

BIPH 4010 Principles of Quantitative Instrumentation

Course Outline - Spring 2018/19

Instructors

Prof. ZHU, Guang (LIFS)

Prof. CHEUNG, Tom (LIFS)

Prof. ISHIBASHI, Toyotaka (LIFS)

Prof. PARK, Hyo Keun (LIFS & PHYS)

Prof. Shangyu Dang (LIFS)

Prof. DU, Shengwang (PHYS & CBE)

Prof. TONG, Penger (PHYS)

Prof. WANG, Ning (PHYS)

Prof. Philip So (PHYS)

Schedule

Rm 1409, Mon, Wed: 9:00am-10:20am

Course description

This course aims to provide a general understanding of modern instruments used in biological research with special emphasis on bright-field and fluorescence light microscopes, electron microscopy, X-ray crystallography, local probes and manipulation, nuclear magnetic resonance, and mass spectrometer. The approach is a practical one geared to students who are or will be using these instruments in research. The course consists of ten-week long lectures and four-week long demonstration. During the lectures, students learn basic principles of biological instrumentation and the performance of the instruments. In the demonstration, students apply the understanding gained during the lectures and learn how the instrumentation is used to address biological questions.

Grading

Midterm Exam: 30%

Final Exam: 40%

Final project: 30%

Course Intended Learning Outcomes

On successful completion of this course, students are expected to be able to:

1. Understand the basic concepts of quantitative instrumentation.
2. Recognize how quantitative instrumentation can be built and contribute to modern complex equipment.

3. Evaluate and analyze the system of quantitative instrumentation related to biotechnology.
4. Communicate and explain issues and importance of quantitative instrumentation to general public.
5. Obtain a global perspective to analyze issues related to quantitative instrumentation and biotechnology.

BIPH4010 Mon -Wed	Spring 2019			9:00am-10:20am	Vanue: Rm1409
Week 1	Mon			Wed 30-Jan Course outline General Principles	G Zhu
Week 2	4-Feb	Bio-NMR	G Zhu		
Week 3	11-Feb	Bio-NMR	G Zhu	13-Feb	Bio-NMR G Zhu
Week 4	18-Feb	Electron microscopy X-ray crystallography	N Wang	20-Feb	Electron microscopy X-ray crystallography N Wang
Week 5	25-Feb	Bio x-ray diffraction	Philip So	27-Feb	Genome sequencing T Cheung
Week 6	4-Mar	Genome sequencing	T Cheung	6-Mar	Cryo-EM S Dang
Week 7	11-Mar	BIO-AFM	P Tong	13-Mar	Mid-term Exam
Week 8	18-Mar	Optical tweezer-biological applications	T Ishibashi	20-Mar	Optical tweezer-biological applications T Ishibashi
Week 9	25-Mar	Optical tweezer-biological applications	T Ishibashi	27-Mar	Optics basics fluorescence microscopy HK Park
Week 10	1-Apr	Optics basics fluorescence microscopy	HK Park	3-Apr	Advanced optical microscopy I: super-resolution microscopy (SRM) S Du
Week 11	8-Apr	Advanced optical microscopy II: light-sheet microscopy (LSM)	S Du	10-Apr	Laboratory - fluorescence microscope HK Park
Week 12	15-Apr	Laboratory - magnetic tweezer	HK Park	17-Apr	Laboratory - fluorescence microscope HK Park
Week 13	22-Apr			24-Apr	Laboratory -super-resolution microscopy S Du
Week 14	29-Apr	Electron microscopy	R Ho(2218 and 1125)	1-May	
Week 15	6-May	Laboratory - NMR	G Zhu	8-May	Laboratory - NMR G Zhu