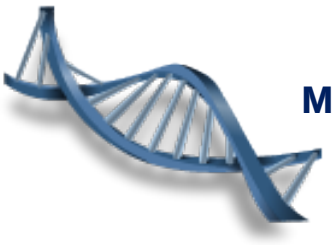


M252A-B & M262A-B

Molecular Mechanisms of Human Diseases

Course Director: Professor Yibin Wang
(yibinwang@mednet.ucla.edu)

Course Coordinator: Yesenia Rayos yrayos@lifesci.ucla.edu
Proposal Coordinator: Dr. Lynn Talton ltalton@mednet.ucla.edu
Course Assistant: Laura Benscoter: lbenscoter@mednet.ucla.edu
Course E-mail: mcipcourse@mednet.ucla.edu

Instructors

Fall Quarter (M252)
Block 1: Yang, Xiao, Vondriska
Block 2: Pyle, Yi Sun, Nakano
Block 3: Gwack, Ganz, Jewett

Winter Quarter (M262)
Block 1: O'Dell, Guo, Sun
Block 2: Ottolia, Tidball, Eghbali
Block 3: Shirihai, Walker, Steve Mittelman

Introduction

M252 and M262 is a 2-quarter introductory course for graduate students in bioscience-related disciplines. The course provides didactic lectures to cover the fundamental concepts and methodologies in modern biology, with a particular emphasis on implications and relevance to human diseases. The goal is to integrate fundamental biology with the mechanisms underlying disease development and applications in therapy.

Learning Objectives

The course emphasizes the integration of biology and medicine. The course is designed to stimulate students' interest and develop their capacity to dissect complex problems, while at the same time increasing their appreciation and understanding of translational research. Each quarter is divided into three-week topic blocks with a team of three instructors. Six topic blocks will be presented across the two quarters, including: 1) Modern Biology Approaches, 2) Stem Cell Biology, 3) Immunology, 4) Neurological Diseases, 5) Cardiovascular Diseases, and 6) Metabolic Diseases.

Lectures and Discussions

Each week will include two didactic lectures (register as **M252A** or **M262A**) led by one of the block instructors and include two discussion sessions. One weekly discussion session (register as **M252B** or **M262B**) will consist of a literature discussion of a primary research article relevant to the week's topic and will be led by one of the block instructors in small groups. The second weekly discussion session will be led by a team of postdocs working in the field. Students will develop a 2-page research proposal over the block based on the block topic, each week students will prepare a new draft of their proposal and present it in the discussion for feedback. Students may register for the lecture component only, if allowed by their graduate program, but both co-requisites are recommended.

Course Registration

This class is posted as two co-requisite courses each quarter and listed in Molecular, Cellular & Integrative Physiology (MCIP). All MCIP students are expected to register as required. Core curriculum and other students need pre-approval from Course Director: Professor Yibin Wang. yibinwang@mednet.ucla.edu.

Fall Quarter: M252A (lecture component) and M252B (discussion component)
Winter Quarter: M262A (lecture component) and M262B (discussion component)

Course Website

The login for the course website is at CCLE: https://ccle.ucla.edu/course/view/16F-MCIPM252A-1. Students will be provided login access to the course after the organizational meeting, September 12, 2016.

Each Block "Week" Consists of:

Lecture 1	Initial lecture led by the week's instructor. Meets 2:00-3:50pm, including a small break.
Lecture 2	Continuation of lecture led by the week's instructor. Meets 2:00-3:50pm, including a small break.
Literature Discussion Group	Literature Discussion led by a topic instructor in a small group. Meets 2:00-4:00pm, according to group/room assignment.
Postdoc Discussion Activity	Discussion of short proposal-writing assignment (<1 page) based on previous literature discussion. Meets 2:00-4:00pm, according to group/room assignment.

Grading Guidelines

The course grade for M252A and M262B will be based on an average of the three exam grades (delivered as a Letter, A-F). The course grade for M252B and M262B will come from participation and presentation in the M252B Discussions (delivered as a Letter, A/A-/B).

Attendance and Participation

Attendance of all lectures and discussion is required. For health or other reasons leading to absence, students need to notify Dr. Yibin Wang for approval and record.

Students are encouraged to ACTIVELY participate in the discussion sessions by raising their own questions and providing opinions. Additionally, all students are expected to present to the group on any parts of the assigned paper in their discussion sessions.

Exams

There will be 3 exams per quarter, each covering the topics of the preceding 3 week block. Exams will be administered by take home exams via a self-administered honor system. Following the last week of each block, the exam will be released on-line (CCLE) on **Monday before 8:00am** for students to download. Exams will be open book (text and paper notes only), **but no internet access or mobile devices will be allowed**. Exam questions may include short essays and multiple-choice and will draw from lectures, assigned reading, and the textbook. (Optional reading materials may help understanding, but will not be directly tested.) Exam time is limited to **3 hours**. The completed exam (hardcopy print out) must be turned in at the Tuesday lecture. The answer sheet should indicate the beginning and ending time of your self-administered exam, which will be worth 100 points.

Reading Prerequisite

Before the course starts, students are expected to have a strong working understanding of cellular and molecular biology at the level of the following text book, Molecular Cell Biology, Sixth Edition (2008, Lodish et al). Students should develop a solid understanding of the contents of this book and refer back to relevant sections throughout the course. Coursework and exams may draw from this text, even if not explicitly mentioned during lectures/discussions.

Molecular Cell Biology, Eighth Edition (2016, Lodish et al)
ISBN-13: 978-1464183393
ISBN-10: 1464183392
Available to purchase at: UCLA Health Sciences Store, Online retailers (B&N, Amazon, etc.), as an e-book: http://ebooks.bfwpub.com/lodish6e, online resources for this book are available at: http://bcs.whfreeman.com/lodish6e/.

Reading Assignments

1-2 primary research articles will be assigned as required reading to accompany each lecture. These articles may be referenced in exams. A single or pair of primary research articles will also be assigned reading for discussion in the literature discussion small groups each week.

All students must read all sections of the assigned paper, including background, methods, data, discussion and supplemental information. Additional readings and background studies related to the didactic course content would be extremely important to fully benefit from the discussion sessions.

Access to Course Material

Whenever provided by the instructor (usually at least one week before the lecture date), the lecture notes and assigned papers will be available for down from the course CCLE website.

Course Evaluation

At the end of each block, students are requested to fill-in an Q/A evaluation sheet for the course content and the instructor. All students are highly encouraged to participate and submit your evaluation along with your exam.

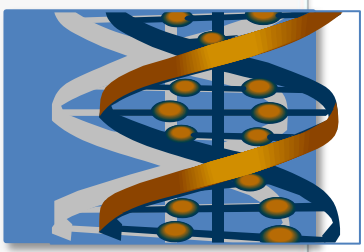
Accommodations

Students needing academic accommodations based on a disability should contact the Center for Accessible Education (CAE) at (310) 825-1501 or in person at Murphy Hall A255. When possible, students should contact the CAE within the first two weeks of the term as reasonable notice is needed to coordinate accommodations. For more information visit www.cae.ucla.edu.

Fall Quarter Topic Blocks

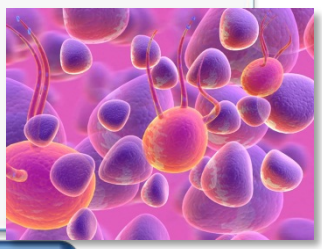
BLOCK 1 - Modern Biology Approaches

- **Functional Genomics**
- Transcript Profiling and Application to Disease
- High-throughput Biological Screens, siRNA pharmacogenomics & Functional Screens
- Synthetic Biology and Biosystems
- **Bioinformatics**
- High-Throughput Sequencing and Applications
- Bioinformatic Analysis of High-Throughput Sequencing Data
- **Proteomics and Systems Biology**
- Systems Biology vs. Classical Physiology
- Role of Proteomics
- Concepts, Tools and Challenges of Proteomics



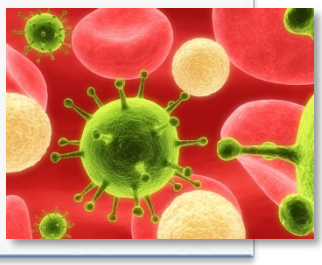
BLOCK 2 - Stem Cell Biology

- **Introduction to basic concepts of stem cell**
- Developmental Basis of Stem Cells
- Stem Cell in Tissue Regeneration and Repair
- **Stem Cell Biology- Varieties and Pathophysiology**
- Transcriptional Network for Stemness
- Signaling Pathways in Stemness Regulation
- Differentiation and Reprogramming
- **Lost and Found in Translation**
- iPS cells: Mechanism and Applications
- Stem Cell Therapy



BLOCK 3 - Inflammation and Immunity

- **Signalling pathways in the immune system**
- Signalling Pathways in innate and adaptive immune cells
- Human Diseases due to defects in innate and adaptive immunity
- **Mucosal and tumor immunity**
- Adaptive immune response
- Development and functions of T and B cells
- Mucosal and tumor immunity
- **Innate immune system and inflammation**
- Overview of the immune system
- Inflammatory response focused on innate immunity
- Antigen presentation



Winter Quarter Topic Blocks

BLOCK 4 - Neural Diseases & Systems

- **Neural System Physiology and Function -**
  - Neurophysiology and Excitatory Synaptic Transmission
  - Synaptic Plasticity
- **Molecular Genetics of Neural Diseases -**
  - Neural degenerative diseases
  - Neural regeneration and repair
  - Neural stem cells and iPSC biology
- **Sensory Biology in Health and Diseases-**
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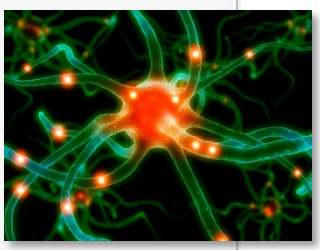
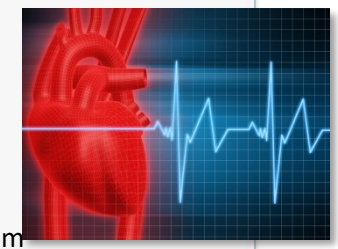


BLOCK 5 - Cardiac and skeletal Muscle Diseases

- **Muscle from Cell to System -**
  - Basic Concepts in Cell Membrane Biology: Action Potential
  - Muscle Physiology: EC coupling and regulation in heath and diseases
- **Regulatory Mechanisms -**
  - Adrenergic Signaling in Cardiovascular Regulation
  - Mechanisms of Gene Regulation: miRNA and non-coding RNAs
- **Heart Failure and muscular dystrophy -**
  - Cardiovascular Physiology and Pathophysiology of Cardiovascular System
  - Heart Failure: Mechanisms,Treatment, Future Prospects



BLOCK 6 - Metabolic Diseases

- **Mechanisms of Diabetes -**
  - Regulation of Insulin Secretion and Insulin Action
  - Prevention and Treatment of Type 2 Diabetes
- **Metabolism and Animal Aging -**
  - Biological Mechanisms of Aging
  - Nutritional Modulation of Aging
- **Fundamentals of Metabolism -**
  - Mitochondrial Dynamics in Metabolic Regulation
  - Lipid Metabolism, Nucleotide Metabolism, and Disease