COURSE ID SHEET

Course No.	5276	NTUA

Semester:	4	Core	X	Elective		Specialization	

Title: **ORGANIC CHEMISTRY**

Aim: The aim of the course is to provide a good, solid grounding in the main concepts of Organic Chemistry. The syllabus incorporates the study of covalent bond formation in organic compounds (single, double, triple, conjugated system, aromatic system and polar covalent bond) as well as the chemical behavior of organic compounds under different conditions. The reactivity of organic molecules and the main reaction mechanisms are studied according to the functional group, in order to correlate the structure of organic compounds to their chemical behavior. In addition, the main applications of organic molecules in the production of fine chemicals, commodity chemicals, active pharmaceutical ingredients, materials, food products etc. are presented in each case.

Content: (i) Organic molecules structure and reactions: how to form bonds in carbon compounds, stereochemistry and reaction classes of organic compounds. (ii) Alkanes: structure, activity and characteristic reaction of alkanes (free radical substitution), cycloalkanes (structure, conformational analysis and reactions). (iii) Alkenes: alkene structure, mechanism of electrophilic addition reaction, elimination reactions (alcohol dehydration, dehydrohalogenation of alkyl halides, mechanisms E1, E2). (iv) Alkynes: structure and activity of alkynes, keto-enol tautomerism, acidity of alkynes. (v) Conjugated dienes: structure, activity and reactions of conjugated dienes (1,2- and 1,4- addition). (vi) Aromatic compounds: aromatic character, benzene structure and characteristic reaction (electrophilic aromatic substitution). (vii) Alkyl halides: structure and activity of alkyl halides, nucleophilic substitution reactions (SN1 & SN2 mechanisms). (viii) Alcohols: preparation reactions, physical and chemical properties of alcohols, mechanisms of characteristic reactions of alcohols. (ix) Ethers and epoxides: preparation reactions and mechanisms of characteristic ether and epoxide reactions. (x) Aldehydes and ketones: aldehyde and ketone preparation reactions, carbonyl addition reactions, activity of the α -hydrogen and condensation reactions. (xi) Carboxylic acids and their derivatives: preparation reactions and physicochemical properties of carboxylic acids and their derivatives (acid chlorides, anhydrides, esters, amides) as well as their physicochemical properties. (xii) Carboxylic Acid Derivatives: nucleophilic acyl substitution reactions. (xiii) Characteristic reactions of carbonyl compounds: mechanisms of characteristic reactions (name reactions) - e.g., Claisen condensation. (xiv) Amines: amines basicity, preparations and characteristic reactions of amines.

Hours per semester:

LECTURE	**52**	EXERCISES	-	LABORA-TORY	**52**	HOME-WORK	**106**	**TOTAL HOURS: 210**

Student performance /evaluation:	The final grade is calculated as the sum of (a) the grade in the Final Written Examination (60%) and (b) the grade in the Laboratory Assessment (40%). The grade of the Laboratory Assessment will be considered in the final grade only if the degree in the Final Written Examination is higher than 5.0.