



University of Nicosia, Cyprus

Course Code BIOL 461	Course Title Cellular Neuroscience	ECTS Credits 8
Department Life and Health Sciences	Semester Fall, Spring	Prerequisites BIOL- 321 Biochemistry I
Type of Course Elective	Field Human Biology	Language of Instruction English
Level of Course 1 st Cycle	Year of Study 3 rd or 4 th	Lecturer Dr Edna Yamasaki Patrikiou
Mode of Delivery face-to-face	Work Placement N/A	Co-requisites None

Objectives of the Course:

The aim of the course is to provide a comprehensive introduction into the cellular and molecular mechanisms mediating neuronal functions. The main objectives of the course are to:

- To provide a solid base in the basic operating principles of neurons and neuronal networks.
- To integrate anatomical, neurophysiological and chemical elements towards the better understanding of how cellular functions of neurons are related to behavior and cognition.
- To consider how hormonal and neurotransmission elements interact at the cell level to produce motivation and emotions

Learning Outcomes:

After completion of the course students are expected to be able to:

1. List and explain the cellular and molecular components of neuronal communication
2. Differentiate and discuss the various means through which neural transmission of information is achieved.
3. Identify and analyze the steps involved in chemical neurotransmission, and the actions and metabolic pathways of neurotransmitters
4. Cite and determine the basic mechanisms involved in the formation of action potentials and current flow
5. Describe and discuss the processes involved in neuronal degeneration/regeneration
6. Identify and trace comparisons between the main components and the

- organization of the sensory, motor and regulatory systems.
7. Identify the brain circuits involved in behavior and cognition
 8. Critically discuss and integrate neuronal function with behavior and cognition

Course Contents:

Cellular and Molecular Neuroscience

1. Cellular components of nervous tissue
2. Electrotonic properties of axons and dendrites
3. Membrane potential and action potential
4. Neurotransmitters
5. Release of Neurotransmitteres
6. Neurotransmitter receptors
7. Intracellular signaling
8. Postsynaptic potentials and synaptic integration
9. Complex information processing in dendrites
10. Brain energy metabolism

Sensory Systems, Motor Systems, Regulatory Systems

1. Fundamentals
2. Organization and components
3. Mechanisms involved in the regulation of sensory, motor and regulatory systems

Behavior and cognition

1. Cognition and Emotion
2. Language and Memory
3. Sleep

Learning Activities and Teaching Methods:

Lectures, presentations, slides/video projections, Practical exercises, assignments

Assessment Methods:

Assignments, Tests and Mid-term Exam; Final Exam

Required Textbooks:

Authors	Title	Publisher	Year	ISBN
1. Bear, MF, Connors, BW, Paradiso, M	Neuroscience: exploring the brain	Lippincott Williams & Wilkins	2007, 3 rd ed.	ISBN-0-7817- 6003-8

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
2. Squire, LR, Berg, D, Bloom, FE,	Fundamental Neuroscience	Academic Press, Elsevier	2008, 3 rd ed.	ISBN-978-0- 12-374019-9

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