

Course Code: MMG 1302H

Course Title: 'Advanced imaging: techniques and functional data analysis in biological systems'

Course Coordinator: Kenichi Okamoto, Mei Zhen

Course Location: online via Zoom (or 600 University Ave. Mount Sinai Hospital, 8th floor, Rm. 885A, depending on the Covid-19 situation)

Course Time and Date: Starting from March 16th (Wed 1pm-, Short Orientation) and every Wednesday 1-3PM from March 23rd to April 27th.

Course Overview:

This course will provide an overview and fundamental knowledge of optical microscopic techniques and their functional data analysis for biological research.

- The course consists of six modules involving brief introductions on specific imaging techniques by presentations on research papers that highlight the application of these techniques and data analysis.
- By the end of the course, students will present a short Research Proposals on a research project of their interest, utilizing at least one imaging technique and data analysis covered by the course.

Course Objectives:

- Understand recent microscopic imaging techniques and data analysis
- Discuss the applications of these techniques
- Propose research projects utilizing the techniques

Marking Scheme:

- 50 % - Paper presentation
- 25 % - Research proposal presentation
- 25 % - Class participation and discussion

- If you anticipate missing a class, you must let the instructor know in advance, given the weight on participation and the fact that there are only six classes.

- by emailing and letting us know that you have a legitimate reason for missing the class, you will then be provided with an assignment based on the reading for that week which you can use to make up for the lost class.

Course topic:

The basic outline that will be covered in the six weeks are as follows; may change based on the papers.

- The updated content will be posted by the end of February.
- Assigned reading will be sent out a week in advance.

- Week 0: a short orientation (30 min), overview of the course and paper assignment.
- Week 1: Ultrastructural imaging and connectome analysis
- Week 2: Functional cellular imaging and circuit analysis for behavior
- Week 3: Imaging-based system manipulation and activity analysis
- Week 4: Computational imaging and data analysis
- Week 5: Student research presentations
- Week 6: Student research presentations