

# BIO43: Developmental Biology

Class #/Date	Topic	Readings
[1] Mar 26 Mon	- Introduction: Concepts and Questions - Genomic Equivalence	Ps. 1-13 Milestone 5.
[2] Mar 28 Wed	- Review: Genes, Gene Expression - Cell-Cell Communication	Pgs 13-35
[3] Mar 30 Fri	- Fertilization (Online lecture) - Specification and Lineage Tracing	Pgs 424-429.
[4] April 2 Mon	- Drosophila I: Stem Cells and Oogenesis - Drosophila II: D/V axis	Pgs 37-54 Milestone 22
[5] April 5 Thur	- Drosophila III: A/P axis. - Paper discussion: Frohnhofer (1986)	Pgs 54-71 Frohnhofer (1986) Milestone 16 Lipshitz Review (optional)
[6] April 6 Fri	- Drosophila IV: Segmentation	Pgs 71-83 Milestone 13
[7] April 9 Mon	- Drosophila V: Hox Genes	Pgs 90-95. Milestone 11 Meyerowitz, Science 295:1482
[8] April 11 Wed	- Drosophila VI: Organogenesis	Pgs 476-488
[9] April 13 Fri	- Paper discussion: Nellen (1996) - Review Session	Nellen (1996) Milestone 17
April 15	No Class	
[10] April 18 Wed	Exam 1	
[11] April 19 Thur	- Asymmetric cell division and cell polarity	Pgs. 235-248 Milestone 10, 15, 18.
[12] April 20 Fri	- RNAi, miRNAs, Apoptosis	Pgs. 248-250. Ambros Perspective
[13] April 23 Mon	- Vertebrates: A/P and D/V Axes	Pgs 103-111; 144-152. Milestone 1, 8, 19.

[14] April 25 Wed	- Gastrulation and the Germ layers	Milestone 23 Pgs 152-162.
[15] April 27 Fri	- Gastrulation II	Pgs 162-169; 377-390.
[16] April 30 Mon	- Neurulation	Pgs. 169-179.
[17] May 2 Wed	- Paper discussion: <b>Palmereimin (1997)</b> - Somitogenesis	Palmereimin (1997) Pgs 207-222.
[18] May 4 Fri	- Neurogenesis	Pgs. 392-396 Milestone 24.
[19] May 7 Mon	- CNS development	Pgs 520-533 Milestones 7 and 21.
[20] May 9 Wed	- Paper Discussion: <b>Kidd (1999)</b> - Axonal Pathfinding and connectivity I	Kidd (1999) Pgs 544-562.
[21] May 11 Fri	- Review Session	
[22] May 14 Mon	Exam 2	
[23] May 16 Wed	- Limb Development I	Pgs. 446-464. Milestone 6.
[24] May 18 Fri	- Limb Development II Paper Discussion: <b>Sanders (2008)</b>	Sanders (2008) Basler Review (1 <sup>st</sup> 4 pages)
[25] May 21 Mon	Germ Cells	Pgs. 409-423. Milestone 9
[26] May 23 Wed	Paper Discussion: <b>Gurley (2008)</b> Regeneration	Pg 594-612. Gurley (2008) Tanaka and Reddien (optional)
[27] May 25 Fri	Aging	

FINAL EXAM

**Faculty:**

Professor Erik Griffin  
Room 348 LSC  
Telephone: 6-8269  
erik.e.griffin@dartmouth.edu  
Office Hours: Monday 11:15am – 1:00 pm or by appointment

**Meeting times:**

MWF 10:10am – 11:15, Thurs 12:15 – 1:05pm (X hour)  
Meeting Room. LSC 205

**Pre-Requisites:** Biol 012 or Biol 013.

**Course Description:** This is an intermediate level Biology course that will examine the fundamental processes that mediate embryonic development. This course will emphasize conserved molecular, cellular and genetic mechanisms that underlie embryogenesis in animals.

**Textbook and Readings:**

- The primary text for this course will be Principles of Development, by Wolpert and Tickle. Textbook readings are intended to reinforce and contextualize material covered in class.
- We will read several primary literature articles throughout the term. These articles will provide a basis for in-class discussions.
- I will post a series of short reviews (“Milestones”) that were recently published by Nature magazine. These reviews place important advances in developmental biology within a scientific, historical and biomedical context.
- There will be several additional supplemental articles posted on the course Canvas site. I will indicate whether these articles are required or optional. Optional readings may help you understand and contextualize the course material and provide an entry point for further independent study. Optional readings will not be covered on the exams.
- I will post links to a number of online videos that relate to various aspects of developmental biology. These videos are intended to emphasize how our understanding of developmental biology relates to other areas of inquiry, including evolution, disease pathogenesis and biomedical research and ethics.

**Assessment:**

Midterm Exams (12.5% each)  
Final Exam (25%)  
Paper Evaluations: (25%)  
Class Participation (25%)

Presentations:

- *In class*: Students are expected to attend class, engage with the course material, in class projects and discussions on a regular basis. Students will be evaluated on their participation during class and not on the accuracy of the contributions.

- *Discussion of the primary literature paper*: Most weeks, we will discuss one paper from the primary literature. These discussions will emphasize the hypotheses being tested by each experiment as well as a critical evaluation of the design and interpretation of each experiment. Students will be chosen at random to lead the discussion of individual figures from the paper.

#### Paper Evaluations:

- We will read 6 papers from the primary literature. Each student will pick 5 of the 6 papers to write a brief (~1 page) summary. The summary will be due in class on the day we discuss the paper. A template for each summary will be provided. After our in class discussion, students will have the option to revise and resubmit their summary the next class period. The grade for the original and revised summaries will be averaged.

#### Exams:

The lecture schedule shows the date and time for the exams. Exams will focus on material covered in lecture. The exams will not cover material from the readings that are not discussed in lecture. Barring illness, failure to take the exam at the scheduled time will result in a grade of zero. You will be permitted one page (front and back) of notes for the exams. Graded exams will be returned to the students approximately one week after they are taken. Exams are graded not only for content but also for clarity and conciseness. The exam key will be posted on the course Canvas site. If, after reading the key, you feel there was an error in the scoring of your exam, you may submit a regrade request. Include a typewritten explanation stapled to your exam detailing the mistake made in the grading. Do not write or alter the exam prior to handing it in for regrading. The regrade request must be submitted within one week of the distribution of the graded exam.

#### **ACADEMIC HONOR PRINCIPLE:**

The Dartmouth College Student Handbook (page iii) states "Fundamental to the principle of independent learning are the requirements of honesty and integrity in the performance of academic assignments, both in the classroom and outside. Dartmouth operates on the principle of academic honor, without proctoring of examinations. Students who submit work which is not their own or who commit other acts of academic dishonesty forfeit the opportunity to continue at Dartmouth." The complete text of the Dartmouth Academic Honor Principle is given in the Dartmouth College Student Handbook.

There are a number of situations in which a student in Biology 43 might be tempted to violate the Academic Honor Principle. These situations include (but are not limited to) the following:

a) Examinations must be completed without reference to written materials other than those provided with the exam paper and must be completed without communication with anyone else (the only permissible exception is that students may request clarification of any exam question from the course faculty and staff who are present expressly for that purpose). The answers that you provide must be entirely your own work.

b) Our policy permits the re-submission of exams for potential re-grading by the professors. Any alteration of the answers between the time when the graded papers were returned to the student and the time when the paper was submitted for re-grading constitutes a breach of the Academic Honor Principle. To deter this practice, we routinely photocopy exams after grading them.

Honesty is the foundation of the academic pursuit of knowledge. In recognition of this, the faculty of Biology 43 will not overlook any violations of the Academic Honor Principle. Indeed, the Faculty Handbook of Dartmouth College states explicitly that College Faculty members are obligated to report potential violations of the Academic Honor Principle to the Dartmouth College Committee on Standards. Should the Committee on Standards find the student to be in violation of the Academic Honor Principle,

punishments usually involve suspension for multiple terms or separation of the student from the College.

**Note to Students with Physical or Learning Disabilities:**

Any student with a documented disability, including “invisible” disabilities such as chronic diseases and learning disabilities, needing academic adjustments or accommodations is requested to speak with Prof. Griffin by the end of the second week of the term. At the meeting, the student should be prepared to present a copy of the accommodations form. All discussions will remain confidential, although the Director of Student Disabilities may be consulted if questions arise.

**Religious Holidays:**

Some students may wish to take part in religious observances that occur during the academic term. If you have a religious observance that conflicts with your participation in the course, please speak with Prof. Griffin as soon as possible to discuss appropriate accommodations.

**Wellness:**

I recognize that the academic environment at Dartmouth is challenging, that our terms are intensive, and that classes are not the only demanding part of your life. There are a number of resources available to you on campus to support your wellness, including: your undergraduate dean (<http://www.dartmouth.edu/~upperde/>), Counseling and Human Development (<http://www.dartmouth.edu/~chd/>), and the Student Wellness Center (<http://www.dartmouth.edu/~healthed/>). I encourage you to use these resources and come speak with me to take care of yourself throughout the term.