MACROMOLECULAR CRYSTALLOGRAPHY: METHODS AND APPLICATIONS

Co-Directors
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Time and Place
Lectures will be on Tuesdays and Thursdays 10:30 A.M. - 12:00 P.M.

Sep. 1 – Oct. 15 and Nov. 5 – Dec. 8 in 253 BRB
(No class on Oct. 8 for fall term break, Nov 12 for BMB Retreat and Nov. 26 for Thanksgiving)

Oct. 20 – Nov. 3 in the Wistar, Room 330.

Required Text
Biomolecular Crystallography: Principles, Practice, and Application to Structural Biology,
Bernhard Rupp, Garland Science

Course Outline
The Course will be broken up into three parts:
(1) Principles of X-ray crystallography
(2) Workshop on Macromolecular Structure Determination
(3) Student presentations

Grading will be based on the following: There will be problem sets (10%) and a mid-term exam covering part 1 (30%), and a final exam covering parts 2 and 3 (30%). For part 3 of the course, students will also be required to make a 20-30 minute presentation on a manuscript describing a macromolecular structure of their choice (30%).
Tentative Schedule

Sep. 1, 3, 8, 10, 15, 17, 22, 24, 29; Oct. 1, 6, 13, 15 (Midterm Exam)
Lecturer: Ronen Marmorstein, 253 BRB

(1) Principles of X-ray crystallography. Topics will include:
   (i) Why Use X-Rays in Structural Biology?
   (ii) X-Ray Diffraction.
   (iii) Preparation of Crystals.
   (iv) Crystal symmetry, and space groups.
   (v) Data collection.
   (vi) The structure factor and fourier synthesis.
   (vii) The phase problem (Multiple Isomorphous Replacement, Molecular Replacement, Anamolous Dispersion, Multiple Anomalous Dispersion)
   (viii) Electron density maps.
   (ix) Electron density modification
   (x) Crystallographic refinement and analysis.

Oct. 20, 22, 27, 29; Nov. 3
Lecturer: Emmanuel Skordalakes, Wistar Room 330

(2) Workshop on Macromolecular Structure Determination:
   Oct. 20: Crystallization
   Oct. 22: Data Collection & Processing
   Oct. 27: Phase Determination
   Oct. 29: Model Building & Refinement
   Nov. 3: Structure Analysis

Nov. 5, 10, 17, 19, 24; Dec. 1, 3, 8
Coordinator: Emmanuel Skordalakes, 253 BRB

(3) Student Presentations:

Students will present a 30 min lecture on a manuscript describing a macromolecular structure of their choice. There will be 1 to 3 presentations per day depending on the number of students enrolled.