

LIFS4190 (Cellular Signaling)

Course Outline for Spring Semester 2019-20

1. Instructors

Instructor	Office	Extension	E-mail address
Prof. Yung Hou WONG (Course Co-ordinator)	Room 5461	x7328	boyung@ust.hk
Prof. Karl W.K. TSIM	Room 5456	x7332	botsim@ust.hk

2. Meeting Time and Venue

Lecture Time: Monday (1:30 pm - 2:20 pm)
Friday (9:00 am - 9:50 am)
Tutorial Time: Monday (2:30 pm - 2:50 pm)
Friday (10:00 am - 10:20 am)
Venue: Rm 1410

3. Course Description

Credit points: 3

Pre-requisite: LIFS3020 or LIFS3030

Exclusion: NIL

Grading: A+ to F

Brief information/synopsis: Recent advances in the study of the molecular mechanisms of cell function, with an emphasis on the structure and function of signaling components that control cell growth, differentiation, and integrated responses in eukaryotic cells.

4. Intended Learning Outcomes

To provide students with contemporary knowledge of cellular communication, including the structural and functional characteristics of receptors; receptor-mediated intracellular signaling; correlations of cell signaling with physiology and pathophysiology; with focus on the biochemical basis of signaling events such as phosphorylation/dephosphorylation and specific protein-protein interaction.

To help students apply their cell biology knowledge for bioscience applications.

To help students acquire the ability for decision-making and logical thinking

To help students understand the correlations between cell biology and other bioscience topics such as physiology, pharmacology, neurobiology, and the molecular basis of diseases.

To help students recognize the essentiality of self-enrichment and life-long learning

To help students gain awareness of complexity of issues facing professionals in biosciences.

Upon completion of this course, students are expected to be able to:

No.	ILOs
1	Relate structural characteristics of different receptor systems to distinct signaling pathways in the cell.
2	Describe and explain how different intracellular signaling events are regulated by extracellular signals.
3	Describe and explain how cellular activities such as growth and differentiation are regulated at the molecular level.
4	Describe and explain the importance of signaling integration in response to multiple cellular stimuli.
5	Possess the basic concepts for designing experiments to study intracellular signaling events.

5. Assessment Scheme

- Mid-term examination (Open-book; 1 hour 20 minutes)
- Final examination (Open-book; 2 hours)
- Group project: Groups of 3-4 students will work together in compiling a written report on a specific area chosen from a list of topics. The report should be no longer than 5 pages of text (12 pt font size, single space, inclusive of references) and 1 page of illustrations. Students will be evaluated as a group.

Assessment

Mid-term examination (35%)
 Final examination (35%)
 Group project (30%)

Assessing Course ILOs

ILO: 1, 2, 3, 4, 5
 ILO: 1, 2, 3, 4, 5
 ILO: 1, 2, 3, 4

6. Student Learning Resources

Lecture notes and research articles

7. Teaching and Learning Activities

Scheduled activities: Two 50-minute lectures and two 20-minute tutorials per week

8. Course Schedule

Week	Date	Topic	Instructor
1	07-02-2020	Overview of cell-surface receptors	Wong
	10-02-2020	G protein-coupled receptors: overall structure	Wong
2	14-02-2020	G protein-coupled receptors: regulation	Wong
	17-02-2020	Tutorial 1	Wong
3	21-02-2020	Signal transduction by G proteins: GTPase cycle	Wong
	24-02-2020	Signal transduction by G proteins: structure and function	Wong
4	28-02-2020	Activators and regulators of G protein signaling	Wong

	02-03-2020	Tutorial 2	Wong
5	06-03-2020	Second messengers: adenylyl cyclases and phospholipases	Wong
	09-03-2020	Second messengers: other signaling molecules	Wong
6	13-03-2020	Tutorial 3	Wong
	16-03-2020	Signal integration: conditional activation	Wong
7	20-03-2020	Signal integration: MAPK cascade	Wong
	23-03-2020	Tutorial 4 and briefing on Group Project	Wong
8	27-03-2020	<i>Open-book Mid-term Examination</i>	Wong
	30-03-2020	Protein kinases: structures and functions	Tsim
9	03-04-2020	Receptor tyrosine kinases: classification and function	Tsim
	06-04-2020	Tutorial 5	Tsim
10	17-04-2020	Receptor and non-receptor tyrosine phosphatases	Tsim
	20-04-2020	Receptor and non-receptor tyrosine phosphatases	Tsim
11	24-04-2020	Ion channels and transporters	Wong
	27-04-2020	Ion channels and transporters	Wong
12	04-05-2020	Tutorial 6	Wong
	08-05-2020	Revision	Wong