

LSBS 524500: Membrane Biology
R6R7 (Thurs 14:10-16:00) 2024 Spring semester
Wen-guey Wu (吳文桂)

Biological membranes consist of lipids, proteins and carbohydrates to define the compartmentalization of the cells. Membranes are also very dynamics not only within the lateral and in the transverse direction of lipid bilayers, but also undergo constant motions and contacts in the intracellular cytoplasm of the cells. Recent progress in the structures/dynamics and crowdedness (or clustering) of these membrane components has allowed us to address how the molecular diversity and interactions of these essential cellular components help in exert its membrane functions through channels, transporters, enzymes, receptors and other related structural components of lipid and glycoconjugates. In order to achieve this goal, we will spend **1/3 of the lecture hours to review the basics of membrane structures and functions**, another **1/3 to update the progress in the field based on the review articles** during the last couple years and finally, the last **1/3 to guide students reading the state of the art publications** in the field of membrane biology.

- Feb 22 Introduction to membrane structure, dynamics and function
- Feb 29 Structure and diversity of lipids
- Mar 07 Physical Properties of Lipid Assembly and dynamics
- Mar 14 Membrane protein structures, folding and translocation
- Mar 21 Clustering of membrane proteins
- Mar 28 **Midterm Examination (Exercise I)**
- Apr 18 Cell signaling through protein interaction and second messengers
- Apr 25 GPCR and membrane receptors
- May 02 Role of lipid in protein stability and assembly
- May 09 Conformational Space of ATPase and ABC transporters
- May 16 Flippase, lipase and glycosyltransferase at membrane interface
- May 23 **Oral presentation on Special topics of membrane biology**
- May 30 Lipidation and lipid transfer
- Jun 06 Ion channels
- Jun 13 Energy Transduction
- Jun 20 Membrane machine
- Jun 27 **Oral presentation on current topics of membrane biology**

Grade: Midterm Examination (Exercise) 30%, Oral presentation 70%

Textbook:

1. **Cell Boundaries: How Membranes and Their Proteins Work** by Stephen H White, Gunnar von Heijne & Donald M. Engelman , Garland Science; 1st Ed.2022
2. Assigned reading and presentation on current review and articles