

CB 8010

Molecular Cell Biology

Fall Semester, 2004

Drs. Jacek Gaertig and Kojo Mensa-Wilmot, Co-course Directors

Class Time: Tu/Th 3:30-5:00 pmClassroom: 216 Biological Sciences Building

This course is designed to offer a survey of current knowledge in cell biology. Experimental approaches that are commonly employed to acquire information will be emphasized. The goal is to introduce beginning graduate students to the theory and practice of molecular cell biology in order to provide a foundation for independent research in diverse aspects of cell structure and function.

Instructors: The course will be taught by the following faculty members from Cellular Biology:

Dr. Haini N. Cai
Dr. Marcus Fechheimer
Dr. Jacek Gaertig
Dr. Edward Kipreos
Dr. Kojo Mensa-Wilmot

Textbook: Lodish, et al. Molecular Cell Biology, Fifth Edition, W.H. Freeman publishers

Syllabus: A schedule of lectures and lecturers is attached.

Problem Sets:

Each lecturer will assign a take home problem set designed to enhance your thinking and understanding of course material. These could involve computer analysis, calculations, interpretation of original data, scientific writing, etc.

A schedule for handing out of and return dates for the problem sets is provided below.

<i>Instructor</i>	<i>Given out</i>	<i>Due date</i>
Fechheimer	August 24	Sept. 7
Gaertig	Sept. 14	Sept. 23
Cai	Oct. 5	Oct. 19
Kipreos	Oct. 26	Nov. 11
Mensa-Wilmot	Nov. 18	Dec. 7

Grading:

Problem Sets.	40 points	8 points for each of 5 problem sets, one from each instructor
Mid-Term Quiz.	24 points	Fechheimer and Gaertig 12 points each.
Final Quiz	36 points	Cai, Kipreos, and Mensa-Wilmot 12 points each

<u>DATE</u>	<u>DAY</u>	<u>SUBJECT</u>	<u>INSTRUCTOR</u>	<u>APPROACHES</u>
Aug. 19	Thur	<i>Intro to Course</i> /Protein structure and Binding; Membrane structure/transport /permeability/potentials	Fechheimer	Scatchard Plots Fluorescence Microscopy/FRAP
Aug. 24	Tue	pumps/ channels/ carriers	Fechheimer	Patch Clamp
Aug. 26	Thur	Signalling - G proteins	Fechheimer	Structure/Function by Chimerics, and Point Mutants
Aug. 31	Tue	Signalling – Receptor Tyrosine Kinases	Fechheimer	Protein Explorer Chime/RAS MOL
Sept. 2	Thur	Signalling - Phosphoinositides	Fechheimer	<i>In Vivo</i> Calcium Measurement
Sept. 7	Tue	Actin filaments	Gaertig	Electron Microscopy
Sept. 9	Thur	Actin-dependent motors: Myosins	Gaertig	Immunoelectron microscopy
Sept. 14	Tue	Microtubules and Intermediate filaments	Gaertig	Filament polymerization <i>in vitro</i>
Sept. 16	Thurs	Microtubule-dependent motors	Gaertig	<i>In vitro</i> motor motility assays
Sept. 21	Tue	Nuclear structure and nucleocytoplasmic transport	Gaertig	Permeabilized cell models
Sept. 23	Thurs	Mitochondria: Biogenesis, and Function	Gaertig	3D reconstruction
Sept. 28	Tue	Gene regulation: Basal transcription machinery	Cai	Protein-DNA interactions: Footprinting, mobility shifts
Sept. 30	Thurs	MID-TERM	Fechheimer/ Gaertig	
Oct. 5	Tue	Gene regulation: regulated transcription and enhancer function	Cai	Mutational analysis; linker scanning
Oct. 7	Thur	Gene regulation and Development:	Cai	Reporter expression Transgenics
Oct. 12	Tue	Genome organization, Chromosome structure	Cai	In situ hybridization FISH
Oct. 14	Thurs	Chromatin modifications and gene expression	Cai	CHIP
Oct. 19	Tue	Post-transcriptional Regulation of Gene Expression	Cai	RNA processing assays
Oct. 21	Thur	Cell cycle overview/Entry into mitosis	Kipreos	Yeast genetic screens
Oct. 26	Tue	Regulation of Mitosis	Kipreos	<i>Xenopus</i> cytoplasmic extracts
Oct. 28	Thur	FALL BREAK		
Nov. 2	Tue	Transition from G1 to S phase	Kipreos	Coimmunoprecipitation and homologous recombination
Nov. 4	Thur	DNA Replication	Kipreos	<i>In vitro</i> DNA replication
Nov. 9	Tue	DNA Replication	Kipreos	Cell fusion; Chromosomal DNA replication

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Nov. 11	Thurs	Apoptosis	Kipreos	Genetic epistasis analysis
Nov. 16	Tue	Endoplasmic reticulum structure: Lipid synthesis	Mensa-Wilmot	Organelle purification
Nov. 18	Thurs	Signal Peptide Hypothesis; ER Protein Translocation	Mensa-Wilmot	Microsomal protein import
Nov. 23	Tue	Principles of Vesicle Transport	Mensa-Wilmot	Reconstitution of Vesicle Transport <i>in vitro</i>
Nov. 25	Thurs	THANKSGIVING	-	-
Nov. 30	Tue	Golgi: Structure and Biogenesis	Mensa-Wilmot	Glycosylation analysis <i>in vivo</i>
Dec. 2	Thurs	Membrane proteins: Lipid Modifications of Proteins	Mensa-Wilmot	Assessment of protein-lipid interactions
Dec. 7	Tue	NO CLASS: Univ. on MWF schedule	-	-
Dec. 9	Thurs	Endocytic Pathway	Mensa-Wilmot	Analysis of endosomes and lysosomes
Dec. 16	Thurs	FINAL EXAM	Cai / Kipreos/ Mensa-Wilmot	