

COURSE OUTLINE

Biological Basis of Behavior I

1. GENERAL

SCHOOL	SOCIAL SCIENCES		
DEPARTMENT	PSYCHOLOGY		
LEVEL	UNDERGRADUATE		
COURSE CODE:	ΨΧ-2301	SEMESTER	3 ^ο
COURSE TITLE:	BIOLOGICAL BASIS OF BEHAVIOR I		
INDEPENDENT TEACHING ACTIVITIES		WEEKLY HOURS	ECTS
Lectures		3	6
COURSE TYPE:	Specialized general knowledge (Compulsory)		
PREREQUISITES COURSES::	None		
INSTRUCTION/EXAM LANGUAGE:	Greek		
OFFERED TO ERASMUS STUDENTS	YES. Independent study of English literature and a final exam in English		
COURSE WEB PAGE (URL)	https://elearn.uoc.gr/course/view.php?id=5407		

2. LEARNING OUTCOMES

Learning Outcomes
<p>This course provides an introduction to the biological foundations of behavior. Its primary aim is to help students understand how the nervous system influences human behavior and the extent to which dysfunctions of this system contribute to the development of mental or other behavioral disorders. The topics addressed in the course are based the broader field of neuroscience and reflect the remarkable advances of recent years in our knowledge of brain function and its impact on our behavior.</p> <p>Upon successful completion of the course, students will be able to understand:</p> <ul style="list-style-type: none"> • The basic principles underlying the organization and functioning of the nervous system. • The ways in which psychotropic drugs affect the nervous system and behavior. • The impact of biological processes on behavior. • The methodological approaches employed in biopsychology. •The functioning of the sensory systems, with particular emphasis on the visual system. •The relationship between neural activity, sensation, perception, and their disorders.
General Competences
<ul style="list-style-type: none"> • Search for, analyze and synthesize data and information, with the use of the necessary technology. • Working independently. • Respect for diversity and multiculturalism. • Production of free, creative and inductive thinking. • Criticism and self-criticism

3. COURSE CONTENT

The course's content is linked to the 5 main axes of the curriculum:

Scientific Foundations [1], Scientific Research and Critical Thinking [2], Ethical and Social Responsibility [3], Communication Ability [4], Basic Preparation for Career Decisions and Vocational Rehabilitation [5].

Week 1: Biopsychology as a Discipline of Psychology. Historical Overview of Brain and Behavior Research [1, 2, 3, 5]

- Understanding human behavior: the biological perspective
- The field of Biopsychology / Behavioral Neuroscience
- What Is the relation between Biopsychology and the other disciplines of neuroscience?
- What types of research characterize the biopsychological approach?; ethical considerations [esp. 3]
- Divisions of Biopsychology
- Training and career development in Biopsychology / Behavioral Neurosciences [esp. 5]
- Historical overview of brain and behavior research

Week 2: The Cell as the Basic Unit of Life: Structure and Function. Cells of the Nervous System: Neurons and Glia [1, 2]

- The animal cell: structure and function
- Neurons
- Glia

Week 3: Basic Neuroanatomy – I [1, 2]

- Fundamental neuroanatomical terms
- Subdivisions and basic features of the nervous system
- Spinal cord
- Brain and its subdivisions: hindbrain, midbrain

Week 4: Basic Neuroanatomy – II [1, 2]

- Brain and its subdivisions: forebrain (telencephalon and diencephalon)
- Interhemispheric connections
- Limbic system
- Basal ganglia

Week 5: Membrane Permeability Mechanisms. Resting Potential. Graded Potentials [1, 2]

- Membrane permeability mechanisms
- Electricity and neurons
- Resting potential
- Graded potentials

Week 6: Action Potential. Nerve Impulse. Neuronal Integration [1, 2]

- The action potential

- Conduction of the action potential
- Neuronal integration: spatial and temporal summation
- How sensory stimuli generate action potentials and how nerve impulses produce movement

Week 7: Synapse. Synaptic Transmission [1, 2]

- Communication between neurons
- Electrical and chemical synapses
- Structure and types of chemical synapses
- Steps in neurotransmitter action
- Mechanisms drug action: agonistic and antagonistic effects

Week 8: Neurotransmitters I [1, 2]

- Acetylcholine
- Catecholamines

Week 9: Neurotransmitters II [1, 2]

- Serotonin
- Amino acids
- Peptides
- Soluble gas neurotransmitters
- Nucleotides: Adenosine
- Lipids: Endogenous cannabinoids

Week 10: Introduction to Psychopharmacology [1, 2]

- Principles of psychopharmacology: pharmacokinetics and pharmacodynamics
- Effects of chronic/repeated drug administration: tolerance, abuse and dependence, withdrawal syndrome
- Placebo effects
- Major classes of psychotropic drugs

Week 11: Research Methods in Biopsychology [1, 2, 3]

- Neuroanatomical techniques
- Stereotaxic surgery
- Experimental ablation: Producing brain lesions to study animal behavior
- Electrical and chemical brain stimulation
- Neurophysiological techniques in experimental animals
- Neurochemical techniques
- Behavioral methods – Animal behavioral paradigms
- Research ethics and ethical considerations [esp. 3]

Week 12: Principles of Sensory System Organization and Function [1, 2]

- Principles of sensory system organization
- Key properties of sensory stimuli

- Fundamental principles of sensory system function

Week 13: Visual System and Vision [1, 2]

- Psychological aspects of visual perception
- The stimulus
- Anatomy of the eye
- Optical errors of refraction and visual impairments
- Phototransduction in the retina
- Connections between the eye and the brain
- Coding of visual information in the retina
- Coding of visual information in the lateral geniculate nucleus
- Coding of visual information in the visual cortex
- Color vision and achromatopsia
- Disorders of object recognition
- Development of the visual cortex: critical periods, the role of experience and sensory deprivation

4. INSTRUCTIONAL and LEARNING METHODS - EVALUATION

INSTRUCTION METHOD.	In class (face-to-face).		
INFORMATION AND COMMUNICATION TECHNOLOGIES USED	Use of ICT in teaching Support for learning (communication with students and delivery of all course material) via the UoC e-learn online platform (moodle)		
TEACHING ORGANIZATION	Activity	Semester Workload (hours)	ECTS
	Lectures	39	1,56
	Independent study for test 1	18	0,72
	Independent study for test 2	18	0,72
	Independent study for final exam	75	3
	Final exam	2,5	0,10
	Course total	152,5	6,1
STUDENT EVALUATION	The evaluation (written exam with multiple choice questions and/or true false questions and/or open-ended questions) is in Greek for the students of UoC and in English for the Erasmus students. <ol style="list-style-type: none"> 1. Written final examination (80%) 2. Two in-class tests (20%) 		

	The evaluation criteria are presented during the 1st lecture of the semester. Moreover, all criteria are available to the students via the web-site of course on UoC e-learn platform.
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5. BIBLIOGRAPHY

Basic bibliography:

1. Breedlove, M., Rosenzweig, M. R., & Watson, N. V. (2011). *Biological psychology: An introduction to behavioral, cognitive, and clinical neuroscience* (6th ed.). Sinauer Associates.
2. Garrett, B., & Hough, G. (2021). *Brain & behavior: An introduction to behavioral neuroscience* (6th ed.). SAGE Publications.
3. Kalat, J. W. (2020). *Biological psychology* (14th ed.). Cengage Learning.
4. Kandel, E. R., Schwartz, J. H., & Jessell, T. M. (1995). *Essentials of neural science and behavior*. Appleton & Lange.
5. Kolb, B., Whishaw, I. Q., & Teskey, G. C. (2023). *An introduction to brain and behavior* (7th ed.). Worth Publishers.
6. Pinel, J. P., & Barnes, S. (2023). *Biopsychology* (11th ed.). Pearson.
7. Purves, D., Augustine, G. J., Fitzpatrick, D., Hall, W. C., LaMantia, A.-S., McNamara, J. O., & Williams, S. M. (2009). *Neuroscience* (5th ed.). Sinauer Associates.
8. Widmaier, P. E., Raff, H., & Strang, K. S. T. (2016). *Vander's human physiology: The mechanisms of body function*. McGraw-Hill Education.