Advanced Molecular, Cellular, and Synthetic Biology
MMED 6016

FALL 2018

CLASS DAYS and TIME: Mondays and Wednesdays, Dates TBD, 9:00 AM – 11:00 AM

CLASSROOM: TBD

COURSE FACULTY: Course Director: Chun-Liang Chen, Ph.D.

OFFICE LOCATION and HOURS: STRF 233.3 – 10:00 AM – 4:00 PM (By Appointment)

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READ THIS DOCUMENT CAREFULLY - YOU ARE RESPONSIBLE FOR ITS CONTENTS.

COURSE DESCRIPTION AND OBJECTIVES

Advanced Molecular, Cellular, and Synthetic Biology, (MMED 6016), Fall Semester Only- This foundational course is a study of the organization and function of the genome at the molecular level. The topics include: gene structure, transcriptional control, RNA structure and processing, translation, genome replication and repair, the regulation of cell division, signal transduction, hormone regulation, epigenetic regulation, the molecular biology of tumors, and the regulation of proteins. Also included will be the use of CRISPR-Cas and other synthetic biological methods used in research and clinical applications (*Science* 2015 349; 1564). This is an advanced course intended to introduce the student to the important molecules involved in the life processes of the cell. Their structure, function, localization, and interactions will be the focus of study. The students will also be introduced to the implications that these molecular events have in human health and disease and how research of these molecular events can form the foundation of personalized molecular medicine approaches.

Pre-requisites – None

Semester credit hours – 4.0

By the end of this course, each student should be able to:

- Explain the principles of gene structure, transcriptional control, RNA structure and processing, translation, genome replication and repair, the regulation of cell division, signal transduction, hormone regulation, epigenetic regulation, the molecular biology of tumors, and the regulation of proteins.
- Compare the use of CRISPR-Cas and other synthetic biological methods used in research and clinical applications.
- Explain the organization and function of the genome at the molecular level and how important regulatory molecules are involved in the life processes of the cell.
- Explain how the molecular pathways discussed can be used in personalized molecular medicine approaches.

COURSE ORGANIZATION

The main teaching modalities used in this course include:

1) Didactic lectures on specific topics with the purpose of conveying important concepts.

2) Team based learning with students researching topics, reading the scientific literature, and leading discussions on

molecular pathways.

Materials – Laptop for viewing the lecture notes and for reading scientific papers.

Reading Assignments – Course materials will be distributed to students via e-mail prior to class periods.

ATTENDANCE

Attendance and participation are mandatory. One large component of the grading is class participation so if a student misses a class due to sickness, the student needs to inform the instructors and course directors as soon as possible since this may result in an incomplete for the student. Any scheduled absences must be approved by the course director prior to the absence.

TEXTBOOKS

No required textbooks.

GRADING POLICIES AND EXAMINATION PROCEDURES

Grades will be based on attendance, class participation, and 2-3 closed book examinations. Exam questions will be in the form of short answer and/or essay questions. Each faculty lecturer will be asked to provide 1-2 questions with all questions totaling 100 points. The final grade will be based on the score of the examinations as well as on class participation and attendance.

Grading System

A = 90-100% B = 80-89% C = 70-79% F = < 69%

REQUESTS FOR ACCOMODATIONS FOR DISABILITIES

In accordance with policy 4.2.3, **Request for Accommodation Under the ADA and the ADA Amendments Act of 2008 (ADAAA)**, any student requesting accommodation must submit the appropriate request for accommodation under the American with Disabilities Act (ADA, form 100). to his/her appropriate Associate Dean of their School and a copy to the ADA Coordinator. Additional information may be obtained at http://uthscsa.edu/eeo/request.asp.

ACADEMIC INTEGRITY AND PROFESSIONALISM

Any student who commits an act of academic dishonesty is subject to discipline as prescribed by the UT System Rules and Regulations of the Board of Regents. Academic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an exam for another person, signing attendance sheets for another student, and any act designed to give unfair advantage to a student or the attempt to commit such an act. Additional information may be obtained at http://catalog.uthscsa.edu/generalinformation/generalacademicpolicies/academicdishonestypolicy/

TITLE IX AT UTHSCSA

Title IX Defined:
Title of the Education Amendments of 1972 is a federal law that prohibits sex discrimination in education. It reads "no person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance."

University of Texas Health Science Center San Antonio's Commitment:

University of Texas Health Science Center San Antonio (UTHSCSA) is committed to maintaining a learning environment that is free from discriminatory conduct based on gender. As required by Title IX, UTHSCSA does not discriminate on the basis of sex in its education programs and activities, and it encourages any student, faculty, or staff member who thinks that he or she has been subjected to sex discrimination, sexual harassment (including sexual violence) or sexual misconduct to immediately report the incident to the Title IX Director.

In an emergency, victims of sexual abuse should call 911. For non-emergencies, they may contact UPD at 210-567-2800. Additional information may be obtained at http://students.uthscsa.edu/titleix/

EMAIL POLICY

Course information and instructions will be e-mailed to students. Additionally, students should communicate with the course director via e-mail.

USE OF RECORDING DEVICES

Recording devices during the lectures are allowed with the permission of each instructor.

ELECTRONIC DEVICES

Electronic devices such as cell phones, computers, tablets, etc. are permitted in class, but we ask that you silence your cell phones during class.

Fall 2018 Schedule (Specific dates to be determined)

DATE	TOPIC	INSTRUCTOR	LOCATION
Yeast Genetics & Molecular Biology			
August	Yeast I	Hai Rao	
August	Yeast Genetics II & Molecular Biology	Hai Rao	
Mammalian Cell Nucleus, Chromatin Structure & Transcription			
August	Nucleus & Chromatin I	Dave Sharp	
August	Chromatin II, Nucleolus & Transcription I	Dave Sharp	
August	RNA Processing	Dave Sharp	
September	Transcription II	Tom Boyer	
September	Transcription III	Tom Boyer	
September	Transcription IV	Tom Boyer	
September	Transcription V	Tom Boyer	
DNA Replication and Repair			
September	Enzymology of DNA Replication	Renee Yew	
September	DNA Repair I (MMR,BER,NER&Cancer)	Paul Hasty	
September	DNA Repair II	Sang Eun Lee	
DNA Recombination			
September	DNA Recombination I	Sang Eun Lee	
September	DNA Recombination II	Sang Eun Lee	
September	Review Session for Exam #1	TA's	
September	EXAM #1		TBD

DATE	TOPIC	INSTRUCTOR	LOCATION

Development & Evolution

October	Mammalian Development & Evolution	Paul Hasty	

Proteins: Synthesis, Processing, Targeting and Degradation

October			
October	Protein Synthesis	Maria Gaczynska	
October	Protein Processing I	Maria Gaczynska	
October	Protein Processing II	Maria Gaczynska	
October	Protein Targeting	Maria Gaczynska	
October	Ubiquitin & Ub-Dependent Proteolysis	Hai Rao	
October	Controlled Proteolysis & Protein Degradation	Maria Gaczynska	

Cell Cycle and Checkpoint Control

October	Cell Division Cycle I	Renee Yew	
October	Cell Division Cycle II	Renee Yew	
October	Cell Division Cycle III	Renee yew	
October	Cell Division Cycle IV	Renee Yew	
October	DNA Damage Response	Sang Eun Lee	
October	Review Session for Exam #2	TA's	TBD

October	EXAM #2		TBD

DATE	TOPIC	INSTRUCTOR	LOCATION

Signal Transduction

October	Signal Transduction I: General		
November	Signal Transduction II: G-Proteins		
November	Signal TransductionIII:Nuclear Receptors	Bandana Chatterjee	
November	Signal TransductionIV:Nuclear Receptors	Bandana Chatterjee	
November	Signal Transduction V: Nuclear Receptors	Bandana Chatterjee	
November	Signal Transduction VI:Ca2+Signaling	Jim Lechleiter	

Cancer Genetics & Biology

November	Cancer Biology I: Oncogenes	Yanfen Hu	
November	Cancer Biology II: Tumor Suppressors	Rong Li	
November	Cancer Biology III: Mouse Models	Paul Hasty	
November	Cancer & Metabolism	Rong Li	

November	NO CLASS - HOLIDAY

November	Stem Cells & Cancer Stem Cells	Rong Li	
November	Telomerase: Aging & Cancer	Yanfen Hu	

Molecular Immunology, Cell Senescence & Cell Death

November	Molecular Immunology	Maria Gaczynska	
December	Cell Senescence	Renee Yew	
December	Apoptosis & Autophagy		

December	Review Session for Exam #3	TA's	

December	EXAM #3		TBD