Syllabus

Dev Bio 203B Systems Developmental Biology, Spring 2019

Course code 08756

MWF -9:30-10:50 BS3 2120 (see actual dates below)

AL= Arthur Lander, OC=Olivier Cinquin, ZW=Zeba Wunderlich

April 1	Introductory lecture	AL
April 5	Differentiation	OC
April 8		OC
April 10		OC
April 17		OC
April 19	Coordination	OC
April 22		OC
April 24		OC
April 29		OC
May 1	Evolution and Development	ZW
May 3		ZW
May 6	Patterning	AL
May 8		AL
May 13		AL
May 20		AL
May 24	Growth	AL
May 29		AL
May 31		AL
June 3		AL

Topics:

Growth: Growth versus proliferation. What external cues and internal processes influence growth? What external cues and internal processes influence proliferation? Coordinating growth with proliferation. Coordinating growth within a tissue. Cell lineages and tissue-specific growth control. Environmental effects on growth. Regulation of organism size. Cell death. Cell shrinkage. Early embryonic cell cycles.

Differentiation: What are cell "states"? What characterizes them? What accounts for the stability of cell states? What external cues and internal processes determine the trajectories that cells take in "cell state-space"? How is cell phenotype controlled?

Patterning: Creating from out of formlessness. Mechanisms of symmetry-breaking. Creating complex forms from simple ones. Models of pattern formation. Control, robustness, and precision.

Coordination: What mechanisms enable cells to respond as a collective? What enables cells to behave like their neighbors? What enables collections of initially similar cells to diversify their behaviors?

Evolution: How do developmental mechanisms evolve? What are the selective pressures on development. Relationships between ontogeny and phylogeny. Conservation of gene regulatory networks.