

## Developmental Biology MCB141 (Spring 2018)

What is developmental biology? Most organisms develop an adult form from a fertilized egg (some regenerate new adults from pieces of preexisting organisms). This course asks how animals develop, taking a reductionist approach to the cell and molecular biology that underlies the process.

Of course, one could just watch some movies, and then decide “I want to know how this works!”

[Neural tube formation in a vertebrate](#) ([Links to an external site.](#))[Links to an external site.](#)(axolotl)

[Stem cell asymmetric division](#) ([Links to an external site.](#))[Links to an external site.](#) (Parhyale)

[Formation of a fly larva](#) ([Links to an external site.](#))[Links to an external site.](#)

[Butterfly wing spot differentiation](#) ([Links to an external site.](#))[Links to an external site.](#)

[The squid emerges!](#) ([Links to an external site.](#))[Links to an external site.](#)( a long one)

[egg to tadpole](#) ([Links to an external site.](#))[Links to an external site.](#) (Xenopus)

[Larval neurons](#) ([Links to an external site.](#))[Links to an external site.](#) (fly) with “also sprach Zarathustra”

Or if you prefer some “learning outcomes”

After taking the course, students will understand :

How animals generate progressively greater complexity from simpler forms;

How cells become determined to follow particular fates;

How symmetry in eggs or early stages is “broken” to develop the dorsal ventral, anterior posterior, and left right axes of the larval or adult form.

How cells move and rearrange to generate the form of the animal (morphogenesis);

How genes regulate developmental processes;

How evolution is driven by changes in genetic content or its use;

How Developmental Biology gives insight into birth defects and the world!

To achieve this goal, we discuss the **mechanisms** underlying development, eg Prelocalized Determinants in cells, Signaling between cells, transcriptional control, differential adhesion, attraction, repulsion. How both positive and negative feedbacks regulate pathways....etc.

To understand the principles, we will discuss the **experimental evidence** for the causality of processes, for example gain- and loss-of-function methods and how these are done in different contexts, descriptive techniques, including observation, gene expression analysis.

**Instructors:** Nipam Patel ([nipam@berkeley.edu](mailto:nipam@berkeley.edu)), John Gerhart ([jgerhart@berkeley.edu](mailto:jgerhart@berkeley.edu)) and Richard Harland ([harland@berkeley.edu](mailto:harland@berkeley.edu))

**Prerequisites:** 102 or C100A; Biology 1A, 1AL, and 1B; 110 or 130 recommended

**Discussion Sections:** You are expected to attend the meetings of your assigned section, as this will benefit both your comprehension and your grade. Sections will be based primarily on lecture material, with some supplementary material by the GSI. More information regarding the discussions is available on the discussion page.

**Textbook (recommended, not required):**

Referenced Textbook (recommended, not required): Scott F. Gilbert, Developmental Biology, Eleventh (2016, with Michael F. Barresi), or Tenth (2014), or Ninth (2010).

Scott F. Gilbert, and Michael Barresis Developmental Biology, Eleventh Edition, 2013 Sinauer Associates, Inc., Sunderland, MA. <http://11e.devbio.com> (Links to an external site.)Links to an external site. is to the online companion for the eleventh edition.

The sixth edition of the textbook is available free online through the [NCBI bookshelf](#) (Links to an external site.)Links to an external site., though it cannot be browsed, and instead must be searched through keywords to find the material. We will give page references for the eleventh edition throughout the course, but editions 10, 9, 8, 7, and 6 are similar. The text may be supplemented with handouts in discussion.

**Exams:** There will be two midterms and a final exam. Midterms are on the dates indicated in course outline on the lecture topics page and the time and location of the final will be posted. The midterm exams will be designed to fit into one hour, but you will be given one and a half hours to allow time to compose organized answers. The final will be three hours. There will be no makeup exams. Failure to take an exam will result in zero points. For excuses such as serious illness, you must contact the instructor or GSI PRIOR to the exam about the nature of the problem, and you must provide signed documentation by a physician or responsible person explaining your absence. Since medical school interviews are not a required part of the curriculum, you must schedule interviews around the exam dates. Regrade requests must be submitted in writing by the first lecture following the return of the exams. Only answers written in ink will be eligible for regrades, and a random subset of all the exams will be photocopied before they are returned.

**Points:** The course will be graded on the basis of 500 possible points: each midterm is worth 100 points; the final will consist of a midterm covering the final third of the course (100 pts) and a cumulative section covering the entire course (100 pts); the final 100 pts will be assigned for participation in section.

**GSIs:**

Jennifer McCarthy [jbmccarthy1@berkeley.edu](mailto:jbmccarthy1@berkeley.edu) and Dennis Sun [dennis.a.sun@gmail.com](mailto:dennis.a.sun@gmail.com) will direct the discussion sections, and will be available at office hours and by appointment. In addition to hearing from you directly, the instructors will receive feedback from the GSIs about what points in lectures were not clear, so it is in your interest to tell them how you are doing with the material.

letters of recommendation: Of course, if you plan on asking for a letter of recommendation, it should be obvious to you that you should take an active part in the course, so we know who you are, and so that we can write an informed letter. Most letters contain contributions from the GSI and an instructor.

**Disabilities:** If you need disability-related accommodations in this class, if you have emergency medical information you wish to share with us, or if you need special arrangements in case the building must be evacuated, please inform the professor and your GSI immediately.

Students who need academic accommodations (for example, a notetaker), should request them from the Disabled Students' Program, 260 César Chávez Center, 642-0518 (voice or TTY). DSP is the campus office responsible for verifying disability-related need for academic accommodations, assessing that need, and for planning accommodations in cooperation with students and instructors as needed and consistent with course requirements. [Click here](#) for more information.

**Plagiarism:** It is your responsibility to familiarize yourself with the University's policies governing plagiarism. You may find [this website](#) helpful in defining and avoiding plagiarism.

### **Safe, Supportive, and Inclusive Environment**

Whenever a faculty member, staff member, post-doc, or GSI is responsible for the supervision of a student, a personal relationship between them of a romantic or sexual nature, even if consensual, is against university policy. Any such relationship jeopardizes the integrity of the educational process.

Although faculty and staff can act as excellent resources for students, you should be aware that they are required to report any violations of this campus policy. If you wish to have a confidential discussion on matters related to this policy, you may contact the Confidential Care Advocates on campus for support related to counseling or sensitive issues. Appointments can be made by calling (510) 642-1988.

The classroom, lab, and work place should be safe and inclusive environments for everyone. The Office for the Prevention of Harassment and Discrimination (OPHD) is responsible for ensuring the University provides an environment for faculty, staff and students that is free from discrimination and harassment on the basis of categories including race, color, national origin, age, sex, gender, gender identity, and sexual orientation. Questions or concerns? Call (510) 643-7985, email [ask\\_ophd@berkeley.edu](mailto:ask_ophd@berkeley.edu), or go to <http://survivorsupport.berkeley.edu/>.