CHEM8009: ADVANCED NEUROBIOLOGY

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Advanced Neurobiology

Subject Code
CHEM - Chemistry
Course Number
8009

Academic Unit
Chemistry (CHEM)

College/School
College of Science (SI)

Course Duration
One Semester

Credit Units
4

Level
R8 - Research Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
BCH8009 Advanced Neurobiology

Exclusive Courses
Nil

Part II Course Details

Abstract

This course aims to provide a solid foundation in the field of neurobiology at cellular and organismal levels, and the concepts of integrative neurobiology. This is targeted for graduate students who are interested in professional fields in animal and human neurophysiology, research, and medicine or veterinary sciences.

Students are encouraged to build broad and strong academic foundations and are urged not to specialize too heavily.

- Neuroanatomy: structure and function of nervous system

- Cellular neurophysiology: synapses, and circuits

- Systems neuroscience: integration of molecular mechanisms, anatomical circuits, and behavioral analysis to understand function of neural systems

- Fundamental topics in biological neuroscience: Brain-generated learning and memory; Pain and pleasure; Satiety and obesity

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the anatomy of central and peripheral nervous system at cellular, histological and regional systems levels.	20			
2	Describe the circuitry and neurochemistry of the vagus nerve and major brain regions.	20			
3	Explain the action potential and membrane potentials, channels and channel blockers, synaptic receptors, transmitter release, and sensory transduction.	30			
4	General overview to discover how the brain generates learning and memory, what is consciousness and why do we have pain and pleasure.	30			

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures, tutorials and laboratory demonstrations	Students will learn neuronal anatomy (rat) in lectures, tutorials, and small group laboratory demonstrations.	1	

2	Lectures, tutorials and laboratory demonstrations	Students will learn brain and vagal nerve that regulate gastric or pancreatic functions in lectures, tutorials, and small group laboratory demonstrations.	2	
3	Lectures, tutorials and laboratory practices	Lectures, tutorials and small group laboratory practices to perform electrical physiological recordings. The students will report their findings.	3	
4	Lectures, tutorials, written reports, oral presentations	Lectures and tutorials, in which internet resources and literature will be reviewed. Students will evaluate, discuss, and present their findings in the form of written reports and oral presentations.	4	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Short Quizzes	1, 2, 3, 4	20	-	Yes
2	Tutorial Discussion	1, 2, 3, 4	20	-	Yes
3	Lab Practice/ Report	3	10	-	Yes
4	Oral Presentation	4	10	-	Yes

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

40

Minimum Examination Passing Requirement (%)

40

Assessment Rubrics (AR)

Assessment Task

Short Quizzes (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

ABILITY to develop an understanding of the concepts taught in the course.

Assessment Task
Tutorial Discussion (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
ABILITY to develop an understanding of the concepts taught in the course.

Assessment Task
Lab Practice/ Report (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
ABILITY to develop an understanding of the concepts taught in the course.

Assessment Task
Oral Presentation (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
ABILITY to develop an understanding of the concepts taught in the course.

Assessment Task
Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
ABILITY to develop an understanding of the concepts taught in the course.

Assessment Task
Short Quizzes (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
ABILITY to develop an understanding of the concepts taught in the course.

Assessment Task
Tutorial Discussion (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
ABILITY to develop an understanding of the concepts taught in the course.

Assessment Task
Lab Practice/ Report (for students admitted from Semester A 2022/23 to Summer Term 2024)

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Assessment Task

Oral Presentation (for students admitted from Semester A 2022/23 to Summer Term 2024)

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Assessment Task

Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

ABILITY to develop an understanding of the concepts taught in the course.

Part III Other Information

Keyword Syllabus

- The basic structure features of nervous system
- Cellular neurophysiology: neurons, synapses, electrotonic properties, neurotransmitters, receptors, long-term potentiation
- Systems neuroscience: sensory, motor system, autonomic function and behavioral analysis
- Brain-generated learning and memory, pain perception

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Michael J. Zigmond (1999), Fundamental Neuroscience (2th edition) Academic Press USA