

# GENERAL ORGANIC CHEMISTRY

**Code number: NP18-20**

**Cycle : Undergraduate**

**Semester : 3**

**Course Type**

<b>X</b>	Background / General Knowledge
	Scientific area: Pharmacy

**Credit units (ECTS): 6,5**

**Lectures (hours per week): 3**

**Tutorial (hours per week): 2**

**Course coordinator: Konstantinos Litinas, Elisavet Malamidou-Xenikaki**

**Tutor (s):**

1) Konstantinos Litinas,  
Office 308, 1st floor, Old Chemistry Building.  
Time for collaboration with students: everyday

E-mail: klitinas@chem.auth.gr

2) Christos Stathakis,  
Office 303, 1st floor, Old Chemistry Building.  
Time for students: everyday

E-mail: cstathakis@chem.auth.gr

**Assistant personnel: .**

**Aims of the course:** The study of the basic principles of modern Organic Chemistry and the understanding of their importance/significance on the structure and reactivity of molecules as well as their interaction. Therefore, the course covers the general principles of Organic Chemistry and the chemistry of alkanes, alkenes, alkynes, alkyl halides, alcohols, phenols, ethers, epoxides, thiols and sulfides. In the Laboratory the tutoring covers experiments of principal laboratory techniques and simple organic reactions.

**Skills:** Familiarization with the basic principles of Organic Chemistry.

**Teaching methods:** Lectures and tutoring.

**Contents of the course:** Study and investigation of the basic principles of Organic Chemistry. Study for some classes of organic compounds. The aforementioned subjects can be classified in the following chapters:

Electrons, Bonds and Molecular Properties.

Molecular Representations, Resonance

Acids and Bases

Alkanes and Cycloalkanes

Stereoisomerism

Chemical Reactivity and Mechanisms

Substitution Reactions

Alkenes: Structure and Preparation via Elimination Reactions

Addition Reactions of Alkenes

Alkynes

Radical Reactions

Synthesis

Alcohols and Phenols

Ethers and Epoxides; Thiols and Sulfides

**Suggested Literature:**

- «ΟΡΓΑΝΙΚΗ ΧΗΜΕΙΑ, ΤΟΜΟΣ Ι», David Klein, Εκδόσεις Utopia, Αθήνα, 2015.

- «ΟΡΓΑΝΙΚΗ ΧΗΜΕΙΑ », Marc Loudon & Jim Parise  
Εκδοτικός Οίκος: Broken Hill Publishers Ltd, Nicosia, Cyprus, 2019.

- «ΟΡΓΑΝΙΚΗ ΧΗΜΕΙΑ ΤΟΜΟΣ Ι», J. McMurry, Πανεπιστημιακές Εκδόσεις Κρήτης, Ηράκλειο Κρήτης, 2007.
- «ΟΡΓΑΝΙΚΗ ΧΗΜΕΙΑ, ΔΟΜΗ ΚΑΙ ΛΕΙΤΟΥΡΓΙΚΟΤΗΤΑ, Τόμος Α, Έκτη Έκδοση», K. P. C. Vollhardt, N.E. Schore, Εκδοτικός Οίκος Αδελφών Κυριακίδη, Θεσσαλονίκη, 2012.
- «ΟΡΓΑΝΙΚΗ ΧΗΜΕΙΑ, ΔΟΜΗ ΚΑΙ ΛΕΙΤΟΥΡΓΙΚΟΤΗΤΑ, Τόμος Β, Έκτη Έκδοση», K. P. C. Vollhardt, N.E. Schore, Εκδοτικός Οίκος Αδελφών Κυριακίδη, Θεσσαλονίκη, 2012.
- «ORGANIC CHEMISTRY”, H. Beyer and W. Walter, Translator and Editor D. Lloyd, Albion Chemical Science Series, Chichester, England, 1997.
- «ORGANIC CHEMISTRY, Fourth Edition», T. W. Graham Solomons, John Wiley & Sons, New York, 1988.
- «ADVANCED ORGANIC CHEMISTRY, Reactions, Mechanisms, and Structure, Fourth Edition», J. March, Wiley-Interscience Publication, John Wiley & Sons Inc., New York, 1992.
- «ΜΑΘΗΜΑΤΑ ΟΡΓΑΝΙΚΗΣ ΧΗΜΕΙΑΣ ΜΕΡΟΣ ΠΡΩΤΟ», Δ. Ν. Νικολαΐδης, Εκδόσεις Ζήτη, Θεσσαλονίκη 1987.
- «ΟΡΓΑΝΙΚΗ ΧΗΜΕΙΑ», Ν. Ε. Αλεξάνδρου-Α. Γ. Βάρβογλη, Εκδόσεις Ζήτη, Θεσσαλονίκη, 1986.

#### **Educational activities:**

Lectures, discussion with the students in every lecture.

#### **Evaluation process:**

Written examination at the end of the semester covering the knowledge of the students and their ability of critically evaluating different problems of Organic Chemistry. All examined subjects are graded equally. The duration of the examinations is 3 hours.

#### **Use of ΠΠΕ / electronic distribution of the lectures:**

Lectures and tutorials are based on Power point presentation or overhead transparent-film presentation.

The lectures are available online on the corresponding tutors' site at [www.chem.auth.gr](http://www.chem.auth.gr).

#### **Teaching (lectures, tutorials, supervisions)**

Teaching of this course is accomplished through lectures and supervisions.

Lectures . The lectures (5 hours per week) are taking place in lecture room A on the ground level, of the Old Chemistry Building.

The lectures are available online on the corresponding tutors' site at [www.chem.auth.gr](http://www.chem.auth.gr)

<b>Lecture</b>	<b>Title</b>	<b>Tutor</b>
<b>1-4</b>	Electrons, Bonds and Molecular Properties. Induction. Orbitals. Intramolecular Forces. Dipole Moment. Solubility.	<b>K. Litinas</b>
<b>5-7</b>	Molecular Representations, Resonance.	<b>K. Litinas</b>
<b>8-9</b>	Acids and Bases (Bronsted-Lowry and Lewis).	<b>K. Litinas</b>
<b>10-13</b>	Alkanes and Cycloalkanes. Nomenclature of Organic Compounds. Stereochemistry of alkanes and cycloalkanes. Stereoisomerism Cis-Trans.	<b>K. Litinas</b>
<b>14-15</b>	Stereoisomerism.	<b>K. Litinas</b>
<b>16-18</b>	Chemical Reactivity and Mechanisms. Equilibrium. Kinetics. Nucleophiles and Electrophiles.	<b>K. Litinas</b>
<b>19-21</b>	Substitution Reactions. Alkyl Halides. S <sub>N</sub> <sup>1</sup> and S <sub>N</sub> <sup>2</sup> Mechanisms.	<b>C. Stathakis</b>

<b>22-25</b>	Alkenes: Structure and Preparation via Elimination Reactions. Stereoisomerism of Alkenes. E2 and E1 Mechanisms. Substitution versus Elimination.	<b>C. Stathakis</b>
<b>26-28</b>	Addition Reactions of Alkenes. Hydrohalogenation. Hydration. Oxymercuration. Hydroboration. Catalytic Hydrogenation. Halogenation. Dihydroxylation. Oxidation.	<b>C. Stathakis</b>
<b>29-31</b>	Alkynes. Preparation. Acidity of Acetylene and Terminal Alkynes. Reduction. Hydrohalogenation. Hydration. Halogenation. Ozonolysis. Alkylation of Terminal Alkynes.	<b>C. Stathakis</b>
<b>32</b>	Radical Reactions. Chlorination of Methane. Allylic Bromination. Anti-Markovnikov Addition.	<b>C. Stathakis</b>
<b>33-35</b>	Alcohols and Phenols. Acidity. Preparation. Reactions. Alcohol Protection.	<b>C. Stathakis</b>
<b>36-38</b>	Ethers and Epoxides; Thiols and Sulfides. Preparations. Reactions. Strategic Synthesis from Epoxides.	<b>C. Stathakis</b>
<b>39-40</b>	Synthesis. Retrosynthetic Analysis. Functional Group Interconversion.	<b>K. Litinas</b>