

Biology 423, Spring 2015

Developmental Biology

Textbook: Gilbert, Developmental Biology (10th edition) required

Wolpert, Tickle, Principles of Development (4th edition) optional

Course Overview: This course provides students with a fundamental understanding of the principles of embryogenesis and animal development from fertilization through gametogenesis. Topics include the establishment of body axes, tissue differentiation, and organ and limb development. Concepts and principles of development covered include differentiation, specification of cell fates, patterning, and embryonic induction. Principles are covered with an emphasis on cell signaling, cell migration, and the control of gene expression within the context of a developing organism. Throughout the course, the developmental mechanisms that diverse animal species utilize are compared and contrasted with respect to their evolutionary history. Discussions of primary scientific literature will be an integral part of the course.

Course Goals:

- 1) to increase the student's curiosity about the processes that contribute to the formation of a complex multicellular organism.
- 2) to stimulate student-initiated investigations into scientific advancements as reported in primary scientific literature as well and mainstream media.
- 3) to learn to read, assimilate, evaluate, and express ideas from primary literature.
- 4) to enable students to learn and appreciate the molecular, cellular and multi-cellular processes that control development.
- 5) to synthesize and integrate information from other disciplines and courses, applying them to the context of a developing organism.
- 6) to understand of how experiments are designed, executed, and interpreted.
- 7) to gain additional practice using verbal and written communication skills.

This conceptual foundation should enable students to understand and evaluate developmental biology information in review articles, newspapers, or other advanced courses.

Grading: Grading will be on a straight grading scale. However, based on class averages (which we plan to put at around 75%) we reserve the right to adjust the scale. You may be scored up but NEVER down.

Exams (3x 15%)	45%
Two Writing assignments (2x 15%)	30%
In class discussion, participation and homework assignments	25%
Total	100%

Exams will test your knowledge of major concepts presented in the course. The format will be short essays consisting mostly of questions that can be addressed in 1-2 well-organized and concise paragraphs.

Writing assignments will be limited to a maximum of 2 double spaced pages. The emphasis will be on expression. The goal is to test your comprehension and practice your written communication skills.

Cell phones and electronic devices: Make sure you turn your cell phone ringer off in class. If your phone rings and it disrupts the lecture, you will lose 5%. Other non class-related use of electronic devices (e.g. texting) will also result in a 5% penalty.

Attendance and participation: Many class meetings will be devoted, in whole or in part, to discussions of primary literature. This is an integral part of the course. Accordingly, students are expected to attend and to participate in discussions. Absences should be discussed with the instructor as participation points are frequently assigned.

Literature Discussions: Literature discussions will be on primary literature papers and will be announced in class and on Blackboard

Blackboard: Relevant materials will be posted on Blackboard.

<https://bb.its.iastate.edu/webapps/portal/frameset.jsp>

Special Accommodations: Please contact the instructors at the beginning of the semester if you require special needs or accommodations.

Disability Accommodation: Iowa State University complies with the Americans with Disabilities Act and Sect 504 of the Rehabilitation Act. If you have a disability and anticipate needing accommodations in this course, please contact Dr. Schneider or Dr. Kuhlman to set up a meeting within the first two weeks of the semester or as soon as you become aware of your need. Before meeting with an instructor you should obtain a SAAR form with recommendations for accommodations from the [Disability Resources Office](#), located in Room 1076 on the main floor of the Student Services Building. Their telephone number is 515-294-7220 or email disabilityresources@iastate.edu. Retroactive requests for accommodations will not be honored.

Religious Accommodation: If an academic or work requirement conflicts with your religious practices and/or observances, you may request reasonable accommodations. Your request must be in writing, and your instructor or supervisor will review the request. You or your instructor may also seek assistance from the [Dean of Students Office](#) or the [Office of Equal Opportunity and Compliance](#).

Academic honesty, integrity and plagiarism: The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office. <http://www.dso.iastate.edu/ja/academic/misconduct.html>

The policy and for academic honesty and integrity is outline in the University Catalog. For more information refer to <http://www.public.iastate.edu/~catalog/2007-2009/geninfo/dishonesty.html> and <http://www.dso.iastate.edu/ja/academic/students.html>

It is important that you understand that academic dishonesty and plagiarism are not acceptable and will not be tolerated. In addition to receiving zero points for an assignment presentation or exam, students caught plagiarizing may be subject to more severe actions and/or university discipline. More info on plagiarism can be found at: <http://www.bioethics.iastate.edu/classroom/plagiarism.html>

One of the goals for this course is for you to gain skill and practice expressing **your** ideas, using someone else's words is **NOT** practicing your self-expression skills and makes it difficult to determine if you really understand the material. As a rule of thumb, if you copied and pasted it (or the equivalent) it is plagiarism. We expected that all out of class writing will include proper references for concepts, ideas, and data. We encourage the use of references from peer reviewed journal articles. Referencing of websites is discouraged.

By taking this course, you agree that your papers and other written assignments may be subject to evaluation for originality and intellectual integrity (i.e. plagiarism) by use of Blackboard *SafeAssign*. All papers submitted for review will be included as source documents in Iowa State University's Institutional *SafeAssign* database.

Dead Week: This class follows the Iowa State University Dead Week policy as noted in section 10.6.4 of the Faculty Handbook <http://www.provost.iastate.edu/resources/faculty-handbook> .

Harassment and Discrimination: Iowa State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon race, ethnicity, sex (including sexual assault), pregnancy, color, religion, national origin, physical or mental disability, age, marital status, sexual orientation, gender identity, genetic information, or status as a U.S. veteran. Any student who has concerns about such behavior should contact his/her instructor, [Student Assistance](#) at 515-294-1020 or email dso-sas@iastate.edu, or the [Office of Equal Opportunity and Compliance](#) at 515-294-7612.

Contact Information: If you are experiencing, or have experienced, a problem with any of the above issues, email academicissues@iastate.edu.

Biology 423, Spring 423

Class Schedule

Date	Topics	Instructor	Reading-Ch:pp
Jan. 12	Introduction to Developmental Biology		Part I-Intro: 1-3 Ch. 1: 5-17
Jan. 14	Intro II: Early Developmental Processes		Part I-Intro: 1-3 Ch. 1: 5-17
Jan. 16	Fertilization		Ch. 4: 117-138, 140-145
Jan. 19	No Class—Martin Luther King Holiday		
Jan. 21	Egg activation, Cleavage		Ch. 4: 134-140, 146-7 Ch. 5: 155-159, Ch. 7: 217-219 Ch. 8: 241-244, 271-275 Ch. 9: 285-287, 298-303
Jan. 23	<i>Literature Discussion 1:</i>		
Jan. 26	<i>Literature Discussion 1 continued</i>		
Jan. 28	Implantation in Mammals		Ch. 9: 298-309
Jan. 30	Developmental Mechanics I Fate Mapping Modes of Specification		Ch. 1: 17-23 Part II: 107-115
Feb. 2	Developmental Mechanics II Differential Gene Expression		Ch. 2: 31-65
Feb. 4	Developmental Mechanics III More Differential Gene Expression		Ch. 2: 31-65
Feb. 6	<i>Literature Discussion 2:</i>		
Feb. 9	Drosophila Axis Formation I		Ch. 6: 179-202
Feb. 11	Drosophila Axis Formation II		Ch. 6: 202-206
Feb. 13	Drosophila Axis Formation III		Ch. 6: 206-213
Writing assignment #1 due at midnight Feb. 14			
Feb. 16	Gastrulation I		Ch. 5: 158-160, Ch. 7: 225-232
Feb. 18	Gastrulation II		Ch. 8: 245-251, 275-277
Feb. 20	<i>Literature Discussion 3:</i>		
Feb. 23	Gastrulation III		Ch. 9: 287-293, 303-308

Feb. 25 **Exam #1**

Feb. 27 Cell-Cell interactions and Inductions

Ch. 3: 69-104

Mar. 2 Cell Migration

Ch.3: 78-79

Mar. 4 Dorsal-Ventral Patterning

Ch. 7: 251-266, 277-280

Ch. 8: 293-296

Ch. 8: 296-297, 311-317

Mar. 6 Derivatives of germ layers

Ch. 1:14

Ch. 3: 101

Ch. 9: 367-368

Ch.12: 476-481

Ch. 9: 333-334

Mar. 9 Anterior-Posterior Patterning

Ch. 8: 280

Ch. 8: 293-296

Ch. 8: 296-297, 311-317

Mar. 11 L-R development

Ch. 8: 297-298, 314 - 317

Ch. 8: 280-281

Mar. 13 ***Literature discussion 4:***

Mar. 16-20 **Spring Break**

Mar. 23 Neurulation/CNS pattern formation I

Ch. 7: 266-270

Ch.10: 333-345

Mar. 25 Neurulation/CNS pattern formation II

Ch.10: 347-355

Mar. 27 ***Literature Discussion 5:***

Mar. 30 Neural Crest

Ch. 11: 375 -393

Apr. 1 Axonal Migration

Ch. 10: 345-347

Ch. 11:394-405

Apr. 3 Paraxial Mesoderm

Ch. 12: 415-436

Writing assignment #2 due at midnight Apr.4

Apr. 6 Intermediate Mesoderm

Ch. 12: 436-447

Apr. 8 ***Literature Discussion 6:***

Apr. 10 Heart, Blood and Vascular development

Ch. 13: 449-471

Apr. 13	Exam #2	
Apr. 15	Limb development I	Ch. 14: 489-518
Apr. 17	Limb Development II	Ch. 14: 489-518
Apr. 20	Regeneration	Ch. 16: 571-574
Apr. 22	<i>Literature Discussion 7:</i>	
Apr. 24	Embryonic Stem Cells and Induced Pluripotent Stem Cells	Ch. 17: 598-600 Part III: 319-331
Apr. 27	Embryonic Stem Cells and Induced Pluripotent Stem Cells	
Apr. 29	Germ Cells	
May 1	Development and diseases	Ch. 17: 638-660
May 8	Exam #3 9:45-11:45 AM	