Principles of Organic Chemistry [3640]

COURSE OUTLINE

(1) GENERAL

SCHOOL	ANIMAL BIOSCIENCES		
ACADEMIC UNIT	DEPARTMENT OF ANIMAL SCIENCE		
LEVEL OF STUDIES	Undergraduate [Required]		
COURSE CODE	**3640**	**SEMESTER**	**2nd**
COURSE TITLE	PRINCIPLES OF ORGANIC CHEMISTRY		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Course: Theory and Laboratory Practice (4+3)	7	6
Total	**7**	**6**

COURSE TYPE	Foundation course
PREREQUISITE COURSES:	NO
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS:	NO
COURSE WEBSITE (URL):	https://mediasrv.aua.gr/eclass/courses/EZPY145/
TEACHING STAFF:	THEORY: S. Haroutounian, S. Koulocheri LABORATORY: S. Koulocheri, S. Haroutounian, E. Zoidis

(2) LEARNING OUTCOMES

Learning outcomes

Introductory course to basic concepts and principles of Organic Chemistry with particular emphasis on the structure and functionality of organic compounds found in living organisms (biomolecules, drugs and pollutants).
Upon successful completion of the course, students will be able (according to Bloom) to:

- Know and understand the basic principles of Organic Chemistry, including inductive and mesomeric effects, resonance, and carbon hybridization (**Knowledge / Understanding**).
- Know and understand the nomenclature, structures, and characteristic properties of the major classes of organic compounds, along with their characteristic reactions (**Knowledge / Understanding**).
- Understand the structure and functionality of organic molecules found in living organisms (**Knowledge / Understanding**).
- Know the basic spectroscopic techniques utilized for the identification of the structure of organic molecules (**Knowledge / Understanding**).
- Recognize and understand the molecular structures and main reactions of the major classes of organic compounds (**Knowledge / Understanding / Application**).
- Understand the basic principles and main rules of stereochemistry (**Knowledge / Comprehension**).
- Comprehend the basic principles of spectroscopy techniques (UV, IR, NMR, MS) and their applications for determining the structure of organic molecules (**Knowledge / Comprehension / Application**).
- Distinguish the main classes of organic compounds and biomolecules, understand their properties and biological functions, as well as their mechanisms of action (**Analysis / Understanding / Application**).
- Use basic laboratory equipment and develop skills for problem-solving and data processing (**Application / Analysis / Synthesis**).

General Competences

Data analysis-synthesis, information mining. Application of relevant technologies
Adapting new situations
Work as individual
Teamwork (in the lab)
Working in a multidisciplinary environment
Respect the natural environment
Exercise criticism and self-criticism
Promotion of creative and inductive thinking

(3) SYLLABUS

THEORY

• Electronic Theories (atomic structure, orbitals, bonds, carbon hybridization, inductive and mesomeric effects, resonance).
• Stereochemistry (general concepts, asymmetric carbons and molecules, three-dimensional molecular structure, enantiomeric and diastereomeric structures, racemic mixtures, mesocompounds, cis-trans and E-Z stereoisomers).
• Nomenclature of Organic molecules
• Classification of reactions and reagents. Reaction mechanisms (addition, substitution). Acidity - basicity of molecules.
• Spectroscopy - Structure determination (basic principles and applications in structure determination)
o Ultraviolet
o Infrared
o Nuclear Magnetic Resonance
o Mass spectrometry
• Chemistry of Functional Groups (structure, reactivity, major reactions)
o Alkanes
o Alkenes
o Alkynes
o Alkyl halides,
o Alcohols, ethers
o Carbonyl compounds
o Acids and their derivatives
o Amines
o Aromatic compounds
• Biomolecules (applications and utility)
o Carbohydrates (aldoses, ketoses, monosaccharides or disaccharides, D or L sugars, Fischer and Haworth projections, chair conformation and basic properties-reactions of monosaccharides) o Amino acids-Peptides-Proteins (acid base properties, structure, synthesis and sequence of peptides, protein structures)
o Lipids (fatty acids-fats-oils-triglycerides)
o Isoprene compounds (terpenoids-carotenoids-steroids)
o Vitamins-Hormones
o Nucleic Acids (purines, pyrimidines, nucleosides and nucleotides, DNA and RNA)

LABORATORY

• Introduction, Organic Chemistry Laboratory Safety Rules, Basic Laboratory Equipment
• Extraction-Filtration I (Separation of benzoic acid from organic and inorganic impurities)
• Extraction-Filtration II (Extraction of α- and β-chlorophyll, lycopene, and carotene)
• Spectrophotometry I (Qualitative determination of α- and β-chlorophylls)
• Spectrophotometry II (Quantitative determination of β-carotene sample)
• Thin Layer Chromatography (TLC)
• Acid-Base Properties of Amino Acids
• Detection of Amino Acids
• Detection of Aldoses – Ketoses – Polysaccharides
• Column Chromatography (CC)
- Bibliographic Study

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to face (theory-laboratory) and remote support via Email
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	Power point presentations and video projections in lectures Use of e-class platform Students' support via e-mail
TEACHING METHODS	

Activity	***Semester workload***
Lectures	52
Laboratory practices	39
Individual work	55
Team work	29
Course total (25 h of workload per ECTS)	***175***

STUDENT PERFORMANCE EVALUATION	**Theory** Optional attendance of the Lectures by the students. Written exams (100%) (either as final exam or as the sum of two progress exams during the semester)

	Laboratory "Mandatory attendance of laboratory exercises by the students with attendance recording. Written exam (Multiple choice questions, simple questions and problems) 80% Individual work assignment 20 % or Written exams (100%) Short answers to questions before every practice, 20% Written exam (Multiple choice questions, simple questions and problems) 60% Individual work assignment 20% III. The language of the assessment is Greek. IV. The assessment criteria are communicated to the students.

(5) ATTACHED BIBLIOGRAPHY

Theory

• All lectures are available at e-class as power-point presentations

Books:

• «ORGANIC CHEMISTRY» (translated from English), John McMurry, Edit. University of Crete
• «ORGANIC CHEMISTRY» (translated from English), L.G. WADE Jr., TZIOLAS eds
• "BASIC ORGANIC CHEMISTRY», (translated from English), Bruice, Yurkanis P., Broken Hill Publishers Ltd eds"

Laboratory

• S. Koulocheri, Laboratory Exercises in the Principles of Organic Chemistry, Agricultural University of Athens (AUA), 2025.

• The theoretical part is available on e-class as PowerPoint presentations.