

BIOS S-129: Stem Cell and Regenerative Biology
Summer 2018

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Office Hours: by appointment

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Meeting Times: Tuesday & Thursday
3:15-6:15pm
Northwest Science Building B108

Sections will be held on Tuesdays starting on July 3rd from 2:00-3:00pm in Northwest Science Building B108.

Description: We are entering into a new era in which a fundamental understanding of developmental biology and regeneration will play a critical role. In this course, embryonic and adult stem cells in different organisms will be examined in terms of their molecular, cellular, and potential therapeutic properties. Genetic reprogramming and cloning of animals will be critically evaluated. Ethical and political considerations will also be considered.

Prerequisites: BIOS S-1ab, or the equivalent; knowledge of cell, molecular, or developmental biology is recommended; exceptions granted by permission of the instructor.

Course Website: <https://canvas.harvard.edu/courses/41412>

Textbook: No textbook is required for the course.

The course is taught from the primary literature. Lecture slides contain references for relevant papers and review articles related to the topic.

For a good general resource covering early development:

Scott F. Gilbert and Michael J. Barresi
Developmental Biology (11th Edition)
Sinauer Associates
ISBN# 978-1-60535-470-5

Grading:

Exam #1	20%
Exam #2	20%
Problem Sets	20%
Final Exam	40%

<u>Date</u>	<u>Lecture</u>	<u>Title</u>
6/26	1	Introduction
	2	Cloning
6/28	3	Epigenetics
	4	Pluripotent Stem Cells
7/3		NO CLASS – HOLIDAY PROBLEM SET #1 DUE
7/5	5	Genetic Manipulation
	6	Ethical Considerations
7/10		EXAM #1 (<i>covers Lectures 1-6</i>)
7/12	7	Hematopoietic Stem Cells
	8	Muscle Stem Cells
7/17	9	Neural Stem Cells
	10	Cancer Stem Cells
7/19	11	Germline Stem Cells
	12	Epidermal Stem Cells
		PROBLEM SET #2 DUE
7/24		EXAM #2 (<i>covers Lectures 7-12</i>)
7/26	13	Intestinal Stem Cells
	14	Pancreatic Stem Cells

7/31	15	Regeneration in Invertebrates
	16	Regeneration in Vertebrates
		PROBLEM SET #3 DUE
8/2	17	Molecular Pathways of Pluripotency
	18	Induced Pluripotent Stem Cells
8/7	19	Direct Reprogramming / Transdifferentiation
	20	Disease Modeling
8/9		PROBLEM SET #4 DUE
		FINAL EXAM
		<i>(comprehensive with an emphasis on Lectures 13-20)</i>

Noteworthy Dates:

Wednesday, 6/27	Deadline for course and credit status changes Deadline to drop the course with 100% tuition refund
Tuesday, 7/3	Deadline to drop the course with 50% tuition refund
Friday, 7/27	Deadline to withdraw with WD/WN grade on record

Accessibility Services:

Students who would like to request accommodations for a documented disability should contact the Accessibility Services Office at accessibility@dcemail.harvard.edu or (617) 998-9640.

General Advice and Requirements:

The following advice will be particularly helpful if this is your first Harvard Summer School course or distance course:

The standard to which students are held in this course is high. Students are assumed to be here to be challenged, to gain new knowledge, and to ratchet up your close reading, writing, and analytical skills; as such, we expect that you are prepared to put in the time and effort that will accomplish those goals.

Distance students should approach the course in the same organized fashion that they would if they were coming to class each week, at a designated time, with the readings prepared and written work ready to submit. In other words, they should set themselves a schedule and stick to it as closely as possible. Lectures should be watched without interruption by other duties or activities in a quiet setting. A haphazard approach will lead to a poor performance. Do not let

yourself fall behind in viewing the lectures or doing the readings and other assignments. “Catching up” will be a frustrating and largely fruitless exercise.

A good piece of advice we’ve heard experienced distance students give is: “Start talking with your TAs right away; introduce yourself via email or telephone, so that you feel comfortable emailing with questions or comments throughout the semester.” Even though you may not be able to attend the “live” class, remember that your TAs will be available to talk with you, answer your questions via email, and discuss any other concerns you may have. Prof. Anderson will also be available to answer your questions.

SETTING YOURSELF UP FOR THE DISTANCE COURSE:

Be sure to consult the Summer School’s distance education website, well before the course begins, to make sure that you have the technical requirements in place for successfully viewing the videos. Out-of-date computers and unreliable dial-up connections will be problematic. It’s also a good idea, if this is your first distance course, to view one of the sample videos so that you’ll know what to expect. Please see:

<https://www.summer.harvard.edu/summer-courses/course-formats/video-course-guidelines>

Please read the information carefully and the “Have a question?” link, should you experience any technical difficulties during the semester. We will not have proctored exams in this course. The exams will be completed and submitted online through the course website.

In the past, some students have failed to consult the course website and syllabus until later in the term. We strongly advise against this approach.

ATTENDANCE, SUBMISSION OF WORK:

All written work must be submitted on time. Assignments cannot be made up. Because of their format, exams also cannot be taken earlier.

Please make your work and vacation plans with all assignment due dates in mind. Problem sets, the paper, and exams cannot be given out earlier or handed in later because of conflicting work or vacation schedules. Everything is listed on the syllabus so you can plan around this schedule.

Technical failures will not suffice as an explanation for work not submitted. Work must be submitted through the course website in the time allowed. Back up your work so that if your computer crashes, you can go to an internet café or some other such place and submit your work from there. Work emailed to me or the TA is not accepted; email tends to be an unreliable means for submissions.

COURSE WEBSITE:

You are expected to consult the course website each week. Announcements, handouts, and interesting ancillary materials will be added frequently.

Lectures:

Given that much of the material in this class will be contemporary, there is no comprehensive textbook that adequately covers all topics. As a result, the main reference material will be the lecture slides themselves. Lecture slides will be available the night before on the course website to download in PDF format.

Exams:

Unless otherwise noted, all exam material will consist of topics covered in lecture. All lecture material is fair game for exams. Supplemental readings will be provided in most cases during lecture to serve as reference material.

Problem Sets:

There will be four problem sets during the term, each counting for 5% of the final course grade. These questions will also serve to help prepare students for the exams. Students are permitted to work collaboratively on the problem sets, but the answers submitted should be the student's own. Students should list the names of all collaborators with their problem set answers.

Online Resources:

The following websites will prove useful for certain lectures or serve to pique general interest:

Harvard Department of Stem Cell and Regenerative Biology

<http://www.scrb.harvard.edu>

Harvard Stem Cell Institute

<http://www.hsci.harvard.edu>

StemBook

<http://www.stembook.org>

International Society for Stem Cell Research

<http://www.isscr.org>

HHMI Holiday Lectures – “Potent Biology”

<http://www.hhmi.org/biointeractive/stemcells/lectures.html>

NIH Stem Cell Information

<http://stemcells.nih.gov>

Academic Integrity:

You are responsible for understanding Harvard Extension School policies on academic integrity (<https://www.summer.harvard.edu/resources-policies/resources-support-academic-integrity>) and how to use sources responsibly. Not knowing the rules, misunderstanding the rules, running out of time, submitting the wrong draft, or being overwhelmed with multiple demands are not acceptable excuses. There are no excuses for failure to uphold academic integrity. To support your learning about academic citation rules, please pay particular attention to the section titled “Tips for Avoiding Plagiarism”. You will also find links to the [Harvard Guide to Using Sources](#) and two free online 15-minute tutorials to test your knowledge of academic citation policy. The tutorials are anonymous open-learning tools.

All written work submitted to the course must be the student’s own. Students may discuss work with others (e.g., problem sets), but should be sure to write everything in their own words. Students also may not copy writings from textbooks, journals, or lab protocols without proper citations. Plagiarism is a very serious offense.

It is your responsibility to familiarize yourself with the Harvard Summer School Student Responsibilities website:

<http://www.summer.harvard.edu/policies/student-responsibilities>

SSP Students:

Students participating in the SSP Program should take care in enrolling in this class. It is an upper level course requiring an understanding of general biology at a minimum. Given that advanced placement courses in biology may differ from school to school, it will not be possible for the teaching staff to say with absolute certainty whether a given high school’s AP biology course will suffice.

Concepts that historically have troubled SSP students include:

- transcription
- translation
- transcription factors
- promoters
- enhancers
- recombination