



## Course Syllabus: Stem Cells and Molecular Medicine - B 320

<b>Division</b>	Biological and Environmental Sciences & Engineering Division
<b>Course Number</b>	B 320
<b>Course Title</b>	Stem Cells and Molecular Medicine
<b>Academic Semester</b>	Spring
<b>Academic Year</b>	2018/2019
<b>Semester Start Date</b>	01/27/2019
<b>Semester End Date</b>	05/23/2019
<b>Class Schedule</b> (Days & Time)	09:00 AM - 10:30 AM   Sun Thu

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Antonio Adamo	antonio.adamo@kaust.edu.sa	+966128082695	3337, 2, Ibn Al-Haytham (bldg. 2)	At the end of each class or on appointment
Mo Li	MO.LI@KAUST.EDU.SA	+966128082627 8082627	Rm-4336, 2, Ibn Al-Haytham (bldg. 2)	At the end of each class or on appointment

Teaching Assistant(s)	
Name	Email

Course Information	
<b>Comprehensive Course Description</b>	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
<b>Course Description from Program Guide</b>	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.
<b>Goals and Objectives</b>	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.
<b>Required Knowledge</b>	The course is open to PhD students and master students (For master students Prerequisite is Cell biology I, B224)
<b>Reference Texts</b>	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

<b>Method of evaluation</b>	<b>15.00%</b> - Active participation <b>35.00%</b> - Final exam <b>25.00%</b> - Midterm exam <b>20.00%</b> - Scientific review article presentation <b>5.00%</b> - Attendance
<b>Nature of the assignments</b>	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.
<b>Course Policies</b>	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.
<b>Additional Information</b>	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 01/27/2019 Thu 01/31/2019	The mystery of Life: The Embryo / Derivation of mouse and human Embryonic Stem cells
2	Sun 02/03/2019 Thu 02/07/2019	Epigenetic contribution to pluripotency maintenance and differentiation
3	Sun 02/10/2019 Thu 02/14/2019	Reprogramming/Transdifferentiation: History and technology
4	Sun 02/17/2019 Thu 02/21/2019	Practical course (Pluripotency characterization)
5	Sun 02/24/2019 Thu 02/28/2019	Advances in genome editing: Historical development of genome editing methods/genome editing with targeted nucleases (CRISPR)
6	Sun 03/03/2019 Thu 03/07/2019	Epigenetic mechanisms driving cell reprogramming and transdifferentiation
7	Sun 03/10/2019 Thu 03/14/2019	Students Seminars
8	Sun 03/17/2019 Thu 03/21/2019	Midterm Exam
9	Sun 03/24/2019 Thu 03/28/2019	Spring Break
10	Sun 03/31/2019 Thu 04/04/2019	Disease Modeling I: An iPSC-based disease-modeling project (T2DM/Neurodevelopmental disorders) Derivation of 2D/3D differentiation protocols for disease relevant lineages
11	Sun 04/07/2019 Thu 04/11/2019	Application of genome editing technologies/ prospectives in human therapy and ethical concerns
12	Sun 04/14/2019 Thu 04/18/2019	Disease Modeling II: An iPSC-based disease-modeling project (inherited blood disorders) derivation of hematopoietic progenitors, immune cells and RBCs from hiPSC
13	Sun 04/21/2019 Thu 04/25/2019	Disease Modeling III: Identification of transcriptional and Epigenetic signatures associated to diseases Student seminar
14	Sun 04/28/2019 Thu 05/02/2019	Practical course (X inactivation and FISH)
15	Sun 05/05/2019 Thu 05/09/2019	Disease Modeling IV: Functional evaluation of hiPSC derived blood cells in vitro and in vivo
16	Sun 05/12/2019 Thu 05/16/2019	Students Seminars
17	Sun 05/19/2019 Thu 05/23/2019	Final Exam Week

#### Note

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