Practical X-ray Crystallography, BIOS535

Spring 2010, second half of the spring semester, starting March 9
Tues and Thursdays, 1-4 pm, Keck 308
Instructor: Yizhi Jane Tao; Office: Keck 326; ytao@rice.edu, x4910

Schedule

March 9 Lecture: Introduction – what is X-ray crystallography; crystallization
Lab: None

March 11 Lecture: Crystal symmetry
Lab: Crystallization of chicken egg white (CEW) lysozyme

March 16 Lecture: X-ray and radiation safety
Lab: Preliminary crystal analysis; High throughput crystallization (demo of the Hydra II Plus-One robot)

March 18 Lecture: Bragg’s law and Miller indices
Lab: Mounting crystals for data collection

March 23 Lecture: Ewald sphere and data collection
Lab: Data collection using the Rigaku RAXIS-IV++ diffraction system

March 25 Lecture: Intensity and systematic absences
Lab: Evaluating quality of raw data and indexing - indexing using the program HKL

March 30 Lecture: Patterson synthesis and Patterson map
Lab: Data reduction and space group determination – scaling using the program HKL

April 1 NO CLASS – Spring Recess

April 6 Lecture: MIR
Lab: Diffraction intensity analysis, the use of program CCP4i:TRUNCATE

April 8 Lecture: MR
Lab: Molecular replacement, the use of program CCP4i:AMORE

April 13 Lecture: MAD
Lab: Electron density maps and model building, the use of program O

April 15 Lecture: Refinement
Lab: Refinement of atomic structures, the use of program CNS

April 20 Lecture: Stereochemistry
Lab: Stereochemistry and model assessment, the use of program PROCHECK

April 22 Lecture: Literature analysis
Lab: Making graphical representations of atomic structures, the use of program Pymol

Assignments and Grading

This is a graduate level laboratory course and is intended to convey practical application of crystallographic methods and use of equipment and software. Very class will be started with a 30-min lecture to cover theoretical background that is necessary for understanding of various labs. Attendance and participation will count 70% in the grading of this course. Class
participation in the form of questions and comments is encouraged. There will not be an exam. In addition to the instructor's evaluation of your attendance and participation, the grade will be based on the problem sets (10%) and the results of the computational labs (20%). Students are encouraged to work together on the problem sets. The problem sets will be evaluated as either Satisfactory or Unsatisfactory.

**Students with Disabilities**

Any student needing academic adjustments or accommodations for this class due to a disability is encouraged to contact Dr. Tao as soon as possible during the first 2 weeks of the semester. Additionally, students should contact the Coordinator for Disabled Student Services in the Ley Student Center. All discussions regarding student disabilities will be kept strictly confidential.