

**Division of Life Science**  
**The Hong Kong University of Science and Technology**

**LIFS4950 Neurochemistry**

Fall semester

Instructor:

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**Meeting Time and Venue**

Time 9:00 - 10:20 (MON)

9:00 - 10:20 (WED)

Venue: LTK

**Course goals**

This course will provide you with knowledge of basic neurochemistry and the molecular mechanism behind the function of the brain.

**Learning Outcomes**

By the end of this course, you will be able to:

1. Explain the basic concepts and principles of neurochemistry and its relationship to the basic functioning of the brain.
2. Appraise the extent to which advances in neurochemistry impact the treatment of a range of diseases related to the dysfunction of the brain.
3. Apply the principles of neurochemistry to day-to-day decision-making and problem solving.
4. Evaluate the impact of continuing scientific research in neurochemistry and how this research might influence society.

**Course description**

The brain is one of the most complicated organs in our body. By understanding the neurochemistry and molecular mechanism of how the brain functions, we will be able to

develop various drugs to treat different medical conditions. This course is designed to help you understand some of the concepts behind how the brain works and how you can apply this knowledge in some aspects of our daily life. You will learn about how the signals are encoded and transmitted within the nervous system. You will also learn how networks of neurons are the functional units of the brain and coordinate higher cognitive functions. The neurochemical basis of different neurological diseases, narcotics and pain will also be discussed. By the end of the course, you will also learn about some of the advanced approaches to study the neurochemistry of the brain and how these can help the treatment of neurological diseases.

### **Teaching approach**

This course is primarily delivered through interactive lectures. Learning is an active process and students are expected to read course materials and ask questions in lectures. Assignments will be given to help student understand concepts in neurochemistry. Before the end of the course, students are required to do a group project presentation about neurochemistry in relation to our daily life. This project will help students to develop decision making and problem-solving skills with the use of knowledge acquired in neurochemistry.

### **Assessment scheme**

You will be assessed as summarized in the followings:

Components	Percentage	
A. Assignments	10	
B. Group project	25	(TBC)
C. Midterm exam	25	(Oct 11)
D. Final exam	40	(TBC)
Total	100	

### **Class outline**

- 1 Introduction to neurochemistry.
- 2 Neurotransmitters and receptors in the nervous system.
- 3 Acetylcholine.
- 4 Catecholamine.

- 5 Amino acids.
- 6 Neuropeptides.
- 7 Gaseous molecules as neurotransmitters.
- 8 Neurochemistry of addiction.
- 9 Neurochemistry of narcotics and commonly abused drugs.
- 10 Neurochemical basis of learning, memory, and behavior.
- 11 Pathogenic mechanism of neurological diseases.

**Reference books**

1. George J. Siegel et al., Basic Neurochemistry, 7<sup>th</sup> edition.
2. Eric R. Kandel et al., Principles of Neural Science, 4<sup>th</sup> edition.
3. A. Longstaff ed. Neuroscience. BIOS Scientific Publishers Ltd 2000.
4. Purves, Dale et al., Neuroscience, Sinauer Associates, 4<sup>th</sup> edition.
5. Mark F. Bear et al., Neuroscience exploring the Brain, 4<sup>th</sup> edition