



Course Syllabus: Stem Cells and Molecular Medicine - B 390K

Division	Biological and Environmental Sciences & Engineering Division
Course Number	B 390K
Course Title	Stem Cells and Molecular Medicine
Academic Semester	Spring
Academic Year	2017/2018
Semester Start Date	01/28/2018
Semester End Date	05/24/2018
Class Schedule (Days & Time)	09:00 AM - 10:30 AM Sun Thu

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
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Teaching Assistant(s)	
Name	Email

Course Information	
Comprehensive Course Description	The advent of new technologies such as induced pluripotent stem cells and genome editing has revolutionized biomedical research. This course aims to provide a comprehensive overview of pluripotent stem cell biology, advanced techniques of cellular reprogramming, transdifferentiation and genome editing and how these technologies can be applied to model human diseases and to develop new therapeutics. The topics covered by the course include: - History of stem cells, derivation of embryonic stem cells, classification of stem cells, epigenetic control of stem cell fate - Methods of cellular reprogramming and transdifferentiation; epigenetic dynamics during reprogramming - Advances in genome editing technologies? Application of human induced pluripotent stem cells in disease modeling
Course Description from Program Guide	This course will provide a comprehensive overview of pluripotent stem cell biology, advanced techniques of cellular reprogramming, transdifferentiation and genome editing and how these technologies can be applied to disease modeling studies.
Goals and Objectives	The course aims to equip students with a solid framework of knowledge in stem cell biology and practical methods of cell-fate reprogramming and genome editing. Additional emphasis is put on teaching the students how to apply the knowledge and tools to address relevant research questions in the field of regenerative medicine.
Required Knowledge	The course is open to PhD students and master students (For master students Prerequisite is Cell biology I, B224)
Reference Texts	Essentials of Stem Cell Biology (2014) - Robert Lanza and Anthony Atala (ed) Stem Cells (2013) - Knoepfler, Paul Genome Editing Editors: Kursad Turksen (2016) – Assigned readings

Method of evaluation	5.00% - Attendance 20.00% - Scientific review article presentation 25.00% - Midterm exam 35.00% - Final exam 15.00% - Active participation
Nature of the assignments	Assigned readings and writings Oral presentation of findings of a specified paper relevant to the course topics, followed by questions and answers. Mid-term and final exams will be composed of multiple choices and open questions.
Course Policies	In accordance with the University policy and professional standards, the highest levels of academic integrity are expected in this class. The code of student conduct is strictly enforced. Attendance is mandatory. Academic dishonesty will result in reductions in grades and/or expulsions from this class and/or the University.
Additional Information	The course is open to PhD students and master students (For master students Cell biology I, B224, is a prerequisite).

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Sun 01/28/2018 Thu 02/01/2018	The mystery of Life - The Embryo / Derivation of mouse and human Embryonic Stem Cells
2	Sun 02/04/2018 Thu 02/08/2018	Reprogramming / Transdifferentiation: History and technology
3	Sun 02/11/2018 Thu 02/15/2018	Student seminars
4	Sun 02/18/2018 Thu 02/22/2018	Epigenetic contribution to pluripotency maintenance and differentiation
5	Sun 02/25/2018 Thu 03/01/2018	Epigenetic mechanisms driving cell reprogramming and transdifferentiation
6	Sun 03/04/2018 Thu 03/08/2018	Student seminars
7	Sun 03/11/2018 Thu 03/15/2018	Advances in genome editing: - Historical development of genome editing methods/genome editing with targeted nucleases (CRISPR)
8	Sun 03/18/2018 Thu 03/22/2018	Midterm Exam
9	Sun 03/25/2018 Thu 03/29/2018	Application of genome editing technologies / prospectives in human therapy and ethical concerns
10	Sun 04/01/2018 Thu 04/05/2018	Spring Break
11	Sun 04/08/2018 Thu 04/12/2018	Disease Modeling I - An iPSC-based disease-modeling project (T2DM/Neurodevelopmental disorders) Derivation of 2D/3D differentiation protocols for disease relevant lineages
12	Sun 04/15/2018 Thu 04/19/2018	Disease Modeling II: - An iPSC-based disease-modeling project (inherited blood disorders) Derivation of hematopoietic progenitors, immune cells and RBCs from hiPSC
13	Sun 04/22/2018 Thu 04/26/2018	Disease Modeling III - Identification of transcriptional and Epigenetic signatures associated to diseases Student seminar
14	Sun 04/29/2018 Thu 05/03/2018	Disease Modeling IV - Functional evaluation of hiPSC derived blood cells in vitro and in vivo Student seminar
15	Sun 05/06/2018 Thu 05/10/2018	Student seminars
16	Sun 05/13/2018 Thu 05/17/2018	Current applications of regenerative medicine approaches based on the use of patient-derived induced pluripotent stem cells.
17	Sun 05/20/2018 Thu 05/24/2018	Final exam
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Note

The instructor reserves the right to make changes to this syllabus as necessary.