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  15:00-14:20 (MON)
      10:30-11:50 (FRI)

Venue: 2464 Lift 25-26

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 are able to
develop various drugs to treat many 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 poster 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:

<table>
<thead>
<tr>
<th>Components</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>A. Assignments</td>
<td>5</td>
</tr>
<tr>
<td>B. Group project</td>
<td>25</td>
</tr>
<tr>
<td>C. Midterm exam</td>
<td>25</td>
</tr>
<tr>
<td>D. Final exam</td>
<td>45</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
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**Class outline**

1. Introduction to neurochemistry.
2. Neurotransmitters and receptors in the nervous system.
3. Acetylcholine.
Amino acids.

Neuropeptides.

Gaseous molecules as neurotransmitters.

Neurochemistry of addiction.

Neurochemistry of narcotics and commonly abused drugs.

Neurochemical basis of learning, memory and behavior.

Pathogenic mechanism of neurological diseases.

**Reference books**

5. Mark F. Bear et al., Neuroscience exploring the Brain, 4th edition