BMB 829

Fall 2017

Tuesdays and Thursdays, 9:10 AM-10:00AM

Room 111 Biochemistry

Course coordinator: Honggao Yan, yanh@msu.edu

Instructors:

Kevin Childs	1130E MPS Bldg	884-6926	kchilds@msu.edu
Melinda Frame	B7 CIPS Bldg	432-2327	framem@msu.edu
R. Michael Garavito	513A Biochemistry	355-9724	garavito@msu.edu
A. Daniel Jones	215A Biochemistry	432-7126	jonesar4@msu.edu
Louis King	5112 BPS Bldg	355-1536	kingl@msu.edu
Honggao Yan	313A Biochemistry	353-5282	yanh@msu.edu

Texts: No text; material provided by instructors

Exams:

Midterm: Tuesday, October 24th, 7-9 p.m., Rm 111 BMB (Note: exam at night). No lecture this day.

The Midterm Exam will cover materials provided by the first three lecturers. The final exam will cover materials by the remaining three lecturers only.

Final: Thursday December 14th, 10:00 a.m. – 12:00 p.m., Room 111 BMB

Absence from examination: Absence from any examination will be on the basis of a written statement from a physician stating that the student was unable to attend the exam to be presented to Dr. Yan. Other matters can be taken up with Dr. Yan but must constitute serious problems.

Problem Set:

Each instructor during or upon completion of his or her lecture series will provide a take home problem set. It is expected that each student will work INDEPENDENTLY on the problem set, unless otherwise instructed. Details of each problem set will be announced by the corresponding instructor.

Grading:

Each lecture counts 10 points, 7 of which from exam and 3 from problem set. The total of points is 280, 196 of which from two exams and 84 from six problem sets (1 Problem set from each instructor). Course grades will be curved.

Office Hours: Appointments can be arranged with individual faculty.

Course Objectives:

The course seeks to introduce students to modern molecular and structural/analytical techniques, including next-generation sequencing and gene expression analysis, mass spectrometry, flow cytometry, confocal microscopy, NMR, isothermal titration calorimetry, surface plasmon resonance, and x-ray crystallography. It provides methodological information that goes beyond the textbook basics on molecular biology, optical imaging and protein structure and interaction.

Course materials and announcements can be accessed using the MSU D2L system. Students are expected to monitor this site for assignments and other important information.

BMB 829 Lecture Schedule: Fall 2017

Thr. 8/31	Jones	Mass Spectrometry: Ionization methods and metabolite identification
Tue. 9/5	Jones	Mass Spectrometry: Quantitative metabolite analysis using GC/MS and LC/MS
Thr. 9/7	Jones	Mass Spectrometry: Stable isotope tracers and their application for pathway elucidation and flux analysis
Tue. 9/12	Jones	Mass Spectrometry: Identification of proteins and peptides
Thr. 9/14	Jones	Mass Spectrometry: Characterization of post-translational modifications of proteins
Tue. 9/19	Jones	Mass Spectrometry: Techniques for probing tertiary and quaternary structure of proteins
Thr. 9/21	Childs	DNA sequencing, genotyping, and gene expression analysis
Tue. 9/26	Childs	DNA sequencing, genotyping, and gene expression analysis
Thr. 9/28	Childs	DNA sequencing, genotyping, and gene expression analysis
Tue. 10/3	King	Introduction to flow cytometry and what it does
Thr. 10/5	King	The flow cytometer
Tue.10/10	King	Simple phenotyping – protocol and data analysis
Thr. 10/12	King	Review of data analysis
Tue. 10/17	Frame	Confocal microscopy: Optics, fusion proteins, diffusion
Thr. 10/19	Frame	Confocal microscopy: FRET, Spectral Imaging; Laser Capture Microscopy
Tue. 10/24		*Evening midterm – no class. Covers through October 12 Lecture.*
Thr. 10/26	Yan	Cloning and recombinant protein production
Tue. 10/31	Yan	Protein purification
Thr. 11/2	Yan	Principles of NMR: Basics and observables
Tue. 11/7	Yan	Principles of NMR: Biomolecular experimentation
Thr. 11/9	Yan	Applications of NMR: Structure and interactions
Tue. 11/14	Yan	Applications of NMR: Dynamics and catalysis
Thr. 11/16	Yan	Macromolecular binding. Thermodynamic and kinetic parameters
Tue. 11/21	Yan	ITC and SPR analysis of binding
Thursday November 23: Thanksgiving Day, no class		
Tue. 11/28	Garavito	The biology and physics of crystallization
Thr. 11/30	Garavito	The physics of electron microscopy and X-ray diffraction
Tue. 12/5	Garavito	The process of X-ray structure determination
Thr. 12/7	Garavito	Structural analysis and interpretation: Practices and controversies

Final: Thursday December 14th, 10:00 a.m. – 12:00 p.m., Room 111 Biochemistry.