Developmental Biology
BIOL 4350(6350), Sections A-B (4 credit hours)
Fall Semester 2018

Lecture (BC 2022): **Tue-Thu 3:30 pm – 4:45 pm**

Laboratory (BC 2071): **Section A Tue 9:30 am – 12:20 pm**
Section B Fri 9:00 am - 11:50 am

Instructor: Dr. Cristina Calestani
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Office hours:
Mon 2:00 pm-4:00 pm
Thu 10:00 am - 12:00 pm
Or by appointment (please send an email to ccalestani@valdosta.edu with "appointment" in the subject line).

Pre-Requisites: BIOL 1107, BIOL 1108, and BIOL 3200 with a grade of C or better or permission of instructor.

Course Description (as stated in the Undergraduate Catalogue):
A study of development from fertilization through embryological stages, with an emphasis placed on experimental embryology and molecular genetic mechanisms in selected model organisms.

Course Learning Outcomes

This course learning outcomes support the achievement of the Department of Biology Educational Outcomes 1 through 5, and the VSU General Education Outcomes 3, 5, and 7. By the end of this course the students will be able to:

1) Describe the developmental anatomy of selected invertebrate and vertebrate embryos
2) Comprehend the basic molecular and cellular mechanisms of fertilization and embryo development
3) Compare and contrast development of different organisms
4) Comprehend and predict the outcomes of possible interactions between developmental processes and environmental factors, naturally occurring or man-made.
5) Understand experimental approaches used to answer specific questions in developmental biology
6) Develop and test a hypothesis using experimental embryology techniques learned in the laboratory
7) Analyze and interpret experimental data in developmental biology
8) Communicate scientific results and evaluate their significance in the context of current knowledge in developmental biology
9) Discuss ethical implications and societal impacts of advances in developmental biology research

Textbook
Scott F. Gilbert. 2013. *Developmental Biology* 10th ed. Sinauer Associate, Inc., Massachusetts USA.

Laboratory Manual
Mary S. Tyler & Ronal N. Kozlowski. 2010. *DevBio Laboratory: vade mecum 3*. An Interactive Guide to Developmental Biology (online access). To download the manual register at: http://labs.devbio.com using the code printed inside the cover of the textbook.

Additional material for the lab will be posted on Blazeview.

ASSESSMENTS

Lecture

The lecture assessments will consist of four exams and one paper presentation. The fourth exam will be a comprehensive final.

Exams 1,2 and 3 will be taken during class time and must be turned in by the scheduled end of class. The final exam will be on Friday December 7, 2018 from 2:45pm to 4:45pm in BC 2022.

Exam grades will be posted on Blazeview.

- All exams are based on lecture material and assigned readings.
- Exams questions are multiple choice, true/false, matching and short written answers.
- If you fail to attend one of the exams for any reason, you must provide documented evidence (e.g. from doctor, police, etc.) that circumstances beyond your control prevented you from taking the exam. Failure to provide reasonable evidence will result in a grade of 0 for the exam. Makeup exams will be administered at any time during the semester at the discretion of the instructor.
- If you arrive late for an exam you will be allowed to take the exam. However, you must turn in the exam paper at the regular scheduled end of the class. You will not be allowed extra time unless a documentable emergency has occurred.
- The final exam grade (exam 4) can replace the lowest grade of exams 1, 2 or 3. This applies only to exam 4; no other exam can replace the lowest grade. If exam 4 is used to replace a lower grade in tests 1, 2, or 3, the grade for exam 4 will count twice in the final grade calculation. Exam 4 cannot be used to replace a missed test.
- Exam 4 will always count in calculating the final grade.
- After each exam, students are strongly encouraged to review it. You can review an exam during office hours. Exam papers will not be returned to students.
- **Any student attempting to copy, take pictures or steal a hard-copy of a test, at any time during the semester, will receive an automatic F for the entire course and face disciplinary action for student misconduct.**

Attendance will be recorded at the beginning of class. Students arriving late, after the first 10 minutes of class, will be considered absent. If you do not attend class on a regular basis you will be at a significant disadvantage.

Paper Presentation

The paper presentation is a group assignment. A paper from current literature in developmental biology will be assigned to each group of students by the Instructor. The students will present the paper in class in a PowerPoint presentation format. Guidelines and rubrics will be communicated to the students by the Instructor.

Your final grade for the presentation will be influenced by peer evaluation of your relative level of contribution; *i.e.* your group partners will grade your contribution on a scale of 0-100%. For example, if your group presentation receives a grade of 100% by the instructor and your partners estimate your effort to be 60% (instead of 100% for your assigned work) your presentation grade will be 60% of 50 points. An average taken from all members of the group will be used to calculate the percent effort for each person. Peer assessment will be anonymous.

Laboratory

The laboratory assessments consist of two practical exams and two PowerPoint presentations of inquiry-based experiments. Students are required to maintain a laboratory notebook.

The practical exams questions may include microscope slides, whole specimens and a written component.

The inquiry-based experiments will be performed in groups of approximately four students. Time outside of the assigned laboratory hours is required for the inquiry-based experiments. Your final grade for the presentations will be influenced by peer evaluation of your relative level of contribution; *i.e.* your group partners will grade your contribution on a scale of 0-100%. For example, if your group lab presentation receives a grade of 100% by the instructor and your partners estimate your effort to be 60% (instead of 100% for your assigned work) your lab presentation grade will be 60% of 25 points. An average taken from all members of the group will be used to calculate the percent effort for each person. Peer assessment will be anonymous.

There are no make-up labs. Attendance for the laboratory is mandatory. Attendance will be recorded at the beginning of each laboratory. Students arriving after the first 30 minutes of the laboratory will be considered absent. Any student missing 3 laboratories or more, with or without documented excuse, cannot receive a lab grade above a "D" (60%).

Extra-credit up to a maximum of 20 points will be offered. These points will be added to the student total points for the course before calculating the percentage grade. Extra-credit points can be earned with in-class activities during the lecture or the laboratory, take-home assignments and in-class written critique of the lecture paper presentations.

Grade Calculation*		
Assessment		**Max. Points**
Lecture	Exam 1	100
	Exam 2	100
	Exam 3	100
	Final Exam	100
	Paper Presentation	50
	Attendance	20
Laboratory	Practical 1	50
	Practical 2	50
	Oral presentation 1	25
	Oral presentation 2	25
Total Max. Points		**620**
Extra-credit max. Points		**20**

Grade Distribution	
Letter	**Percentage**
A	90 -100%
B	80 - 89%
C	70 - 79%
D	60 - 69%
F	≤ 60%

***Final grade calculation: (Lecture exams + Paper Presentation +Attendance + Lab practicals + Lab presentations + Extra-Credits points)/620 points**

NOTE: Graduate students enrolled in BIOL 6350 will have additional assignments and adjusted grading scale in a supplementary syllabus.

Behavior in the Classroom
It is assumed that all students will act in a mature manner in the classroom, showing consideration for their peers and the instructor. Any student who consistently distracts other students or the instructor will be removed from the course. **All electronic devices must be turned off or set to silent mode in the classroom.**

Cheating or Plagiarism
Incidents of cheating or plagiarism will result in **an automatic 0% for the assignment and referral to The Office of Student Conduct for disciplinary action.** For VSU's Academic Integrity Code please see https://www.valdosta.edu/academics/academic-affairs/academic-honesty-policies-and-procedures.php.

Learning Support
 The Academic Support Center provides free peer tutoring in core courses, the top four of which are math, writing, Spanish, and biology/chemistry. It also offers time management and study skills workshops as well as provides free professional academic advising and on-campus job information in one location: Langdale Residence Hall. Help is available to all VSU students. Call 333-7570 to make an appointment, or visit the website: https://www.valdosta.edu/asc/.
 Odum Library provides a variety of services to assist classroom instruction, including library instruction, course reserves, and interlibrary loan. Please see https://www.valdosta.edu/academics/library/ for further information.

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Access Statement: Students with disabilities who are experiencing barriers in this course may contact the Access Office for assistance in determining and implementing reasonable accommodations. The Access Office is located in Farbar Hall. The phone numbers are 229-245-2498 (V), 229-375-5871 (VP) and 229-219-1285 (TTY). For more information, please visit VSU's Access Office or email: access@valdosta.edu.

Lecture	Date	Topic	Text Reading
1	Aug 14	**Course Introduction**	
2	Aug 16	**Comprehending Development**	Part I: pg. 1-3 Chapter 1 pp.5-12; 14-27
3	Aug 21	**Fertilization**	Chapter 4 pp.117-134; Fig. 4.25 pp.140-147
4	Aug 23	**Differential Gene Expression in Development I**	Chapter 2
5	Aug 28	**Differential Gene Expression in Development II**	Chapter 2
6	Aug 30	**Cell-Cell Communication**	Chapter 3 pp.69-99
7	Sept. 4	**Specification and Early Development**	Part II pp.109-115 Chapter 5 pp. 153-161 (Snails excluded); pp.170-177
8	Sept 6	**The Genetics of Axis Specification in *Drosophila***	Chapter 6 pp. 179-187; 194-197; 202-203; 209-210
9	Sept. 11	**Sea Urchin Development**	Chapter 7 pp. 217-224; 225-232
--	Sept 13	**EXAM # 1**	**Lecture material 2-8**
--	Sept 18	**Paper Presentation and Discussion-Group 1-2**	
--	Sept 20	**Paper Presentation and Discussion-Group 3-4**	
10	Sept 25	**Vertebrate Early Development:** Amphibians and Fish	Chapter 8 pp. 244-260; 271-277
11	Sept 27	**Vertebrate Early Development:** Birds and Mammals	Chapter 9 pp. 285-296; 298-317
12	Oct 2	**The Stem Cell Concept**	Part III: pp. 319-331
13	Oct 4	**Postembryonic development- Regeneration**	Chapter 16 pp. 568-574; 578-579
--	Oct 9	**FALL BREAK- NO CLASS**	
14	Oct 11	**Late Development-Organogenesis I** Central Nervous System	Chapter 10 pp. 333-349; 351-359
--	Oct 16	**EXAM #2**	**Lecture material 9-13**
--	Oct 18	**NO CLASS**	
15	Oct 23	**Late Development-Organogenesis II** Derivatives of the Neural Crest Cells, Paraxial and Intermediate Mesoderm	Chapter 11 pp.375-386; 391-392 (Cranial placodes excluded) Chapter 12 pp. 415-426; 429-434
16	Oct 25	**Late Development-Organogenesis III** Derivatives of the Lateral Plate Mesoderm and the Endoderm	Chapter 13 pp. 449-460; 472-481; 484-486
--	Oct 30	**Paper Presentation and Discussion-Group 5-6**	
--	Nov 1	**Paper Presentation and Discussion-Group 7-8**	
17	Nov 6	**Development of Tetrapod Limb**	Chapter 14 pp.490-498; 506-516
18	Nov 8	**Sex Determination and the Germ Line**	Chapter 15 pp. 519-532; 541-545 Chapter 17 pp. 591-592; 598-597; 604-605; 614-623
19	Nov 13	**Medical Aspects**	Chapter 18
--	Nov 15	**TEST # 3**	**Lecture material 14-18**
20	Nov 20	**Developmental Mechanisms of Evolution**	Chapter 20 pp.689-707
--	Nov 22	**THANKSGIVING HOLIDAY**	
--	Nov 27	**Paper Presentation and Discussion-Group 9-10**	
--	Nov 29	**Paper Presentation and Discussion-Group 11-12**	
--	**Dec 7 Friday**	**FINAL EXAM 2:45pm-4:45pm**	**Cumulative-Lecture 2-20**

TENTATIVE LABORATORY EXERCISES:

Lab	Day:	Topic:	Lab Manual	Due Dates
--	Aug 14-17	NO LAB	--	
1	Aug 21-24	Amphibian Development	Chapter 14	
2	Aug 28-31	Sea Urchin Fertilization	Chapter 6	
--	Sept 4-7	Labor Day Week-NO LAB		
3	Sept. 11-14	Effects of UV radiation (inquiry-based experiment)	Chapter 7	
4	Sept. 18-21	Chicken Development I-II	Chapter 9-10	
5	Sept 25-28	**Practical Exam 1**		
6	Oct 2-5	**Oral presentation 1** (Effects of UV)		
--	Oct 9-12	FALL BREAK-NO LAB		
--	Oct 16-19	NO LAB		
7	Oct. 23-26	Regeneration in Planaria (inquiry-based experiment)	Chapter 13	
8	Oct 30-Nov 2	Teratogens effects on Planaria regeneration (inquiry-based experiment)	Handout	
9	Nov. 6-9	Gametogenesis	Chapter 5	
10	Nov. 13-16	**Practical Exam 2**		
--	Nov 20-23	THANKSGIVING-NO LAB		
11	Nov 27-30	**Oral presentation 2** (Regeneration-Teratogens)		