup>th</sup> or 12<sup>th</sup> edition is suitable to use as your textbook for this course. The 12th edition of the book is slightly more up to date, but it includes new material on plant development which we will not cover. Earlier versions of the text will suffice as well, especially the 9<sup>th</sup> and 10th editions, although students should be aware that the order of the chapters in those editions is different.

Every student must obtain a University of Calgary computer account immediately. Tutorials are computer-based and require electronic interaction between students and instructors. Students will have electronic access to the tutorial material from any Internet-capable computer at all times (the server willing). All students should make arrangements to have regular access to an Internet-capable computer. There are several microcomputer laboratories on campus for your convenience if you do not have a computer at home. Updated information about this course will be distributed posted on the website bulletin board.

Developmental Biology is the study of progressive changes that occur within cells, tissues and organisms during their lifespan. The study of development may be at a variety of levels: molecular, biochemical, genetic, morphological, physiological--all words that are used to describe biological points of view that imply methodology. You are expected to have a background in biochemistry, cell biology and genetics. **This course focuses on gene function and cell signaling in development so an understanding of basic molecular biology is essential.**

Students are encouraged to discuss course problems with the instructor or teaching assistants.

### **The Use of World Wide Web Material in Term Papers, Lab Reports and Assignments**

As with other more traditional sources of material, information obtained from the Web must be fully and accurately cited. As with all other sources, students must take full responsibility for the quality, accuracy and verifiability of material that they cite. Because Web sites may be transient, the following must be done if Web sites are cited:

A full Website address must be provided, and the date on which it was accessed.

A print-out of the home page of the Web site and the page on which the particular information begins must be included as appendix material for the term paper, lab report or assignment.

In accordance with the Freedom of information and Privacy Act students should identify themselves on papers by placing their name on the front page and ID number on all subsequent pages.

## Tentative Course Lecture and Exam Schedule

DATE	LECTURER	TITLE	BOOK CHAPTER
Sept. 6	JC	Introduction and review of important processes and techniques	
Sept. 9	JC	Intro to the study of development, developmental organization	1
Sept. 11	JC	Cell specification during development	2
Sept. 13	JC	Differential Gene Expression in Development	3
Sept. 16	JC	Differential Gene Expression in Development continued	3
Sept. 18	JC	Cell to Cell Communication during development	4
Sept. 20	JC	Cell to Cell Communication during development cont'd	4
Sept. 23	JC	Stem Cells	5
Sept. 25	JC	Sex Determination	6
Sept. 27	JC	Gametogenesis	6
Sept. 30	JC	Fertilization	7
Oct. 2	JC	Early <i>C. elegans</i> development	8
Oct. 4	JC	<i>Drosophila</i> development	9
<b>Oct. 7</b>	<b>JC</b>	<b>MIDTERM 1</b>	
Oct. 9	JC	<i>Drosophila</i> development continued	9
Oct. 11	JC	Development in sea urchins and tunicates	10
Oct. 14	<b>Holiday</b>	<b>Thanksgiving, NO CLASSES</b>	
Oct. 16	JC	Early development-Amphibians	11
Oct. 18	JC	Early development-fish	11
Oct. 21	JC	Early development-birds	12
Oct. 23	JC	Early development-mammals	12
Oct. 25	JC	<i>Hox</i> genes	12
Oct. 28	JC	CRISPR/Cas9 in the study of development	Supplementary
Oct. 30	JC	Introduction to organogenesis and the ectoderm	13
Nov. 1	JC	Formation and patterning of the neural tube	13
Nov. 4	JC	Brain Development	14
Nov. 6	JC	<b>Midterm 2</b>	
Nov. 8	JC	Neural Crest Cells	15
Nov. 11	None	<b>No Class-Remembrance Day</b>	
Nov. 13	None	<b>No Class-Reading Break</b>	
Nov. 15	None	<b>No Class-Reading Break</b>	
Nov. 18	JC	Neural Crest (Continued) and cranial Placodes	15 and 16
Nov. 20	JC	Paraxial mesoderm: Somitogenesis	17
Nov. 22	JC	Bones and muscle	17
Nov. 25	JC	Intermediate mesoderm: Kidney Development	18
Nov. 27	JC	Lateral Plate Mesoderm: Heart Development	18
Nov. 29	JC	Lateral Plate Mesoderm: Blood	18
Dec. 2	JC	Limb development in tetrapods	19
Dec. 4	JC	The endoderm: glands, gut, lungs and liver	20
Dec. 6	JC	The endoderm: glands, gut, lungs and liver	20
<b>The Final Exam will be sometime between December 9-19, to be scheduled later by the registrar.</b>			

## Course Outcomes

- Students will be able to explain the connections between biochemistry, cell biology and genetics that create pattern and form in the animal embryo
- Students will be able to describe the principle cellular signaling pathways that control development from the single-cell stage to the mature form of the animal
- Students will be able to predict the effects of mutations and other perturbations of signaling pathways on development of an animal embryo
- Students will be able to assemble a written synthesis describing the discovery and characterization of a developmental signaling protein and its relationship to human disease
- Students will be able to deduce the potential effects of genomic perturbations on development
- Students will be able to justify the use of model organisms to study human diseases
- Students will be able to compare development in insects, nematodes, echinoderms, fish, amphibians, reptiles, birds and mammals.
- Students will be able to describe the origins of the major organ systems of amniotes
- Students will be able to critique and extract information from the primary literature of developmental biology.