

BMB634 Cryo-EM mini-course (1 credit)

This is an introductory course on cryo-electron microscopy methods and applications. 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

Kenji Murakami, Ph.D.

Assistant Professor

Department of Biochemistry and Biophysics Perelman School of Medicine

University of Pennsylvania

Clinical Research Building 364

415 Curie Blvd.

Philadelphia, PA 19104-6059

TEL. 215-573-1125

E-mail: kenjim@pennmedicine.upenn.edu

Yi-Wei Chang, Ph.D.

Assistant Professor

Department of Biochemistry and Biophysics Perelman School of Medicine

University of Pennsylvania

913B Stellar-Chance Labs

422 Curie Blvd.

Philadelphia, PA 19104-6059

TEL. 215-898-7789

E-mail: ywc@pennmedicine.upenn.edu

Sudheer Kumar Molugu, Ph.D

Director, Electron Microscopy Resource Lab

Department of Biochemistry and Biophysics Perelman School of Medicine

The University of Pennsylvania (SOM)

3620 Hamilton Walk, Philadelphia, PA 19104-6059

TEL: 215-898-6730

Sudheer.Molugu@pennmedicine.upenn.edu

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

support@pennemclass.freshdesk.com

TAs

Leon Palao III

Department of Biochemistry and Biophysics Perelman School of Medicine

University of Pennsylvania

915 Stellar-Chance Labs
422 Curie Blvd.
Philadelphia, PA 19104-6059
TEL: 215-898-1191
palaoiii@penmedicine.upenn.edu

Matthew Martinez
Department of Biochemistry and Biophysics Perelman School of Medicine
University of Pennsylvania
915 Stellar-Chance Labs
422 Curie Blvd.
Philadelphia, PA 19104-6059
TEL: 215-898-1191
mpr896@penmedicine.upenn.edu

Hee-Jong Kim
Department of Biochemistry and Biophysics Perelman School of Medicine
University of Pennsylvania
Clinical Research Building 364
415 Curie Blvd.
Philadelphia, PA 19104-6059
TEL. 215-573-1128
heejong@heejong.com

Jose Gorbea
Department of Biochemistry and Biophysics Perelman School of Medicine
University of Pennsylvania
Clinical Research Building 364
415 Curie Blvd.
Philadelphia, PA 19104-6059
TEL. 215-573-1128
gorbea@penmedicine.upenn.edu

Time and place

Lectures will be on Wednesday 1:45 PM – 3:45 PM from January 12 – April 27 (except March 9 in spring break) in Anatomy-Chemistry class room 202 (Unless otherwise indicated).

Required Text

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

Course Outline

(1) Principles and practical workshop of cryo-electron tomography

- (2) Principles and practical workshop of cryo-electron microscopy single particle analysis
- (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 12, 19, 26, Feb 2, 9

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

- (1) Principles of cryo-electron microscopy and cryo-electron tomography (Jan 12, 19)
- (2) EMRL sample freezing workshop (Jan 26)
- (3) Hands-on activities of cryo-ET tomography reconstruction and subtomogram averaging (Feb 2, 9)

Feb 16, 23, Mar 2, 16, 23

Coordinators: Kenji Murakami, Jose Gorbea, Hee-jong Kim

- (1) Principles of single particle analysis (Feb 16)
- (2) Hands-on activities of SPA data analysis (Feb 23, Mar 2, 16, 23)

Mar 30, Apr. 6, 13, 20, 27

Students will conduct a 15 min presentation of research article.