



COURSE OUTLINE

1. **Course:** CMMB 403, Developmental Biology of Animals - Fall 2021

Lecture 01: MWF 13:00 - 13:50 in ST 148

Instructor	Email	Phone	Office	Hours
Dr John Cobb	jacobb@ucalgary.ca	403 220-5948	BI 286D	Open door policy (BI-286D) or by appointment (recommended to be sure I'm in my office). Set office hours will be announced before each exam.

The course coordinator is Dr. John Cobb. Preferred contact method is email jacobb@ucalgary.ca.

The outline for the tutorial component of the course will be posted as a separate document on D2L by September 8. Tutorials will begin the week of September 13.

In Person Delivery Details:

All lectures and tutorials will be delivered in-person.

Attendance at all lectures and tutorials is expected but not required. However, Top Hat questions are to be answered in class unless previous arrangements are made. Copies of slides covered in class will be posted on D2L.

The tutorials will all be held in-person in Biological Sciences Room 159. There are ten different tutorial sections (T01-T10); you should attend the tutorial for which you registered, which should be one of the following:

Monday 2:00pm - 2:50pm -----	T01
Monday 3:00pm - 3:50pm -----	T02
Tuesday 12:00pm - 12:50pm -----	T03
Tuesday 1:00pm - 1:50pm -----	T04
Tuesday 2:00pm - 2:50pm -----	T05
Wednesday 2:00pm - 2:50pm -----	T06
Wednesday 3:00pm - 3:50pm -----	T07
Thursday 1:00pm - 1:50pm -----	T08
Thursday 2:00pm - 2:50pm -----	T09
Friday 2:00pm - 2:50pm -----	T10

Re-Entry Protocol for Labs and Classrooms:

To limit the spread of COVID-19 on campus, the University of Calgary has implemented safety measures to ensure the campus is a safe and welcoming space for students, faculty and staff. The most current safety information for campus can be found [here](#).

Course Site:

D2L: CMMB 403 L01-(Fall 2021)-Developmental Biology of Animals

Note: Students must use their U of C account for all course correspondence.

2. **Requisites:**

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

Prerequisite(s):

Biochemistry 341 or 393; and Biology 311 or Medical Science 341; and Biology 331 or Medical Science 351.

3. **Grading:**

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the online University Calendar.

In determining the overall grade in the course the following weights will be used:

Component(s)	Weighting %	Date
Tutorial (2 quizzes (2 X 5%) and a term paper (15%))	25%	Quiz #1: Week of October 25-29 Quiz #2: Week of November 29- December 3 Term Paper due December 8
Top Hat Questions (participation)	5%	Most lectures will include one or more top hat questions to be answered during class.
Midterm Exam	35%	October 18, 6-8 pm
Final Exam	35%	TBD

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Minimum % Required	95 %	85 %	82 %	79%	75%	72 %	69 %	65%	62%	59 %	50 %

This course will have a final exam that will be scheduled by the Registrar. [The Final Examination Schedule](#) will be published by the Registrar's Office approximately one month after the start of the term. The final exam for this course will be designed to be completed within 2 hours.

You must submit a term paper in order to receive a passing grade for the course.

Top Hat: Top hat questions are intended to be answered during the in-person lectures unless previous arrangements were made at the beginning of the course.

Rounding: The grade cutoffs are precise; there will be no systematic rounding of marks (e.g. a 81.99 average is a B+). However, students whose overall average is within one point of a cutoff at the end of the course may be awarded a "bonus" up to a maximum of 1% of the total course average based on their performance on the total of all Top Hat questions from the course. The formula for calculating this bonus is: (Percentage of correct answers on Top Hat questions) X 0.01= bonus as a percentage. (For example a student answering 90% of all questions correctly would be eligible for a 0.9% bonus). This bonus will only be applied when it will change a student's letter grade for the course as a whole. Please do not request further rounding/curving beyond the bonus described.

The University of Calgary offers a [flexible grade option](#), Credit Granted (CG) to support student's breadth of learning and student wellness. Faculty units may have additional requirements or restrictions for the use of the CG grade at the faculty, degree or program level. To see the full list of Faculty of Science courses where CG is not eligible, please visit the following website: <https://science.ucalgary.ca/current-students/undergraduate/program-advising/flexible-grading-option-cg-grade>

4. Missed Components Of Term Work:

The university has suspended the requirement for students to provide evidence for absences. Please do not attend medical clinics for medical notes or Commissioners for Oaths for statutory declarations.

In the event that a student legitimately fails to submit any online assessment on time (e.g. due to illness etc...), please contact the course coordinator, or the course instructor if this course does not have a coordinator to arrange for a re-adjustment of a submission date. Absences not reported within 48 hours will not be accommodated. If an excused absence is approved, one possible arrangement is that the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course. This option is at the discretion of the coordinator and may not be a viable option based on the design of this course.

Missed Lectures/tutorials: To accommodate those students who have a valid reason for missing a lecture or tutorial, an audio recording of the missed component(s) will be provided upon request. The same accommodation will be made for those students who are approved to complete the course in an online format. In either case, the audio recording together with the posted slides of the lecture or tutorial will give the student access to all of the material covered in the lecture or tutorial. If the instructor has technical problems such that a recording was not successfully acquired, students will be given access to a video recording of the corresponding lecture from 2020.

Top Hat Questions: Top-hat questions are intended and expected to be answered during the lecture as they are presented. If this presents difficulties for any students for any reason (for example access to appropriate devices) alternative arrangements must be made with the instructor at the beginning of the course. Students who miss lectures for a valid/approved reason or who have an accommodation to complete the course online will have 24 hours to complete Top Hat questions from the scheduled time of the lecture. It is the student's responsibility to confirm that their answers have been recorded for any Top Hat questions--please do not ask the instructor to reopen questions for answering after class. The questions will remain available for review.

Missed exams/quizzes: If a student must miss an in-person exam or quiz for a valid reason (illness, family emergency, contact with a COVID positive-person, COVID accommodation, etc.), they should notify the instructor in advance whenever possible. If that is not possible the instructor (for exams) or teaching assistant (for quizzes) should be notified within 24 hours of the scheduled component, unless specific, extraordinary circumstances prevent such notification. A deferred exam will be scheduled in the above cases, usually within one week of the missed component. Makeup exams and quizzes will often have a different format than those given for the regularly scheduled component (for example, more written, fewer multiple choice questions).

Online versions of the exams will only be offered for students with an accommodation to complete the course remotely/online, and such an exam would be offered synchronously, which means at the same time as the regularly scheduled exam. The only exception to this arrangement would be in cases where the student is located in a time zone that makes this impractical.

5. Scheduled Out-of-Class Activities:

The following out of class activities are scheduled for this course.

Activity	Location	Date and Time	Duration
Midterm	On-Campus, room to be announced	Monday, October 18, 2021 at 6:00 pm	2 Hours

REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY. If you have a conflict with the out-of-class-time-activity, please contact your course coordinator/instructor no later than **14 days prior** to the date of the out-of-class activity so that alternative arrangements may be made.

The Midterm will be held as an out of class activity. Students will write the exam in person on Monday October 18, 2021 from 6-8 pm. Room to be announced.

6. Course Materials:

Recommended Textbook(s):

Michael Barresi and Scott Gilbert, *Developmental Biology*: Oxford University Press.

The 11th edition of this textbook is just as suitable for this course and has a similar organization as the 12th edition--the main difference is the inclusion of plant development in the 12th edition which we will not cover.

Previous editions (especially the 10th edition) are suitable for use. However, they would be more difficult to use because the text has been reorganized starting with the 11th edition.

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam/Camera (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Stable internet connection.

For more information please refer to the UofC [ELearning](#) online website.

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 and 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 concern 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 **ten business 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 submit the Reappraisal of Graded Term work form to the department in which the course is offered within 2 business days of receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next ten business days. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections [I.1](#) and [I.2](#) of the University Calendar
- b. **Final Exam:** 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 and receive supports when needed. We encourage you to explore the 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 370, MacEwan Student Centre, [Mental Health Services Website](#)) and the Campus Mental Health Strategy website ([Mental Health](#)).
- b. **SU Wellness Services:** For more information, see www.ucalgary.ca/wellnesscentre or call [403-210-9355](tel:403-210-9355).
- c. **Sexual Violence:** 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 (syva@ucalgary.ca) or phone at [403-220-2208](tel:403-220-2208). The complete University of Calgary policy on sexual violence can be viewed at (<https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Sexual-and-Gender-Based-Violence-Policy.pdf>)
- d. **Misconduct:** Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act

with integrity. Research integrity, ethics, and principles of conduct are key to academic integrity. Members of our campus community are required to abide by our institutional [Code of Conduct](#) and promote academic integrity in upholding the University of Calgary's reputation of excellence. Some examples of academic misconduct include but are not limited to: posting course material to online platforms or file sharing without the course instructor's consent; submitting or presenting work as if it were the student's own work; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. Please read the following to inform yourself more on academic integrity:

[Student Handbook on Academic Integrity](#)
 Student Academic Misconduct [Policy](#) and [Procedure](#)
[Research Integrity Policy](#)

Additional information is available on the [Student Success Centre Academic Integrity page](#)

e. Academic Accommodation Policy:

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The student accommodation policy can be found at: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Accommodation-Policy.pdf>

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf>.

Students needing an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, by filling out the [Request for Academic Accommodation Form](#) and sending it to Lisa Gieg by email lmgieg@ucalgary.ca preferably 10 business days before the due date of an assessment or scheduled absence.

f. 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.

g. Student Union Information: [VP Academic](#), Phone: [403-220-3911](tel:403-220-3911) Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: [403-220-3913](tel:403-220-3913) Email: sciencerep@su.ucalgary.ca. [Student Ombudsman](#), Email: ombuds@ucalgary.ca.

h. 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.

i. 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.

2021 CMMB 403 Tentative Course Lecture and Exam Schedule

DATE	LECTURER	TITLE	BOOK CHAPTER (12 th Edition)
Sept. 8	JC	Introduction and review of important concepts	None
Sept. 10	JC	Intro to the study of development and developmental organization	1
Sept. 13	JC	Cell specification during development	2
Sept. 15	JC	Differential Gene Expression in Development	3
Sept. 17	JC	Differential Gene Expression in Development cont'd	3
Sept. 20	JC	Cell to Cell Communication during development	4

Sept. 22	JC	Cell to Cell Communication during development cont'd	4
Sept. 24	JC	Stem Cells	5
Sept. 27	JC	Sex Determination	6
Sept. 29	JC	Gametogenesis	6
Oct. 1	JC	Fertilization	7
Oct. 4	JC	Early <i>C. elegans</i> development	8
Oct. 6	JC	<i>Drosophila</i> development	9
Oct. 8	JC	<i>Drosophila</i> development continued	9
Oct. 11	None	Thanksgiving, NO CLASSES	
Oct. 13	JC	Early development-Amphibians	11
Oct. 15	JC	Early development-Amphibians cont'd	11
Oct. 18	JC	Review for midterm	
Oct. 18	JC	In-Person Midterm Exam 6-8 pm (Room to be announced)	
Oct. 20	JC	Early development-fish	11
Oct. 22	JC	Early development-birds	12
Oct. 25	JC	Early development-mammals	12
Oct. 27	JC	<i>Hox</i> genes	12
Oct. 29	JC	<i>Hox</i> genes	12
Nov. 1	JC	CRISPR/Cas9 in the study of development	Supplementary
Nov. 3	JC	Introduction to organogenesis and the ectoderm	13
Nov. 5	JC	Formation and patterning of the neural tube	13
Nov. 8-12	None	NO CLASS FALL BREAK and Remembrance Day	
Nov. 15	JC	Brain Development	14
Nov. 17	JC	Neural Crest Cells	15
Nov. 19	JC	Cranial Placodes	16
Nov. 22	JC	Paraxial mesoderm: the somites	17
Nov. 24	JC	Paraxial mesoderm: the somites cont'd	17
Nov. 26	JC	Bones and muscle	17
Nov. 29	JC	Intermediate mesoderm: Kidney Development	18
Dec. 1	JC	Lateral Plate Mesoderm: Heart Development	18
Dec. 3	JC	Lateral Plate Mesoderm: Blood	18
Dec. 6	JC	Limb development in tetrapods	19
Dec. 8	JC	The endoderm: glands, gut, lungs and liver	20
The Final Exam will be sometime between December 13-22, to be scheduled later by the registrar.			

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.
- Students will be able to explain how regulation of the genome controls development

Electronically Approved - Sep 07 2021 06:19

Department Approval

Electronically Approved - Sep 07 2021 10:32

Associate Dean's Approval