



**UNIVERSITY OF
CALGARY**

DEPARTMENT OF BIOLOGICAL SCIENCES
COURSE OUTLINE

1. Course: CMMB 403 – DEVELOPMENTAL BIOLOGY OF ANIMALS

Lecture Section(s)	L01	MWF	1:00-1:50	CHC 119	Fall 2017
Tutorial Sections(s):	M – 2:00/3:00		BI 190		
	T – 12:00/1:00/2:00		BI 190		
	W – 2:00		BI 190		
	R – 1:00		BI 190		
	F – 2:00		BI 190		
Instructor(s):	Dr. John Cobb (Coordinator)		BI 286D	220-3554	jacobb@ucalgary.ca
	Dr. Peter Vize		BI 268	220-8502	pvize@ucalgary.ca

Desire2Learn Course website name: **CMMB 403 L01 - (Fall 2017) - Developmental Biology Of Animals**

Biological Sciences Department BI 186 403-220-3140 biosci@ucalgary.ca

2. Prerequisites: Biochemistry 393; and one of Biology 311 or Medical Science 341; plus one of Biology 331 or Medical Sciences 351.

See section 3.5.C in the Faculty of Science section of the online Calendar
www.ucalgary.ca/pubs/calendar/current/sc-3-5.html

3. Grading: The University policy on grading and related matters is described sections [F.1](#) and [F.2](#) of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Quizzes and Assignments	20 %		
Midterm Exam #1	20 %	(In Class)	Oct. 13
Midterm Exam #2	20%	(In Class)	Nov. 17
Final Exam (Cumulative)	40%	(Final Examination scheduled by the Registrar's Office.)	

Passing grades in both the tutorial and lecture components are essential if the student is to pass the course as a whole.

Each piece of work (quizzes, assignments, midterm test or final examination) submitted by the student will be assigned a percentage score. The student's average percentage score for the various components 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, bearing in mind that an F grade will result if the student does not pass the overall tutorial OR the overall lecture component.

Composition of Final Grade:

Grading

Final Grade Scale :

- A+: 94 or higher
- A : 85 and under 94
- A- : 82 and under 85
- B+: 79 and under 82
- B : 75 and under 79
- B- : 72 and under 75
- C+: 69 and under 72
- C : 65 and under 69
- C- : 62 and under 65
- D+: 59 and under 62
- D : 50 and under 59
- F : <50

Because there are so many possible marks and the lines must be drawn somewhere we will not round grades (the grading scheme is already quite generous). So, for example, an 81.99 average will be a B+ and an 82.00 will be an A-.

4. **Missed Components of Term Work:** 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 himself/herself with these regulations. See also [Section E.3](#) of the University Calendar
5. **Course Materials:** Developmental Biology, Tenth Edition (2014) by Scott F. Gilbert
(Looseleaf versions of the textbook are available in the University bookstore.
If you desire the more expensive hardback version, it is available from Amazon.ca.)
6. **Examination Policy:** The use of programmable calculators, wireless access devices such as cell phones, PDAs, etc. during examinations will not be allowed. Calculators are not necessary for exams in this course. Students should also read the Calendar, [Section G](#), on Examinations.
7. **Writing across the curriculum statement:** In this course, the quality of the student's writing in assignments will be a factor in the evaluation of those assignments. See also [Section E.2](#) of the University Calendar.

8. ETHICS IN THE BIOLOGICAL SCIENCES

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.

9. OTHER IMPORTANT INFORMATION FOR STUDENTS:

- (a) **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.
- (b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- (c) **Student Accommodations:** 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* http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.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, preferably in writing, to the Associate Head of Biological Sciences, Dr. H. Addy by email addy@ucalgary.ca or phone 403 220-3140.
- (d) **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- (e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, 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 also <http://www.ucalgary.ca/secretariat/privacy>.
- (f) **Student Union Information:** VP Academic Phone: 403 220-3911 Email: suypaca@ucalgary.ca
SU Faculty Rep. Phone: 403 220-3913 Email: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca;
Student Ombuds Office: 403 220-6420 Email: ombuds@ucalgary.ca; <http://ucalgary.ca/provost/students/ombuds>
- (g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.
- (h) At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference - please participate in USRI Surveys.

Department Approval _____ ORIGINAL SIGNED _____ Date _____
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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 instructors.

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.

LEARNING OUTCOMES

At the end of CMMB 403, students who give a diligent effort will be able to

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

TENTATIVE LECTURE SCHEDULE: FALL 2017

Date	Lecturer	Title	Reference Chapter
Sep 11	PV	Review of important processes and techniques	
Sep 13	PV	Introduction to the study of development, developmental anatomy	1
Sep 15	PV	Differential Gene Expression in Development	2
Sep 18	PV	Differential Gene Expression in Development	2
Sep 20	PV	Cell-Cell Communication in Development	3
Sep 22	PV	Cell-Cell Communication Continued	3
Sep 25	PV	Cell specification	Intro, Part II
Sep 27	PV	Fertilization	4
Sep 29	PV	Early development in nematodes	5
Oct 2	PV	Axis specification in <i>Drosophila</i>	6
Oct 4	PV	<i>Drosophila</i> development continued	6
Oct 6	PV	Early Development in sea urchins and tunicates	7
Oct 9		Thanksgiving, NO CLASS!	
Oct 11	PV	Early Vertebrate development: Frogs	8
Oct 13		MIDTERM 1	
Oct 16	PV	Early vertebrate development: Zebrafish	8
Oct 18	PV	Early vertebrate development: Birds	9
Oct 20	PV	Early mammalian development	9
Oct 23	PV	Stem Cells	Intro, Part III
Oct 25	JC	<i>Hox</i> genes	9 and supplementary
Oct 27	JC	CRISPR/CAS9 in the study of development	Supplementary
Oct 30	JC	Introduction to organogenesis	10
Nov 1	JC	Introduction to the ectoderm	10
Nov 3	JC	The neural tube	10
Nov 6	JC	Brain Development	10
Nov 8	JC	Ectoderm: Placodes and neural crest cells	11
Nov 10		No Class-Reading Break	
Nov 13		No Class-Reading Break	
Nov 15	JC	Ectoderm: Neural crest continued	11
Nov 17		MIDTERM 2	
Nov 20	JC	Paraxial mesoderm: somitogenesis	12
Nov 22	JC	Bones and muscle	12
Nov 24	JC	Intermediate mesoderm: the urogenital system	12
Nov 27	JC	Sex determination	15
Nov 29	JC	Germ cells	17
Dec 1	JC	Lateral Plate mesoderm: the heart	13
Dec 4	JC	Lateral plate mesoderm: blood	13
Dec 6	JC	The endoderm: gut, lungs and liver	13
Dec 8	JC	Limb development in tetrapods	14

Cumulative final date to be announced; it will be sometime between Dec 11-21.