

Course Syllabus
MBNS 605 Neurochemistry
Academic Year 2025

Course ID and Name: MBNS 605 Neurochemistry
Course coordinator: Prof. Banthit Chetsawang, Ph.D.
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Instructors:

1. Prof. Piyarat Govitrapong, Ph.D. (piyarat.gov@mahidol.ac.th, piyarat@cgi.ac.th)
2. Prof. Banthit Chetsawang, Ph.D. (banthit.che@mahidol.ac.th)
3. Assoc. Prof. Wipawan Thangnipon, Ph.D. (wipawan.tha@mahidol.ac.th)
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Supporting Staff:

1. Somsong Phengsukdaeng (somsong.phe@mahidol.edu)

Credits: 2 (2-0-4)

Curriculum: Master of Science Program in Neuroscience (core course)
Doctor of Philosophy Program in Neuroscience (core course for B.Sc. Graduates)

Semester offering: First semester

Pre-requisites: -

Course learning outcomes (CLOs)

Upon completion of this course, students should be able to:

1. Understand chemical neurotransmitters, presynaptic proteins and cell adhesion molecules, chemically mediated synaptic transmission, neurotransmitter receptors, receptor-activated phosphoinositide

- turnover, G-proteins, cyclic nucleotides, and phosphorylation in the regulation of neuronal signaling functions. (PLO2-R)
2. Explain the principles and concepts of the chemical and functional organization of the nervous system at the cellular and molecular levels. (PLO3-R)
 3. Demonstrate an understanding of essential knowledge acquired for further approaches relevant to neurochemical research. (PLO1-I, PLO4-R, PLO5-R)

Alignment of teaching and assessment methods to course learning outcome:

Course learning outcome	Teaching method	Assessment method
1. Understand chemical neurotransmitters, presynaptic proteins and cell adhesion molecules, chemically mediated synaptic transmission, neurotransmitter receptors, receptor-activated phosphoinositide turnover, G-proteins, cyclic nucleotides, and phosphorylation in regulation of neuronal signaling functions.	(1) Lecture	(1) Quiz (2) Written examination
2. Explain the principles and concepts of the chemical and functional organization of the nervous system at the cellular and molecular levels.	(1) Lecture	(1) Quiz (2) Written examination
3. Demonstrate an understanding of essential knowledge acquired for further approaches relevant to neurochemical research	(1) Group discussion	(1) Participation

Course description:

The course emphasizes on principles of chemical transmission; second messenger; signaling transduction; neurotransmitters; neurotransmitter receptors; nuclear hormone receptor signaling; advances in neuronal stem cell research and molecular biology.

Course schedule:

Date: Monday, Wednesday and Friday (September 22-October 20, 2025)

Time: 10.00 am. – 12.00 pm. and 13.00 pm. – 15.00 pm.

Rooms: Class activity will be held onsite at Room A107, Molecular Biosciences (MB) Building, Mahidol University, Salaya, Nakhon Pathom.

MAP-C: onsite or online platform through Zoom Meeting

<https://zoom.us/j/>

Meeting ID:

Passcode:

Topics	Date	Time	Lecture topics	Instructors
1.	Sep 22, 2025	09.30-10.00	Orientation	Banthit
		10.00-12.00	Chemical neurotransmission and signal transduction	Siraprapa
2.		13.00-15.00	Synaptic, presynaptic proteins and cell adhesion molecules	Nuanchan
3.	Sep 24, 2025	10.00-12.00	Acetylcholine	Nuanchan
4.		13.00-15.00	Serotonin, histamine and melatonin	Ekkaphot
5.	Sep 26, 2025	10.00-12.00	Catecholamine	Piyarat (Online)
6.		13.00-15.00	Atypical neurotransmitters	Sujira
Exam I	Sep 29, 2025	09.00-15.00	Exam Topics 1-5	Somsong
7.	Oct 1, 2025	10.00-12.00	Neuropeptide	Piyarat (Online)
8.		13.00-15.00	Amino acid neurotransmitters	Banthit
9.	Oct 3, 2025	10.00-12.00	Neurochemistry of learning and memory	Wipawan (Online)
10.		13.00-15.00	Nuclear hormone receptor signaling	Nuanchan
Exam II	Oct 6, 2025	09.00-15.00	Exam Topics 6-10	Somsong
11.	Oct 8, 2025	10.00-12.00	Organoid-based for neurological models	Narisorn
12.		13.00-15.00	Neurochemical regulation of gene expression	Ekkaphot
13.	Oct 15, 2025	10.00-12.00	Recombinant DNA and protein technology	Jiraporn
14.		13.00-15.00	Transgenic animal	Narisorn
Exam III	Oct 17, 2025	09.00-14.00	Examination Topics 11-14	Somsong
15.	Oct 20, 2025	10.00-12.00	Group discussion on integrated neurochemistry research topics	Lecture team

Assessment criteria:

Assessment criteria	Assessment method	Scoring rubrics
Quiz and Written examination (50%)	Short essay questions or multiple-choice questions	Scoring directly from correct answers and keywords.
Group discussion on assigned topic (30%)	Direct observation	observation of class participation (e.g., discussion, asking the question)
Participation in in-class activities (10%)	Direct observation	observation of class participation (e.g., discussion, asking the question)
Class attendance (10%)	Number of class attendance	Scoring directly from signing in each class attendance

Student's achievement will be graded using symbols: A, B+, B, C+, C, D+, D, and F based on the distribution of student scores from the whole course as follows:

Percentage	Grade
85 -100	A
80 – 84	B+
70 - 79	B
60 - 69	C+
50 - 59	C
45 - 49	D+
40 – 44	D
< 40	F

Notice:

1. Since this is a core requirement course, students who receive a final grade below “B” will need to re-enroll in it in the next academic year.
2. According to the Faculty of Graduate Studies regulation, enrolled students must attend classes for over 80% of the total class time. Therefore, students who fail to comply with this regulation will be disqualified from the examination.

Updated: July 14, 2025