

BMB634 Cryo-EM course (1 credit)

This is an introductory and practical course on cryo-electron microscopy methods and applications. The purpose of this course is to help students jump start their research using cryo-electron microscopy or to obtain critical knowledge to design their research with cryo-electron microscopy methods. The course will include the following components: 1) lectures on the principles of cryo-electron microscopy, single particle analysis (SPA), and cryo-electron tomography (cryo-ET), 2) a sample freezing workshop, 3) hands-on SPA and cryo-ET data analysis activities, 4) student presentations of cryo-EM related research articles.

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SUPPORT (Don't hesitate to ask questions!!)

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TAs

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Time and place

Lectures will be on Wednesday 1:45 PM – 3:45 PM from January 11 – April 26 (except March 8 in spring break) in Anatomy-Chemistry classroom 255 (Unless otherwise indicated).

Required Text

<http://cryo-em-course.caltech.edu/>

Course Outline

- (1) Principles of cryo-electron microscopy
- (2) Principles and practical workshop of cryo-electron microscopy single particle analysis
- (3) Principles and practical workshop of cryo-electron tomography
- (3) Student presentations

Grading will be based on the written report of single particle analysis and cryo-ET data analysis hand-on activities (50%) and research article presentation (50%).

Class schedule:

Jan 11

Coordinators: Yi-Wei Chang

- (1) Principles of cryo-electron microscopy

Jan 18, 25, Feb 1, 8, 15

Coordinators: Kenji Murakami, Hee Jong Kim

- (1) Principles of single particle analysis (Jan 18)
- (2) Hands-on activates of SPA data analysis (Jan 25, Feb 1, 8, 15)

Feb 22, Mar 1, 15, 22

Coordinators: Yi-Wei Chang, Sudheer Molugu, Leon Palao III, Matthew Martinez

- (1) EMRL sample freezing workshop (Feb 22)
- (2) Principles of cryo-electron tomography (Mar 1)
- (3) Hands-on activates of cryo-ET tomography reconstruction and subtomogram averaging (Mar 15, 22)

Mar 29, Apr 5, 12, 19, 26

Students will conduct a 15 min presentation of research article.