

TIGP - CBMB

2021 Experimental Molecular Biophysics

實驗分子生物物理學

Time: 2:00 pm ~ 5:00 pm on Tuesdays

Place: R208 of the Institute of Biological Chemistry, Academia Sinica

Credit: 3 credits

Coordinator: Yun-Ru (Ruby) Chen

Instructors: Yun-Ru (Ruby) Chen 陳韻如 (GRC), Kuen-Phon Wu 吳昆峯(IBC),

Su-Chang Lin 林世昌 (GRC), Dr. Che Alex Ma 馬徹 (GRC), Wei-Hau Chang 章為皓 (IC)

TA: upon assignment for each module

Perspective:

The purpose of this class is to introduce different biophysical techniques and their possible applications. We will address how to combine different techniques in tackling specific biological issues. We will address how to combine different techniques in tackling specific biological issues.

Grading scheme:

Mid Term: **30%** (Cover the first two modules)

Final Exam:**30%** (Cover the 3rd and 4th modules)

Presentation / Home Work: **40%** (10% for each module)

Attendance:

Unexplained absence: **-3** of final grade

(did not send notice to the TA or the program secretary before class)

Late: **-1** of the final grade

Absence without supporting document: **-1** of final grade

(if a student did not inform the course TA or the program secretary, Ms. Vicki Huang (vicki0315@gate.sinica.edu.tw) to excuse him/herself from the class before lecture starts, he/she has to provide proof to Ms. Huang to explain his/her absence to the class.)

Schedule

Date	<p>Topic A: Spectroscopy and Solution Biophysics</p> <p>This module is to lecture on general spectroscopy techniques for proteins and protein-protein interactions. The techniques to be covered include fluorescence, circular dichroism, infrared spectroscopy, surface plasmon resonance ...etc. Topics on protein folding and misfolding will be introduced.</p>	Instructor
02/23	A1: Principle of spectroscopy and protein folding	Dr. Yun-Ru Ruby Chen
03/02	A2: Principle of solution biophysical techniques and protein misfolding	
03/09	A3: Hands on experiments	
03/16	A4: Student Presentation	
Date	<p>Topic B: NMR</p>	Instructor
03/23	<p>B1: The physical basics and biology</p> <ul style="list-style-type: none"> ♦ Basics of NMR spectroscopy ♦ NMR biomolecules preparation ♦ Limitation of this technique 	Dr. Kuen-Phon Wu
03/30	<p>B2: The structure and interaction network</p> <ul style="list-style-type: none"> ♦ Biomolecular structures determined by NMR ♦ NMR-based protein-protein or protein-ligand interactions 	
04/06	<p>B3: Data visualization and molecular viewer</p> <ul style="list-style-type: none"> ♦ NMR data visualization ♦ PyMOL tutorial (computer needed) 	
04/13	<p>B4: Presentation and visit NMR facility</p> <ul style="list-style-type: none"> ♦ Discussion and presentation of provided NMR papers ♦ Visit NMR core facility 	

04/20	Midterm Exam	
Date	Topic C: Crystallography This module is to lecture on the techniques for single-crystal X-ray diffraction and its applications and limitations. We will also use lysozyme as a model protein to go through the steps of protein crystallization, X-ray data collection and analysis	Instructor
04/27	C1: Protein crystallization Hands-on training: Hanging-drop protein crystallization	Dr. Su-Chang Lin & Dr. Che Alex Ma
05/04	C2: Why X-ray crystallography? Hands-on training: Crystal mounting	
05/11	C3: Principle of X-ray diffraction Hands-on training: X-ray diffraction	
05/18	C4: Student presentation / Special Talk Hands-on training: Data analysis	
Date	Topic D: CryoEM	Instructor
05/25	D1: The basics of TEM and why electrons	Dr. Wei-Hau Chang
06/01	D2: The revolution: single particle, tomography and electron diffraction	
06/08	D3: Processing softwares: Principles and Practices	
06/15	D4: Issues on getting publishing cryo-EM paper.	
06/22	Final Exam	