

### **BBCB6340 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.

#### **Co-Directors**

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### **Time and place**

Lectures will be on Wednesday 1:45 PM – 3:15 PM from January 21 – May 6 (except March 11 in spring break) in Anatomy Chemistry 202 (Unless otherwise indicated).

### **Class resource**

<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
- (4) Student presentations

Grading will be based on the written report of single particle analysis and cryo-ET data analysis hand-on activities (75%) and research article presentation (25%).

### **Class schedule:**

Jan 21, 28

Coordinators: Yi-Wei Chang

- (1) Principles of cryo-electron microscopy

Feb 4, 11, 18, 25

Coordinators: Kenji Murakami, Linh Pham, Yolanda Simpson

- (1) Principles of single particle analysis (Feb 4)
- (2) Hands-on activates of SPA data analysis (Feb 11, 18, 25)

Mar 4

Coordinators: Shravan Kumar Mageswaran

- (1) EMRL sample freezing and imaging workshop

Mar 18, 25, Apr 1

Coordinators: Yi-Wei Chang, Niharika Shukla

- (1) Principles of cryo-electron tomography (Mar 18)
- (2) Hands-on activates of cryo-ET tomogram reconstruction and subtomogram averaging (Mar 25, Apr 1)

Apr 8, 15, 22, 29, (May 6 if needed)

Each student conducts a 10-min presentation (+2-min Q/A) of cryo-EM-related research article.

Last day of turning in SPA and cryo-ET analysis reports (Apr 29)