

**Course Syllabus**  
**MBNS 600 Neurobiology**  
**Academic Year 2021**

**Course ID and Name:** MBNS 600 Neurobiology

**Course coordinator:** Asst. Prof. Kittikun Viwatpinyo, Ph.D.

Tel: 02-441-9003-7 ext. 1446

Email: [kittikun.viw@mahidol.ac.th](mailto:kittikun.viw@mahidol.ac.th)

**Instructors:**

1. Prof. Banthit Chetsawang, Ph.D.
2. Assoc. Prof. Naiphinich Kotchabhakdi, Ph.D.
3. Assoc. Prof. Nuanchan Chutabhakdikul, Ph.D.
4. Assoc. Prof. Wipawan Thangnipon, Ph.D.
5. Asst. Prof. Kittikun Viwatpinyo, Ph.D.
6. Asst. Prof. Sujira Mukda, Ph.D.
7. Asst. Prof. Sukonthar Ngampramuan, Ph.D.
8. Chutikorn Nopparat, Ph.D.
9. Jiraporn Panmanee, Ph.D.

**Supporting Staff:**

1. Kanda Putthaphongpheuk
2. Somsong Phengsukdaeng
3. Sasithorn Prommet

**Credits:** 3 (2-2-5)

**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:** None

**Course learning outcomes (CLOs)**

Upon completion of this course, students are able to:

1. Explain the fundamental concepts on the cellular and anatomical organization of the human nervous system. (PLO1)

2. Analyze the theoretical knowledge and experimental approaches in the understanding of the neurophysiological processes of neurons and glial cells contributed to sensory perception, neural control of behaviors, and cognitive functions of the human brain. (PLO1)
3. Demonstrate information technology and interpersonal communication skills through discussion of interesting topics in the field of neurobiology. (PLO6)

**Alignment of teaching and assessment methods to course learning outcome:**

Course learning outcome	Teaching method	Assessment method
1. Explain the fundamental concepts on the cellular and anatomical organization of the human nervous system.	(1) Lecture (2) Laboratory practice by observation of brain specimens, microscopic slides and diagrams. (3) In-class discussion	(1) Written examination (2) Laboratory examination (3) Oral comprehensive examination
2. Analyze the theoretical knowledge and experimental approaches in the understanding of the neurophysiological processes of neurons and glial cells contributed to sensory perception, neural control of behaviors, and cognitive functions of the human brain.	(1) Lecture (2) Laboratory practice by observation of brain specimens, microscopic slides and diagrams. (3) In-class discussion	(1) Written examination (2) Laboratory examination (3) Oral comprehensive examination
3. Demonstrate information technology and interpersonal communication skills through discussion of interesting topics in the field of neurobiology.	(1) Individual assignment	(1) Presentation of assigned topic

**Course description:**

This course focuses on fundamental theories and laboratory practice on the human nervous system including the organization of the nervous system, the relationship between the brain, mind and behavior, the concept of chemical neurotransmission and neurotransmitters, evolution of the neural circuitry from animals to man, development of the nervous system and anatomical and functional studies of each brain region.

**Course schedule:**

Date: Monday, Wednesday and Friday from August 9<sup>th</sup> to September 10<sup>th</sup>

Time: 09.00 – 15.00

Rooms: Online format via video conference systems

Date & time	Topic	Instructor
<b>Mon Aug 9</b>		
09.00-11.00	L1: Cell biology of neurons, neuroglia, and supporting elements	Nuanchan
13.00-15.00	L2: Anatomical terms & External structures of the brain	Kittikun
<b>Wed Aug 11</b>		
09.00-11.00	L3-1: Blood circulation of the brain, CSF pathway and blood-brain barrier L3-2: Electrical activities of neuron and glial cells	Sukonthar
13.00-15.00	Self-directed learning/Scheduled lab tutorial	
<b>Fri Aug 13</b>		
09.00-11.00	L4: Spinal cord	Sukonthar
13.00-15.00	L5: Brainstem and diencephalon	Kittikun
<b>Mon Aug 16</b>		
09.00-11.00	L6: Reticular formation	Naiphinich
13.00-15.00	L7: Motor pathways	Naiphinich
<b>Wed Aug 18</b>		
09.00-11.00	L8: Basal ganglia and cerebellum	Kittikun
13.00-15.00	Self-directed learning/Scheduled lab tutorial	
<b>Fri Aug 20</b>		
09.00-11.00	<b>Student presentation 1</b>	RCN staff
13.00-15.00	Self-directed learning/Scheduled lab tutorial	
<b>Mon Aug 23</b>		
09.00-12.00	<b>Written Exam I (L1-L8)</b>	RCN staff

Wed Aug 25		
09.00-11.00	L9: Somatosensory system	Kittikun
13.00-15.00	L10: Visual system	Banthit
Fri Aug 27		
9.00-11.00	L11: Auditory and vestibular systems	Sujira
13.00-15.00	Self-directed learning/Scheduled lab tutorial	
Mon Aug 30		
09.00-11.00	L12: Hypothalamus and autonomic nervous system	Sukonthar
13.00-15.00	L13: Limbic system, basal forebrain, and cognition	Wipawan
Wed Sep 1		
09.00-10.00	L14-1: Cerebrum and cerebral cortex	Jiraporn
10.00-11.00	L14-2: Brain and language	Chutikorn
13.00-15.00	L15: Executive brain functions	Nuanchan
Fri Sep 3		
9.00-11.00	<b>Student presentation 2</b>	RCN staff
13.00-15.00	Self-directed learning/Scheduled lab tutorial	
Mon Sep 6		
9.00-11.00	Self-directed learning/Scheduled lab tutorial	
13.00-15.00	Self-directed learning/Scheduled lab tutorial	
Wed Sep 8		
13.00-14.00	<b>Laboratory Exam</b>	RCN staff
Fri Sep 10		
09.00-12.00	<b>Written Exam II (L9-L15)</b>	RCN staff

#### Laboratory sessions:

Due to COVID-19 pandemic situation, the course coordinator decided to change the lab teaching method to comply with institute's regulation. In this academic year, course coordinator decided to make explanatory video clips for each lab emphasized on anatomical features of the human nervous system both in gross and microscopic levels. Students who wish to review these lab sessions with real specimens can contact course coordinator for available date and time. Examination, however, will be based on structures mentioned in the video clips.

Below is a list of video clips made for lab sessions:

- Lab #1: Microscopic study of neurons, neuroglia, supporting elements, and peripheral nerve

- Lab #2: Gross anatomy of the brain, vascular supply, and CSF pathway
- Lab #3: Gross anatomy and microscopic study of the spinal cord
- Lab #4: Brainstem and diencephalon
- Lab #5: Brain structures in motor pathway
- Lab #6: Sensory organs and pathways
- Lab #7: Hypothalamus and limbic system
- Lab #8: Functional localization of cerebral cortex

#### Student presentation sessions:

To encourage sharing knowledge and boost presentation skills, students will be assigned with two topics to be presented in class in the online format every Monday (except for the first week). Each presentation should take 15-20 minutes, followed by 2-3 questions asked by RCN staff. Evaluation of presentation performance will be according to rubric scoring method.

Presentation date and time	Topics
<b>Presentation #1</b> <b>Friday August 20<sup>th</sup></b> <b>9-12 AM</b>	Cellular responses during peripheral nerve damage and regeneration.
	Control of muscular activities by spinal reflexes.
	Brainstem centers for respiratory control.
	Parkinson's disease: cause and effects on motor control.
<b>Presentation #2</b> <b>Friday September 3<sup>rd</sup></b> <b>9-12 AM</b>	Neural pathways in saccadic and smooth pursuit eye movements.
	Receptors and central pathway of chemical senses (olfaction and taste).
	Sleep: phases and neural control.
	Alzheimer's disease: cause and effects on cognition.

Assessment criteria:

Assessment criteria	Assessment method	Scoring rubrics
Written examination (60%)	(1) Multiple choices questions (2) Short essay questions (3) Take-home assignments	Scoring directly from true/false answer
Laboratory examination (15%)	(1) Timed-station questions	Scoring directly from true/false answers
Presentation of assigned topic (15%)	(1) Short presentation	(1) Information quality and organization of topic presented (2) Verbal communication and English proficiency (3) Visual tools
Class attendance and participation in in-class discussion (10%)	(1) Numbers of classes signed in (2) Direct observation	Scoring directly from times of signing in

Grading and evaluation

Student's achievement will be graded using symbols: A, B+, B, C+, C, D+, D and F based on the criteria 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

ATTENTION

(1) Since this course is a core requirement course, if students receive final grade below “B”, they will need to re-enroll this course in the next academic year.

(2) According to the Faculty of Graduate Studies regulation, enrolled students are required to attend classed more than 80% of total class time. Students will be disqualified from examination if they failed to comply with this regulation.

Scoring rubric for evaluation of student presentation (7.5% for each presentation)

Presentation performance evaluation rubric (10% of total score)					
Criteria	Excellent (score = 5)	Very good (score = 4)	Adequate (score = 3)	Limited (score = 2)	Poor (score = 1)
<b>Information quality and organization of topic presented (including answering the questions) (5%)</b>	Main points are explicitly presented with impressive detail and organization. Information is directly linked to the topic of presentation.	Main points are presented with good amount of detail. Information is well-organized and linked to the topic given.	Main points are somewhat clear but could add some more detail. Information is organized and linked to the topic given.	Main points are not clear and lack detail. Information is loosely organized and some are off-topic.	Main points are missed and have no detail. Information is disorganized and off-topic.
<b>Verbal communication and English proficiency (1.5%)</b>	Speaker's voice is very steady, clear and confident. Spoken language is very fluent and grammatically corrected.	Speaker's voice is steady and confident. Spoken language is fluent and mostly grammatically corrected.	Speaker's voice is moderately confident but could be developed. Spoken language is mediocre and has some grammatical errors.	Speaker's voice is unsteady and lacks confident. Use of spoken language needs to be improved, and many errors can be recognized.	Speaker fails to deliver proper presentation orally. Unable to deliver presentation via spoken English language.
<b>Visual tools (1%)</b>	Visual aids are very creative, easy to read and greatly enhance presentation.	Visual aids are typically clear and easy to follow.	Visual aids are good in terms of quality, but some points can be improved.	Limited visual aids are used or difficult to help audiences follow the topic.	No visual aids are used, and presentation is not interested by audiences.

Updated July 2021