Title: Pluripotent and Somatic Stem Cells

Instructors: Michael Verzi and Kelvin Kwan, Guest lecture from David Axelrod

Dates: 9:30 – 11:00 AM, Tuesday/Thursday February 24 – March 27.
Location: Medical Building, Room V14
No meeting during March 17-21 for spring break.

Description: Somatic and pluripotent stem cells are likely the most important source for healthy tissue regeneration and cancer. This course will engage in discussions and lectures to develop concepts and hypotheses surrounding the identity and function of stem cells. This will be accomplished using intestinal and pluripotent stem cells as model cellular systems.

Structure: Lectures will be designed to end as "cliff hangers" with challenges/questions facing the field. The assigned reading will be seminal work that answered these challenges/questions. The next class begins with discussion of the assigned reading and is followed by a lecture that culminates in introducing the next big question/challenge and assigning the paper that addresses it.

Grading will be based upon a proposal (75%) that address an unresolved problem in stem cell biology. The proposal should have 2 aims and should clearly indicate the significance that completing the proposal will have on the stem cell field and/or human health and the innovative aspects of the proposed work. The proposal should be well and factually referenced such that it is evident that it was composed in a scholarly fashion and after significant background research to put the proposal into the context of the current literature. The remaining grade (25%) will be based upon participation in class discussions.

Outcome: Students should be able to design approaches to identify and functionally characterize somatic stem cells. They should be able to develop approaches to use stem cells in regenerative medicine or as targets for cancer therapy and prevention.

Course Materials: none

Tentative Schedule:

Session	Topic	Learning Goal	Reading	Instructor
1	Introduction to Stem Cells: Somatic vs. Embryonic	Students will be able to discuss the differences between these cell types.	TBD	Verzi
2	Discovery of Intestinal Stem Cell Populations	Students will be able to develop an approach to discovering an unknown stem cell population.	TBD	Verzi
3	Stem Cells and Cellular Plasticity	Students will be able to propose mechanisms underlying cellular plasticity.	TBD	Verzi
4	Directed Differentiation of Auditory Neurons and Hair Cells from Pluripotent Stem Cells	Students will be able to propose molecular mechanisms underlying cellular plasticity.	Koehler *et al. Nature* 2013; Chen *et al. Nature* 2012	Kwan
5	Changes in Molecular Status of Differentiated Cells Derived from Pluripotent Stem Cells	Students will diagram and explain relationships between physiology of differentiated cells and stem cells.	Pauklin & Vallier *Cell* 2013	Kwan
6	Repurposing Stem Cell Concepts for Regeneration of Somatic Cells	Students will apply basic stem cell concepts towards regenerating an organ.	Vierbuchen et al. *Nature* 2010; Takahashi & Yamanaka *Cell* 2006	Kwan
7	Cancer Stem Cells	Student will propose experiments to define a stem cell	Dalerba, PNAS, 2007 Clevers, Nat Med, 2011 review	Axelrod
8	Proposal Peer Critique	Faculty will facilitate peer editing of the proposals	n/a	Verzi/Kwan