

BMS8108: ADVANCED NEUROSCIENCE

Effective Term

Semester B 2024/25

Part I Course Overview

Course Title

Advanced Neuroscience

Subject Code

BMS - Biomedical Sciences

Course Number

8108

Academic Unit

Biomedical Sciences (BMS)

College/School

College of Biomedicine (BD)

Course Duration

One Semester

Credit Units

3

Level

R8 - Research Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

NS8002 Advanced Neuroscience

Exclusive Courses

Nil

Part II Course Details

Abstract

This course aims to provide a solid foundation in the field of neuroscience 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.

- Neuroanatomy: structure and function of nervous system

- Cellular neurophysiology: synapses, and circuits

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

- Fundamental topics in biological neuroscience:

> 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.	30	x		
2	Explain the action potential and membrane potentials, channels and channel blockers, synaptic receptors, transmitter release, and sensory transduction.	30	x	x	
3	General overview to discover how the brain generates learning and memory, what is consciousness and why do we have pain and pleasure.	40	x	x	x

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	Lecture, tutorial	To demonstrate neuronal anatomy.	1	39 hours in total
2	Lecture, tutorial	To review literature about electrical physiological recordings. The students will report their findings.	2	39 hours in total

3	Lecture, tutorial, presentation	Internet resources and literature will be reviewed. Students will evaluate, discuss, and present their findings.	3	39 hours in total
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Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Participation: Attendance	1, 2, 3	30
2	Coursework	1, 2	30
3	Active Participation in Discussion	1, 2, 3	40

Continuous Assessment (%)

100

Examination (%)

0

Minimum Continuous Assessment Passing Requirement (%)

0

Minimum Examination Passing Requirement (%)

0

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 show the learning progress and express the knowledge

Excellent

(A+, A, A-) Outstanding performance on all CILOs. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

Good

(B+, B, B-) Substantial performance on all CILOs. Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

Fair

(C+, C, C-) Satisfactory performance on the majority of CILOs possibly with a few weaknesses. Being able to profit from the course experience; understanding of the subject; ability to develop solutions to simple problems in the material.

Marginal

(D) Barely satisfactory performance on a number of CILOs. Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure

(F) Unsatisfactory performance on a number of CILOs. Failure to meet specified assessment requirements, little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature

Assessment Task

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

Criterion

Participation in class and discussion

Excellent

(A+, A, A-) Outstanding performance on all CILOs. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

Good

(B+, B, B-) Substantial performance on all CILOs. Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

Fair

(C+, C, C-) Satisfactory performance on the majority of CILOs possibly with a few weaknesses. Being able to profit from the course experience; understanding of the subject; ability to develop solutions to simple problems in the material.

Marginal

(D) Barely satisfactory performance on a number of CILOs. Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure

(F) Unsatisfactory performance on a number of CILOs. Failure to meet specified assessment requirements, little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature

Assessment Task

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

Criterion

Ability to analyse and express the synthesis of ideas or test/report results in a clear and cogent manner

Excellent

(A+, A, A-) Outstanding performance on all CILOs. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

Good

(B+, B, B-) Substantial performance on all CILOs. Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

Fair

(C+, C, C-) Satisfactory performance on the majority of CILOs possibly with a few weaknesses. Being able to profit from the course experience; understanding of the subject; ability to develop solutions to simple problems in the material.

Marginal

(D) Barely satisfactory performance on a number of CILOs. Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure

(F) Unsatisfactory performance on a number of CILOs. Failure to meet specified assessment requirements, little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature

Assessment Task

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

Criterion

Ability to show the learning progress and express the knowledge

Excellent

(A+, A, A-) Outstanding performance on all CILOs. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

Good

(B+, B) Substantial performance on all CILOs. Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

Marginal

(B-, C+, C) Satisfactory performance on the majority of CILOs possibly with a few weaknesses. Being able to profit from the course experience; understanding of the subject; ability to develop solutions to simple problems in the material.

Failure

(F) Unsatisfactory performance on a number of CILOs. Failure to meet specified assessment requirements, little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature

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 behavioural analysis;
- Brain-generated learning and memory, pain perception

Reading List**Compulsory Readings**

Title	
1	Nil

Additional Readings

Title	
1	Larry R. Squire, Darwin Berg, Floyd E. Bloom, Sascha du Lac, Anirvan Ghosh & Nicholas C. Spitzer (2012), Fundamental Neuroscience (4th edition) Academic Press USA