MCB 231 Spring 2018

This class aims to cover some important principles of developmental biology by delving in detail into selected examples of developmental events. The lecture topics follow, and during these we will highlight principles, mechanisms and examples such as Use of determinants or inductive events in ~development, generation of asymmetry, Gradients and thresholds: examples of morphogens. Signaling pathways and their regulation. Selective use of genomic information. Cellular behaviors during morphogenesis. Cell migration, cell shape changes and cell rearrangements. Developmental genetics and genetic tools. Experimental embryology, and methods. Evolutionary comparisons and what they tell us about developmental mechanisms.

Lectures	Tuesdays and Thursdays	11:00-12:30	TBD
Discussions	Fridays	12:00-1:00	TBD

INSTRUCTORS):
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There is no required text. For review or background:

Slack "Essential Developmental Biology", 2nd edition, Blackwell
Gilbert "Developmental Biology" 6th, 7th, or 8th edition, Sinauer (the 6th edition is available online at http://www.ncbi.nlm.nih.gov/books/bv.fcgi?call=bv.View..ShowTOC&rid=dbio.TOC&depth=2)
Gilbert & Raunio "Embryology: Constructing the Organism" Sinauer
Moody "Cell Lineage and Fate Determination" Academic Press
Wolpert "Principles of Development" Current Biology/Oxford

Experimental component

Starting from 2018, we will include an experimental component in MCB231 to provide students with hands-o experiences in developmental biology studies. Professor Nipam Patel and Hernan Garcia will introduce microscopy and live cell imaging techniques in developmental biology using the state-of-art equipment in the laboratories. The experimental portion will last 2-3 weeks, and the participation is voluntary. We strongly encourage students to take advantage of this exciting new addition.

Discussions

Each discussion section will consist of student presentations of 1 assigned research articles relevant to the concurrent lectures. At our first meeting, we will choose presentation dates and briefly discuss how to give a effective presentation. The discussion papers will be assigned as the course progresses and will typically be assigned at least one week prior to discussion.

You should present a critical evaluation of the paper, as in a 290 seminar (which most of you haven't taken y Although the entire class must read the paper prior to discussion, you should treat your presentation as thou we have not. As you prepare your presentation, it will probably become clear that you need to read additiona papers (for background knowledge or to clarify previous work that the paper is based on) – you are expected do this additional reading.

Your presentation should be organized as follows:
1. Background: put the paper in context.
2. Statement of the main points and claims of the paper.
3. Detailed consideration of the methods and data: usually this takes the form of going through the figures, discussing each not in general terms but pointing out salient features ("if you compare lane A and G of the figure you see that....")
4. Discussion of whether the work is convincing, how well presented it was, how clear, whether the conclusions are justified, what more you would have liked to see, how this fits with present day notions. Was the work important or overblown?

The whole presentation, including discussion, should take about 30-45 minutes so that the whole section sh take an hour, depending upon the number of papers presented. Members of the class are expected to

participate in a **lively** discussion. Powerpoint presentations are standard to present the data, but you are strongly encouraged to make use of the blackboard during the discussion.

Grading Grades will be assigned on the basis of:
Your **oral presentation**(s) **and participation** in class and discussions. Those who participate in the experimental session of the course will be given an added credit.

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A tentative schedule for MCB231 Spring 2018 (By Richard Harland, Lin He, Gian Garriga, David Weisblat, C Miller, Elcin Ulna, David Bilder, Iswar Hariharan, Nipam Patel and Hernan Garcia)

MCB231 Spring 2018 Schedule

Tu	Jan	16	RH	Principles of development, using frog as a paradigm
Th	Jan	18	LH	Principles of development, using frog as a paradigm
F	Jan	19		*Discussion:*
Tu	Jan	23	LH	Mouse Preimplantation development
Th	Jan	25	LH	Mouse Preimplantation development
F	Jan	26		*Discussion:*
Tu	Jan	30	LH	Totipotency and pluripotency
Th	Feb	1	LH	Embryonic stem cells
F	Feb	2		*Discussion:*
Tu	Feb	6	LH	Limb development
Th	Feb	8	LH	Limb development
F	Feb	9		*Discussion:*
Tu	Feb	13	LH	Lung development
Th	Feb	15	LH	Lung development
F	Feb	16		*Discussion:*
Tu	Feb	20	RH	Frog: Early developmental decisions- experimental embryology and molecular embryology
Th	Feb	22	RH	Frog: Cell behaviors in Gastrulation and Neurulation
F	Feb	23		*Discussion:*
Tu	Feb	27	RH	Neural induction and patterning
Th	Mar	1	RH	Mouse mesoderm induction: positive and negative feedback loops
F	Mar	2		*Discussion:*
Tu	Mar	6	GG	Asymmetric cell division
Th	Mar	8	GG	Asymmetric cell division
F	Mar	9		*Discussion:*
Tu	Mar	13	GG	Cell migration and axon guidance
Th	Mar	15	GG	Cell migration and axon guidance
W	Mar	16		*Discussion:*

Tu	Mar	20	DW	Leech: alternate modes of segmentation and D/V patterning
Th	Mar	22	DW	Leech: alternate modes of segmentation and D/V patterning
W	Mar	23		*Discussion:*

(Spring break Mar 26-30)

Tu	Apr	3	NP	Insect development
Th	Apr	5	NP	Hox gene and evolution
F	Apr	6	NP	*Discussion:*
Tu	Apr	10	CM	Periodic pattern formation and vertebrate epithelial appendages
Th	Apr	12	CM	Segmentation and patterning of the vertebrate head
F	Apr	13		*Discussion:*
Tu	Apr	17	DB	Epithelial Polarity (apicobasal, PCP)
Th	Apr	19	DB	Morphogenesis
F	Apr	20	DB	*Discussion:*
Tu	Apr	24	IH	Growth and size regulation
Th	Apr	26	IH	Regeneration
F	Apr	27		*Discussion:*
Tu	May	1	EU	Germ cell specification and control of meiotic entry
Th	May	3	EU	Meiotic differentiation
F	May	4	EU	*Discussion:*

Highlighted schedules have yet to be finalized with the individual instructors.