Biochemistry & Molecular Biology Graduate Program
Molecular Biophysics II
HBCG 6334, 3 Credit Hours
Term: January 5 – April 24, 2014

Class Times: Monday and Wednesday, either 11am-12:30pm

Location: BSB 108E

Textbook: References provided by each lecturer depending on the topic

Course Director: Stan Watowich, PhD, Associate Professor, BMB, watowich@xry.utmb.edu, (7-4749)

Summary: This course will provide an in-depth introduction to principles, methods, and approaches employed in the study of the structure and function of biological macromolecules. Topics include NMR, X-ray diffraction, and electron microscopy methods.

Grades: Grades will be calculated based on the performance of the following:
10% grade from Dr. Sherman, 45% grade from Dr. Rajarathnam, and 45% grade from Dr. Watowich.
Grades will be based on exam, paper discussion, and in-class presentation.

The grading may be subject to change at the discretion of the co-directors, but final course grades will be determined using the GSBS grading scale:

- 90-100 = A
- 80-89 = B
- 70-79  = C
- 69 or below = F

***Student end of course evaluations are required for all A/B/C/F-graded GSBS courses. Students are required to fill out the evaluations to receive a grade in the course. If the specified evaluation form is not received, an “I” Incomplete grade will be reported to the Office of Enrollment Services. If the course requirements are not completed within 30 days, the grade automatically converts to an “F” Failure grade. The evaluations are anonymous and will be available to course directors only after grades are assigned.

Examinations/Evaluations:
An exam or in-class presentation will be given at the end of each major lecture topic (NMR, X-ray). Any appeals for grading changes must be submitted to the lecturers responsible for the writing and grading of the questions within 1 week after the return of the graded examination to the student. The lecturers must report changes in grades to BMB Graduate Program Office.

Excused Absences:
Since the course is highly interactive, attendance and participation are required. Students can be excused from graded assignments without penalty to their grade if an excused letter is obtained from the Director of BMB Graduate Program or Dr. Andres Oberhauser, Director of MBET Educational Track, in advance. If absences are excused, appropriate make-up work will be provided for students at the discretion of the co-directors.

Important Dates:
No GSBS classes
- Monday, January 19 Martin Luther King Day
- Monday, February 16 President’s Day
**Lecturer:** Stan Watowich, PhD, Associate Professor, BMB, 6.634 BSB, watowich@xray.utmb.edu, (409) 747-4749

Jan 7  Electron Microscopy: overview

**Lecturer:** Michael Sherman, PhD, Assistant Professor, BMB, mbsherma@utmb.edu

Jan 12  Electron Microscopy: imaging
Jan 14  Electron Microscopy: reconstructions, modeling
Jan 19  Electron Microscopy: FT, power spectrum, icosahedral reconstructions,

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Jan 21  X-ray diffraction: Introduction to X-ray diffraction
Jan 26  X-ray diffraction: Waves, interference, reciprocal space, geometry, reflections
Jan 28  X-ray diffraction: Reflections continued
Feb 2   X-ray Diffraction: Crystallization of proteins.
Feb 4   X-ray Diffraction: X-ray sources, synchrotron radiation, neutron diffraction, low angle scattering experiments
Feb 9   X-ray diffraction: phase problem, Patterson function, heavy atom replacement, molecular replacement
Feb 11  Student paper presentations (15-20 minutes each)
Feb 16  X-ray diffraction: Map calculation, structure refinement
Feb 18  What’s X-ray crystallography good for? Structure-based drug discovery and design
Feb 23  Advanced X-ray crystallography
Feb 25  BioSAXS – Dr. Marc Morais
Mar 2   Student paper presentations (15-20 minutes each)

**Lecturer:** Krishna Rajarathnam, PhD, Professor, BMB, krrajara@utmb.edu

Mar 4   NMR Spectroscopy: Introduction to NMR
Mar 9   NMR Spectroscopy: Chemical shifts,
Mar 11  NMR Spectroscopy: Introduction to 2D NMR
Mar 16  NMR Spectroscopy: Structure determination - secondary structure.
Mar 18  NMR Spectroscopy: Structure determination - tertiary structure
Mar 23  NMR demo at the dockside
Mar 25  NMR Spectroscopy: NOESY and dipolar interactions
Mar 30  NMR Spectroscopy: Product Operator Formalism.
Apr 1   NMR Spectroscopy: Coherence selection and water suppression.
Apr 6   NMR Spectroscopy: HSQC and NOESY
Apr 8   NMR Spectroscopy: Relaxation Measurements.
Apr 13  NMR Spectroscopy: Backbone dynamics
Apr 15  Take home exam
Apr 20  Take home exam