



COURSE OUTLINE

1. **Course:** CMMB 403, Developmental Biology of Animals - Fall 2020

Lecture 01: MWF 13:00 - 13:50 - Online

Instructor	Email	Phone	Office	Hours
Dr John Cobb	jacobb@ucalgary.ca	403 220-5948	BI 286D	Thursdays 12-1 pm (Via Zoom) and by appointment

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

In Person Delivery Details:

The only in-person component for this course is a single tutorial session that consists of an embryo observation exercise. **Although attendance at this session is highly encouraged since it will deliver the best learning experience, an online alternative will also be offered for those unable or uncomfortable with attending.**

Plan: 1. To facilitate social distancing, we will divide each tutorial group of 20 individuals into a subgroup of 6 or 7 students that will attend the in-person tutorial session on **one of three weeks between September 21 and October 9, 2020** at their assigned tutorial time.

2. The tutorials are held in BI-190 where there is more than adequate space for 2 metres of separation between each of 6 or 7 students and a TA. We will have 7 stations with a microscope and a plate with embryos for observation. Students will stay seated at one of these stations for the duration of the tutorial, except for when they exchange plates, which will be done at a point immediately behind each station. Three scopes will be arranged along each of two walls on tables that are 7.3 metres long, allowing for ~3 metres between each student. The seventh scope (if necessary) will be on a portable table in the back of the room, also >2 metres from any other students. The "exchange points" for plates will be along the island of tables at the middle of the room.

3. Students will observe six different sets of embryos arranged within six different tissue culture plates, with the embryos within wells of each plate. Plates will be rotated between stations with ~7 minutes of observation for each plate.

4. The rotation procedure for the plates will be as follows to allow social distancing: when a student has finished their observations of one plate they will place it on the tables at the middle of the room, directly behind their station, and then return to their station. Students will NOT need to cross each others' paths to do this. The TA will then proceed to the exchange point where he/ she will disinfect the plate with 70% ethanol spray. The TA will then move the plate to the next sequential disinfection station and the TA returns to the front of the room or the next "exchange point" and the student at next scope can retrieve the plate. This procedure is performed around the room, and repeats until all students have observed all plates.

5. After each session, the TA will disinfect all surfaces at the viewing stations, including the microscopes, adjacent table surfaces, the non-absorbent chairs and the embryo plates with 70% ethanol, so that they will be clean and disinfected for the next session.

Online Delivery Details:

Some aspects of this course are being offered in real-time via scheduled meeting times. For those aspects you are required to be online at the same time.

Lectures on Mondays and Wednesdays will be delivered live (synchronous) via Zoom at the regular class time (1-1:50 pm). **These sessions will be recorded and made available on D2L for those unable to attend at the scheduled times. However, attendance at the live sessions is strongly encouraged since it will be a more interactive experience, including student questions.** Friday lectures will not be live, but instead these will be recorded and uploaded to D2L by 1pm on the scheduled date so that you can view them at your convenience (Note however, that Top Hat questions can only be answered within 24 hours of the scheduled lecture time). The delivery methods (live vs. recorded) may be changed during the course as student feedback is gathered starting with the second week of the term. Slides for all lectures will be available on D2L by the start of the lecture.

Course Site:

D2L: CMMB 403 L01-(Fall 2020)-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%	Dates provided on D2L
Top Hat questions (participation)	5%	Most lectures will include one or more Top Hat question
Midterm Exam	35%	October 19
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	94 %	85 %	82 %	79%	75%	72 %	69 %	65%	62%	59 %	50 %

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

This course has a registrar scheduled final exam.

Top Hat: In order to encourage students to keep up with the course material, responses to Top Hat questions can only be entered within 24 hours of the scheduled time of a lecture, whether it is delivered in a live or recorded format. However, the questions will remain available for review after this time.

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.

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, then the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course.

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-line	Monday, October 19, 2020 at 6:00 pm	180 Minutes

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.

If you have a conflict with the time of the midterm you must contact Dr. Cobb no later than two weeks before the midterm with details of the conflict and to obtain approval to take another version of the exam.

6. Course Materials:

Recommended Textbook(s):

BARRESI, MICHAEL J. F. AND GILBERT, SCOTT F, *Developmental Biology*: OXFORD UNIVERSITY PRESS, INCORPORATED.

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 (10th and earlier) would be more difficult to use because the text has been reorganized started 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:

Both exams in this course will be administered synchronously through the class D2L website, which means that all students will be taking the exam at the same time. All students must begin writing the exams within 15 minutes of the scheduled start time. For the midterm exam, this means that the exam will become available on D2L at 6 PM MDT Monday October 19. You must begin the exam by 6:15 MDT and it will be due at 9:00 PM MDT. The exam is intended to be a two hour exam. The extra one hour allowed is intended to allow time to resolve any technical difficulties. The specific times for the final exam will be announced later, but the same duration and rules will apply.

The final exam is a registrar scheduled timed exam and is designed to take 2 hrs to write but 3hrs will be given to account for any issues. Students will start at the registrar scheduled time. Time will be adjusted for SAS students if needed and accommodations for students will be done on a case-by-case basis. The final exam will be administered online through the course D2L website. The final will not be cumulative, but will cover all material since the midterm. If you miss the final exam you must apply for a makeup exam through the registrar.

The following is borrowed from the BIOL 371 course outline--it applies to this course as well: "IMPORTANT: It is the student's responsibility to ensure they have adequate computer and internet access to write the exams. If a student encounters any technical issues starting an exam, they MUST document the issue by taking a photo, screenshot, or video, and they must contact the instructor immediately so that either additional time can be provided to access the exam or alternative arrangements made. Students claiming to experience such difficulties who do not contact their instructor providing evidence of technical difficulties within 15 minutes of the scheduled start of the exam will not be allowed to write the exam and will receive a grade of zero (0) on the exam. If a student's exam is suspended during the exam (lost internet connection, internet browser crashes etc.), they MUST provide evidence (photo/ screenshot/video) and contact the instructor immediately. Students will then be granted re-entry to suspended exams if they began the exam on time, provided evidence of the suspension, and still have time remaining to complete their exam."

During the midterm and final exams you are allowed to access your textbook and class notes **but no other resources or aids may be consulted. You are strictly forbidden from accessing internet resources such as search engines (Google etc), other websites, shared documents (Google docs etc) or chat servers (Discord, WhatsApp etc), etc.** Consulting these sources or communicating with other people during the exam constitutes academic misconduct. You are specifically prohibited from working with or contacting any other individuals while you complete the exam. All written answers must be in your own words and not copied from the textbook, notes or any other source.

Accommodations: For each exam, time will be adjusted for SAS students if needed and accommodations for students will be done on a case-by-case basis.

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 Center:** 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/policies/files/policies/sexual-violence-policy.pdf>)
- 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. **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 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.

- 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.

2020 CMMB 403 Tentative Course Lecture and Exam Schedule

DATE	LECTURER	TITLE	BOOK CHAPTER (12 th Edition)
Sept. 9	JC	Introduction and review of important concepts	None
Sept. 11	JC	Intro to the study of development and developmental organization	1
Sept. 14	JC	Cell specification during development	2
Sept. 16	JC	Differential Gene Expression in Development	3
Sept. 18	JC	Differential Gene Expression in Development cont'd	3
Sept. 21	JC	Cell to Cell Communication during development	4
Sept. 23	JC	Cell to Cell Communication during development cont'd	4
Sept. 25	JC	Stem Cells	5
Sept. 28	JC	Sex Determination	6
Sept. 30	JC	Gametogenesis	6
Oct. 2	JC	Fertilization	7
Oct. 5	JC	Early <i>C. elegans</i> development	8
Oct. 7	JC	<i>Drosophila</i> development	9
Oct. 9	JC	<i>Drosophila</i> development continued	9
Oct. 12	None	Thanksgiving, NO CLASSES	
Oct. 14	JC	Early development-Amphibians	11
Oct. 16	JC	Early development-Amphibians cont'd	11
Oct. 19	JC	Review for midterm	
Oct. 19	JC	Online Midterm Exam 6-9 pm	
Oct. 21	JC	Early development-fish	11
Oct. 23	JC	Early development-birds	12
Oct. 26	JC	Early development-mammals	12
Oct. 28	JC	<i>Hox</i> genes	12
Oct. 30	JC	<i>Hox</i> genes	12
Nov. 2	JC	CRISPR/Cas9 in the study of development	Supplementary
Nov. 4	JC	Introduction to organogenesis and the ectoderm	13
Nov. 6	JC	Formation and patterning of the neural tube	13

Nov. 9-13	None	NO CLASS FALL BREAK and Remembrance Day	
Nov. 16	JC	Brain Development	14
Nov. 16	JC	Neural Crest Cells	15
Nov. 18	JC	Cranial Placodes	16
Nov. 20	JC	Paraxial mesoderm: the somites	17
Nov. 23	JC	Paraxial mesoderm: the somites cont'd	17
Nov. 25	JC	Bones and muscle	17
Nov. 27	JC	Intermediate mesoderm: Kidney Development	18
Nov. 30	JC	Lateral Plate Mesoderm: Heart Development	18
Dec. 2	JC	Lateral Plate Mesoderm: Blood	18
Dec. 4	JC	Limb development in tetrapods	19
Dec. 7	JC	The endoderm: glands, gut, lungs and liver	20
Dec. 9	JC	The endoderm: glands, gut, lungs and liver cont'd	20
The Final Exam will be sometime between December 12-23, to be scheduled later by the registrar.			
(An online review session will be scheduled before the final)			

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 03 2020 11:48

Department Approval

Electronically Approved - Sep 03 2020 19:06

Associate Dean's Approval