TQF 3 Course Specifications

Section 1 General Information

1. Course code and course title

   Thai ประสาทชีววิทยา

   English Neurobiology

2. Number of credits 4 (3-2-7) (Lecture/Lab/Self-study)

3. Program and type of subject

   3.1 Program Bachelor of Science

   3.2 Type of Subject Required course

4. Course Coordinator and Course Lecturer

   4.1 Course Coordinator Athikhun Suwannakhan, PhD.

   4.2 Course Lecturers Wisuit Pradidarcheep, PhD.

   Athikhun Suwannakhan, PhD.

5. Trimester/ Year of Study

   5.1 Trimester 3/2021-2022

   5.2 Course Capacity 30 students

6. Pre-requisite N/A

7. Co-requisites N/A

8. Venue of Study Mahidol University Salaya Campus

9. Date of Latest Revision 4 April 2021

Section 2 Goals and Objectives

1. Course Goals

The main purpose of this course is to provide students with a comprehensive overview of neuroscience, with an emphasis on neuroanatomy. This course covers the understanding of the

organization and functions the central and peripheral nervous system including the spinal cord, cerebral cortex and cranial nerves. Students will understand how groups of neurons function together for our motor functions, sensory functions and behaviors. Based on the understanding of normal neural connections and brain functions, the anatomical and physiological bases for multiple neurological disorders are briefly discussed. Weekly laboratory sessions provide students with an opportunity to dissect the human brain to further students' understanding.

2. Objectives of Course Development/Revision

2.1 Course Objectives

Students understand structural organization of the central and peripheral nervous systems in sufficient depth for engaging in basic clinical problem-solving.

2.2 Course-level Learning Outcomes: CLOs

By the end of the course, students will be able to (CLOs)

CLO1 – Describe the topography and structural organization of the meninges, spinal cord, brainstem, cranial nerves, cerebrum, diencephalon, limbic structures, basal ganglia and cerebellum.

CLO 2 – Describe the arterial supply, venous drainage and the flow of cerebrospinal fluid of the brain and spinal cord.

CLO3 – Identify major structures and describe the function of the motor systems including voluntary movement and the control of posture.

CLO4 – Identify major structures and describe the function of the sensory systems including the somatosensory, vestibular, visual, and auditory systems.

CLO5 – Identify major structures and describe the function of the limbic system, its nuclei, inputs and outputs.

CLO6 – Integrate the information of structure and function in order to compare and contrast between different injury sites based on their location in the brain.

Section 3 Course Management

1. Course Description

(Thai) ความเข้าใจพื้นฐานของโครงสร้างและหน้าที่ของระบบประสาทส่วนกลางและส่วนปลาย ประสาทกายวิภาคศาสตร์ของระบบประสาทสั่งการ ระบบประสาทรับความรู้สึก การควบคุมพฤติกรรมและอารมณ์ รอยโรคและความผิดปกติของระบบประสาท

(English) Basic understanding of structural organization and function of the central and peripheral nervous systems; neuroanatomy of the motor system, sensory system, emotional and behavioral control; lesions and disorders of the nervous system

2. Credit hours per trimester

Lecture (Hours)	Laboratory/field trip/internship (Hours)	Self-study (Hours)
30	20	96

3. Number of hours that the lecturer provides individual counseling and guidance: 3 hours per week

Section 4 Development of Students' Learning Outcome

1. Short summary on the knowledge or skills that the course intends to develop in students (CLOs)

ICBI 341 is an introductory course to neuroscience and neuroanatomy. Comprehensive understanding in neuroscience and neuroanatomy are essential for students who would like to pursue their future career as biomedical scientists or physicians. This course is mainly focused on the structural organization of the nervous system and how these structures work together as a

neural circuit. In the beginning of the course, students will be taught the three-dimensional anatomy of the central nervous system including the spinal cord, brainstem, diencephalon, cerebral cortex, cerebellum and also vascular supplies to these structures. Towards the second half of the course, students will then learn how neurons from these structures form tracts and work together to perform specific functions including motor, sensory and other specialized functions. With these neuroanatomical principles, students are expected to briefly explain the functional deficits and predict potential sites of lesion that occur within the brain.

2. Teaching methods for developing the knowledge or skills specified in item 1 and evaluation methods of the course learning outcomes

CLO	Teaching methods	Evaluation Methods
CLO1	Lectures, class discussion and case studies	Written assessment
CLO2	Lectures, class discussion and case studies	Written assessment
CLO3	Lectures, class discussion and case studies	Written assessment
CLO4	Lectures, class discussion and case studies	Written assessment
CLO5	Lectures, class discussion and case studies	Written assessment
CLO6	Lectures, class discussion, case studies and oral presentation	Written assessment Oral presentation

Section 5 Teaching and Evaluation Plans

1. Teaching plan

Date	**Time**	**Topic**	**Lecturer**
Fri, 29 Apr 22	12:00 – 14:50	Lec 1 ● Introduction to neurobiology ● External morphology of the nervous system ● Spinal cord	AS
	15:00 – 16:50	Lab 1	AS

		• External morphology of the nervous system • Spinal cord	
Fri, 6 May 22	12:00 – 14:50	Lec 2 • Brainstem and cranial nerves	WP
	15:00 – 16:50	Lab 2 • Brainstem and cranial nerves	WP
Fri, 13 May 22	12:00 – 14:50	Lec 3 • Diencephalon	WP
	15:00 – 16:50	Lab 3 • Diencephalon	WP
Fri, 20 May 22	12:00 – 14:50	Lec 4 • Cerebral cortex and specialized functions	AS
	15:00 – 16:50	Lab 4 • Cerebral cortex and specialized functions	AS
Fri, 27 May 22	12:00 – 14:50	Lec 5 • Ventricles and blood supply	AS
	15:00 – 16:50	Lab 5 • Ventricles and blood supply	AS
Sat, 4 Jun 22	12:00 – 14:50	**MIDTERM LECTURE EXAMINATION**	TBA
	15:00 – 16:50	**MIDTERM LAB EXAMINATION**	TBA
Fri, 10 Jun 22	12:00 – 14:50	Lec 6 • Motor system	AS
	15:00 – 16:50	Lab 6 • Motor system	AS
Fri, 17 Jun 22	12:00 – 14:50	Lec 7 • Somatosensory system	WP
	15:00 – 16:50	Lab 7 • Somatosensory system	WP
Fri, 24 Jun 22	12:00 – 14:50	Lec 8 • Special sensory system	WP
	15:00 – 16:50	Lab 8 • Special sensory system	WP

Fri, 1 July 22	12:00 – 14:50	Lec 9 ● Limbic system	WP
	15:00 – 16:50	Lab 9 ● Limbic system	WP
Fri, 8 July 22	12:00 – 14:50	Lec 10 ● Reticular formation and electrical brain wave	WP
	15:00 – 16:50	Lab 10 ● Reticular formation and electrical brain wave	WP
Fri, 15 July 22	12:00 – 14:50	Oral presentation	AS and WP
	15:00 – 16:50	Lab review	AS and WP
Fri, 22 July 22	12:00 – 14:50	**FINAL LECTURE EXAMINATION**	AS and WP

2. Plan for Assessing Course Learning Outcomes

2.1 Assessing and Evaluating Learning Achievement

a. Formative Assessment

Presentation rubrics

Oral discussion self-evaluation using rubrics

Oral discussion evaluation using rubrics

Critical review paper evaluation rubrics

b. Summative Assessment

(1) Tools and Percentage Weight in Assessment and Evaluation

Learning Outcomes	Assessment Methods	Assessment Ratio (Percentage)
CLO1	Written assessment – MCQ, short answer, long answer	15
CLO2		15

CLO3		15
CLO4		15
CLO5		15
CLO5		25
	Total	100

(2) Grading System

Percentage	Achievement	Letter grade	GPA
90-100%	Excellent	A	4.0
86-89%	Very good	B+	3.5
80-85%	Good	B	3.0
75-79%	Fairly good	C+	2.5
70-74%	Fair	C	2.0
65-69%	Poor	D+	1.5
60-65%	Very poor	D	1.0
< 60%	Fail	F	0.0

(3) Re-examination (If course lecturer allows to have re-examination)

N/A - (Not applicable with MUIC)

3. Student Appeals

Student are able to submit appeals either in person or via email to athikhun.suw@mahidol.edu within 7 days of receiving the final grade.

Section 6 Teaching Materials and Resources

1. Textbooks and/or other documents/materials

Haines, D. E., Willis, M. A., & Lambert, H. W. (2019). Neuroanatomy atlas in clinical context: structures, sections, systems, and syndromes (10th edition.)

2. Recommended textbooks and/or other documents/materials

https://www.neuroanatomy.ca/

https://sketchfab.com/booniewatson_MEDSWU

3. Other Resources (If any)

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Section 7 Evaluations and Improvement of Course Management

1. Strategies for evaluating course effectiveness by students
   - Student evaluation at the end of the trimester
   - Verbal feedbacks from students
2. Strategies for evaluating teaching methods
   - Student evaluation at the end of the trimester
   - Verbal feedbacks from students
   - Obtain feedback from the other instructor
   - Reflection and submission of TQF5
3. Improvement of teaching methods
   - Continuously ask for feedback from students during the course
   - Student evaluation at the end of the trimester
   - Obtain feedback from the other instructor
4. Verification process for evaluating students' standard achievement outcomes in the course
   - Continuously ask for feedback from students during the course
   - Consultation with the other instructor
5. Review and plan for improving the effectiveness of the course
   - Revision of class materials, objectives and goals prior to the beginning of the course
   - Modification to the teaching pedagogy based on students' evaluation

Appendix

Alignment between Courses and Program

Table 1 The relationship between course and Program Learning Outcomes (PLOs)

Course Name	Program Learning Outcomes (PLOs)					
Scientific Research and Presentation	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
ICBI341	R	R	R	R	R	I

Note: Indicate the level of CLOs by letter I, R, P or M. Using the information as shown in the Curriculum Mapping of TQF2

Table 2 The relationship between CLOs and PLOs

ICBI 341	Program Learning Outcomes (PLOs)					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1 Describe the topography and structural organization of the meninges, spinal cord, brainstem, cranial nerves, cerebrum, diencephalon, limbic structures, basal ganglia and cerebellum	1.1				5.2, 5,4	

CLO2 Describe the arterial supply, venous drainage and the flow of cerebrospinal fluid of the brain and spinal cord	1.1				5.2, 5,4	
CLO3 Identify major structures and describe the function of the motor systems including voluntary movement and the control of posture	1.1				5.2, 5,4	
CLO4 Identify major structures and describe the function of the sensory systems including the somatosensory, vestibular, visual, and auditory systems.	1.1				5.2, 5,4	
CLO5 Identify major structures and describe the function of the limbic system, its nuclei, inputs and outputs.	1.1				5.2, 5,4	
CLO6 Integrate the information of structure and function in order to compare and contrast between different injury sites based on their location in the brain.	1.1, 1.4, 1.5		3.1		5.2, 5,4	

Table 3 The description of PLOs and Sub Los of the course

Program Learning Outcomes (PLOs)	SubPLOs
1. Apply knowledge and technical skills of diverse biological disciplines to address health, societal and environmental issues	1.1 Explain the fundamental and detailed knowledge of biological sciences

	1.2 Apply knowledge in biological sciences to address health, societal and environmental issues
	1.3 Perform experimentation in laboratory or field
	1.4 Apply technical skills in biological sciences to address health, societal and environmental issues
	1.5 Integrate biological sciences knowledge and technical skills across different disciplines to solve problems in biological sciences
2. Critically appraise information from scientific articles/journals, biological research methodology, and experimentation to draw a meaningful conclusion from the materials	2.1 Explain qualitative and quantitative data and/or ideas in basic biological sciences
	2.2 Draw meaningful conclusion from the learning materials such as scientific articles, research methodology, and scientific findings
	2.3 Retrieve relevant scientific information independently from textbooks, literatures, and databases
	2.4 Manage scientific literatures using a reference-management program

	2.5 Assess the scientific relevance of information acquired to the objective at hand
3. Proficient in oral and written communication of biological sciences concepts formally and informally to both scientific community and general audience	3.1 Proficient in oral communication of ideas, concepts, and findings in biological sciences to both the scientific community and the wider society
	3.2 Proficient in written communication of ideas, concepts, and findings biological sciences to both the scientific community and the wider society
4. Apply scientific integrity, professionalism, and competencies to function independently as well as a team player	4.1 Maintain data integrity using appropriate tools and acceptable methods
	4.2 Work independently or coordinate with others to complete tasks at hand
	4.3 Apply concepts of lab and fieldwork safety when carrying out the tasks
	4.4 Set, plan and accomplish the assigned project in a timely manner
5. Apply moral and ethical values when dealing with issues relating to humans, animals, and the environment, enabling actions	5.1 Recognize ethical issues in human and animal experimentation

based on moral and ethical judgment	
	5.2 Recognize emerging ethical issues in biological sciences
	5.3 Apply accepted ethical standards to resolve ethical dilemma
	5.4 Implement the course of action in accordance with moral and ethical judgment
6. Demonstrate innovative mindset to formulate and create solutions for situations relevant to oneself, the well-being of others, and the natural environment	6.1 Formulate lines of enquiry to drive problem-solving relevant to oneself, the well-being of others, and the natural environment
	6.2 Formulate a process for data acquisition based on scientific methodology
	6.3 Demonstrate systematic and logical thinking in formulating solutions through the application of knowledge and technical skills acquired from the different biological science disciplines
	6.4 Explain the potential for knowledge transfer to innovation
	6.5 Create networks to learn from others and create new ideas