

SEMESTER II
LSM4231 STRUCTURAL BIOLOGY

Prerequisite: LSM2103

Workload: 28 lecture hours + 8 practical hours + 14 tutorial hours

This module provides an overall view on the structure determination of protein molecules, protein complexes, and viral assemblies, and molecular architectures in cell. Topics will include the theory and practice of the three major methods – cryo-X-ray crystallography, electron microscopy (cryo-EM), and nuclear magnetic resonance (NMR).

S/N	Topics	Lecture hours
1.	X-ray crystallography Protein crystallization Crystal symmetry X-ray diffraction Data collection Structure determination	8 J. Sivaraman 4 Adam Yuan
2.	Three-dimensional electron microscopy and its applications in biology Introductions to cryo-EM Single particles analysis & electron crystallography Electron tomography & application Sample preparation and application	8 Sheemei Lok
3.	Nuclear magnetic resonance spectroscopy Basic NMR theory Basic NMR experiments NMR resonance assignment and protein structure determination NMR sample preparation and application of NMR to dynamics and metabonomics	8 Daiwen Yang
Total Lectures: 28h		
Practicals and Tutorials: 22h		
Total hours:		50h

TEXT BOOKS:

NMR of macromolecules
Roberts, G.C.K.
Oxford University Press, 1993

X-Ray Structure Determination: A Practical Guide
Stout, G.H. & Jensen, L.H.
Wiley-Interscience, 2nd edition, 1989.

Crystal Structure Analysis for Chemists and Biologists
Glusker, J.P., Lewis, M. & Rossi, M.
John Wiley & Sons, 1994.

Three-Dimensional Electron Microscopy of Macromolecular Assemblies: Visualization of Biological Molecules in Their Native State, Joachim Frank,
Oxford University Press, USA, 2nd edition, 2006

MODE OF ASSESSMENT:

Final exam: 60 marks (X-ray-30, NMR-15, EM-15)
CA: 40 marks (X-ray 20, NMR-10, EM-10) from any combination of Project-10, Assignment-10, Quiz-10, Written exam-10, Facility visit report-10 or lecturer's own mode of CA-10 marks.

MODULE CO-ORDINATOR:

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LECTURERS:

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