

# SCRB 140: Developmental and Molecular Basis of Growth and Regeneration

Fall 2021

## Description:

This course will focus on the biology of organ growth and regeneration from a developmental perspective. We will first learn about the genetics, biochemistry, and function of basic developmental pathways that are also necessary for adult regeneration. We will then tackle questions such as: How different are the cellular and molecular mechanisms of regeneration across species? Why do some tissues regenerate and others do not? What are the barriers to regenerative therapies in the clinic? How does a regenerating animal sense that something is missing and eventually stop the regenerative process when tissues reform? What happens when these regenerative pathways are aberrantly activated? Could these same pathways contribute to cancer in the human?

**Class project:** This will involve preparing a written and oral presentation on one regeneration topic to be chosen by the student. The objective of this project is to encourage the student to apply the knowledge of what they have learned in class to connect a cellular/tissue based observation with a known human pathology. The work should focus on the biological basis of the problem, the clinical consequences of this, the current therapeutic approaches (or lack thereof) available to tackle this problem, and a potentially novel way to approach or understand this disease/disorder. We will connect the students with experts in the field in the Boston and international regeneration community to discuss the plan. Finally, the project will be presented at the end of the semester.

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Lectures: Tuesday and Thursdays 10:30am-11:45am

Website: <http://www.courses.fas.harvard.edu/73523>

## COVID-19 policy:

*We are committed to not only provide an intellectually stimulating environment that promotes your learning of the material, but also to do so with the safety of our entire community in mind. Toward that end, we have put in place policies that will support your learning should the possibility arise that you cannot attend lecture in person for a period of time, be it that you must quarantine or that you are not feeling well. We ask that you err on the side of caution in all instances. Lectures will be broadcast live should you not be able to attend in person. As per Harvard policy, everyone must be masked in the classroom at all times with no food allowed. We strongly encourage you to know the names of your classmates who sit nearby you should the need arise to provide a list of close contacts.*

Course Grading:	Midterm Exam #1	15%
	Midterm Exam #2	15%
	Class Participation	30%
	Class project	20%
	Final Exam	20%

Prerequisites: Life Sciences 1a or equivalent; Life Sciences 1b; SCRB 10; MCB 52 or permission of the instructor.

Enrollment: Limited to 12 students

<u>Lecture</u>	<u>Date</u>	<u>Topic</u>
1	9/2 (Th)	Introduction
2 gradients	9/7 (T)	Developmental pathways in action: organogenesis and morphogen
3	9/9 (Th)	Paper discussion
4	9/14 (T)	Epimorphosis and blastema formation
5	9/16 (Th)	Paper discussion
6	9/21 (T)	Axolotl Regeneration
7	9/23 (Th)	Paper discussion
8	9/28 (T)	Limb regeneration in mammals/general concepts
9	9/30 (Th)	Paper discussion
	10/5 (T)	MIDTERM I
10	10/7 (Th)	Planaria/Hematopoietic Regeneration 1

11	10/12 (T)	Paper discussion
12	10/14 (Th)	Hematopoietic regeneration 2
13	10/19 (T)	Liver regeneration
14	10/21 (Th)	Paper discussion
15	10/26 (T)	Epithelial regeneration
16	10/28 (Th)	Paper discussion
	11/2 (T)	MIDTERM EXAM #2
17	11/4 (Th)	The irreversibility of injury: fibrosis
18	11/9 (T)	Paper discussion
19	11/11 (Th)	Chalones and organ size regulation
20	11/16 (T)	Paper discussion
21	11/18 (Th)	Cancer as a developmental biology problem
22	11/23 (T)	Paper discussion
11/25 (Th)	No Class-Thanksgiving	
23	11/30 (Tu)	Presentation of class projects (I)
24	12/2 (Th)	Presentation of class projects (II)

