

NS4001: BRAIN DISORDERS AND THERAPY

Effective Term

Semester B 2024/25

Part I Course Overview

Course Title

Brain Disorders and Therapy

Subject Code

NS - Neuroscience

Course Number

4001

Academic Unit

Neuroscience (NS)

College/School

College of Biomedicine (BD)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

GE1352 How Your Brain Works or NS1001 Brain Structure and Function or NS2002 Molecular and Cellular Neurobiology

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

The aim of this course is to provide student with an understanding of pathophysiology and therapy for a wide spectrum of brain disorders. Assuming students have taken the an introductory neuroscience course, therefore primary focus will be

on exploring neurodegenerative disorders (e.g. Parkinson), acute injury (e.g. stroke); neurodevelopmental disorders (e.g. Autism) and neuropsychiatric disorders (e.g. Schizophrenia). For each disease discussed, the section will be organized to introduce fundamental aspects of nervous system dysfunction, molecular mechanisms underlying disease pathogenesis, current treatments and on-going translational research for therapeutic invention. The class format will be a mix of lecture-based sessions and discussions of scientific articles. The topics will be addressed through scientific, literary and popular media in a combination of lectures and tutorials. There will be many opportunities for interactive group work and sharing of ideas during the classes. With these approaches, students will gain an understanding of disease presentation and current knowledge gap as well as preclinical models for investigating pathogenesis and developing new drug of human brain disorders.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Obtain a working knowledge of anatomy and physiology of the central nervous system.	15	x		
2	Understand the symptoms, signs and basic principles of major traumatic, neurodegenerative, neurodevelopmental disorders of the human brain.	20	x	x	
3	Explain the updated biological mechanisms underlying pathogenesis of multiple brain disorders.	20	x	x	x
4	Ability to present, interpret, and critically analyze preclinical studies of human disease reported in the scientific literatures.	15		x	x
5	Understand the basic principles and modalities of current treatments for multiple brain disorders. Gain ability to explain the utility and limitations of animal models for developing effective therapies for neurological disorders.	20		x	x
6	Identify knowledge gaps in our current understanding of biological mechanisms and treatment strategies for brain disorders.	10		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	Lectures & Tutorials	Learning and interactive discussion based on a combination of lectures and models to introduce brain structure and function, pathogenesis of brain disorders and current and future treatments.	1, 2, 3, 4, 5, 6	
2	Class discussion	Interactive discussions on scientific topics, preclinical studies in the scientific literatures and knowledge gaps will promote broader perspectives and a deeper critical understanding of the complex connections between issues of profound importance.	4, 5, 6	
3	Group presentation/ projects	Projects based task will be assayed to small groups by means of writing an essay or ppt presentation to demonstrate the creative, collaborative, and communication skills.	3, 4, 5, 6	

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Quizzes after lectures	3, 4, 5	25	
2	Projects based poster/ platform Presentation or writing assay	4, 6	25	
3	Class discussion, assignments, and attendance	1, 2, 3, 4, 5, 6	20	

Continuous Assessment (%)

70

Examination (%)

30

Examination Duration (Hours)

2

Assessment Rubrics (AR)

Assessment Task

Quizzes after lectures

Criterion

Correction

Excellent (A+, A, A-)

>75% of corrected questions.

Good (B+, B, B-)

>60 to 74% of corrected questions

Fair (C+, C, C-)

45% to 59% of corrected questions

Marginal (D)

40% to 44% of corrected questions

Failure (F)

Do not hand in the assignment on time, or correctly answered < 40% of the questions.

Assessment Task

Projects based poster/platform group presentation or writing essay

Criterion

The content, literature review and logic of the essay (75%). The session of questions and answer (25%) .

Excellent (A+, A, A-)

Demonstrates a high level of knowledge and integration regarding content, literatures, and issues. Provide clear answers with detailed explanations for questions.

Good (B+, B, B-)

Demonstrates a well-developed knowledge regarding content, literatures, and proposed topics. Provide clear answers for questions.

Fair (C+, C, C-)

Demonstrates s basic knowledge regarding content, literatures, and proposed topics. Provide answers partially for questions.

Marginal (D)

Demonstrates knowledge regarding content, literatures, and proposed topics but lack of logic and details.

Failure (F)

Lack ability to demonstrate the content, literatures, and proposed topics without logic and details.

Assessment Task

Class discussion, assignments, and attendance

Criterion

To be able to define the scientific concept and principles clearly and logical with integration. Able to discuss current limitations, advanced therapeutic platforms and ethical concerns with critical thinking. Raise up good questions will add additional mark.

Excellent (A+, A, A-)

Demonstrates a high level of understanding for the content with substantial integration. Develops deep thinking for discussed issues.

Good (B+, B, B-)

Demonstrates understanding of the content and develops deep thinking for discussed issues.

Fair (C+, C, C-)

Demonstrate a basic content. The discussed issues are easy to understand but lacking of details

Marginal (D)

Demonstrates a correct content but poor writing without discussion.

Failure (F)

Do not submit the essay or not involved in any discussion. The content is poorly written.

Assessment Task

Final Examination

Criterion

Correction of answers and able to describe key points of scientific based issues.

Excellent (A+, A, A-)

>75% of corrected questions. Clearly define and describe all key points for the issues.

Good (B+, B, B-)

>60 to 74% of corrected questions. Describe majority of key points for the issues.

Fair (C+, C, C-)

45% to 59% of corrected questions. Describe a few key points for issues.

Marginal (D)

40% to 44% of corrected questions. No key points are described.

Failure (F)

Not reaching marginal levels.

Part III Other Information

Keyword Syllabus

1. Introduction:

Course introduction & overview of brain disorders

Formation and functional diversity of the nervous system.

2. Neurodegenerative disorders:

Parkinson's disease

Alzheimer's disease

Multiple Sclerosis

Huntington's disease

3. Traumatic injury induced neurological disorders:

Traumatic brain injury

Spinal cord injury

Pain

4. Neurodevelopmental disorders:

Genetic etiologies for the neurological diseases

Disorders of intellectual, learning and speaking (Autism, Attention deficit hyperactive disorder, Dyslexia)

Disorders of motor coordination (Cerebral palsy, Dyspraxia and SMA)

5. Neuropsychiatric disorders:

Schizophrenia and Bipolar disorder

Obsessive Compulsion and addictive Disorder

6. Group based project

Poster or topical presentations

Reading List

Compulsory Readings

Title	
1	We set no compulsory textbooks for the course.

Additional Readings

Title	
1	“Cutting edge” recent publications, and review articles
2	Diseases of the Nervous System, 2nd Edition - May 18, 2021, Harald SontheimerBook ISBN: 9780128213964