

Syllabus

Course title

Organic Chemistry and Introduction to Environmental Chemistry

<i>faculty</i>	Fields of study:	Environmental Engineering, Environmental Protection, Materials Science, Geology, Metallurgy, Mechanical Engineering, Energy/Power Engineering, Chemical Technology and others where general knowledge of organic and environmental chemistry is required
	Specialisation:	all
	Level of study:	Undergraduate and graduate
	System of education:	Full-time and extra-mural

Course: mandatory or elective				ECTS points: 6			
Semester	Nmber of hours	L	C	P	Lab	Seminar	Completion/Exam
Fall and/or Summer	45	30			15		Exam

Course content (Lectures)
Course designed to give basic information on chemistry of carbon compounds with a special attention given to those playing essential role in the environment Chemistry is defined as the science that deals with the composition, structure, and properties of substances and the changes they undergo. Organic chemistry refers to the compounds composed of carbon and hydrogen (hydrocarbons) and their derivatives including mainly oxygen, nitrogen, sulphur. Environmental chemistry applies this body of science to understanding and predicting the fate and transport of chemical substances in nature and to the engineering design of systems to reduce or remove pollution. It is absolutely essential that environmental engineers have a good knowledge of environmental chemistry. Basics of the chemistry of carbon. Inorganic carbon compounds. Classification of hydrocarbons and other organic compounds. Aliphatic compounds. Alkanes, alkenes and alkynes. Cyclic compounds. Crude oil as a source of hydrocarbons. Aromatic compounds. Alcohols, aldehydes, ketones, carboxylic acids, amines, carbohydrates, fats. Processes of polymerization and polycondensation. Plastics, structure, classification, applications. Aminoacids, peptides, proteins. Nucleic acids, DNA and RNA. Chemical foundations of life and its replication. Introduction to environmental chemistry. Environment an its components. Chemical composition of outer layers of the planet Earth. Chemical composition of the crust, hydrosphere and atmosphere. Biosphere, its composition and range. Ecosystems. Cycles of carbon, nitrogen, oxygene in nature.

References (Basic):
Raymond Chang , Chemistry, McGraw-Hill, 1998 Robert T. Morrison, Robert N. Boyd, Organic Chemistry, Allyn and Bacon, Inc., Boston, Massachusetts, 1973 Linus Pauling, Peter Pauling, Chemistry, W.H.Freeman and Company, San Francisco 1975
Environmental Chemistry Peter O'Neill Chapman & Hall, UK, 1993 (second edition) Environmental Chemistry

Colin Baird
W.H. Freeman and Company, N.Y. 1998

References (Additional):

Environmental Chemistry, A Modular Approach
Ian Williams,
John Wiley & Sons,Ltd, 2005

Elements of Environmental Chemistry
Ronald A. Hites
Wiley-Interscience, A John Wiley & Sons,Inc., Publications, 2007

An Introduction to Environmental Chemistry
J.E.Andrews, P.Brimblecombe,T.D.Jickells, P.S.Liss, B.J. Reid,
Blackwell Publishing, Second Edition 2004
Linus Pauling, Peter Pauling , Chemistry

Optional books for Polish students (in Polish)

Robert T. Morrison, Chemia organiczna, Wyd. Nauk. PWN, Warszawa 1994
Lech Pajdowski, Chemia ogólna, Wyd. Nauk. PWN, Warszawa 1999
Peter O'Neill , Chemia środowiska, Wyd. Nauk.PWN 1998

Expected learning outcome:	Understanding the structure, classification and fundamental chemical properties of organic compounds and basic knowledge concerning the scope of environmental chemistry, components of the environment and their chemical composition
Language of instruction:	English
ERASMUS subject code:	13.3 (chemistry), 07.2 (environmental sciences, ecology)
Prerequisites:	No prerequisites for foreign students. Suggested requirement: basic knowledge of general chemistry. Suggested requirement for Polish students is completion of General Chemistry course in Polish.
Assessment method:	Examination (written or oral)
Unit:	Department of Environmental Sciences in Energy Research, Faculty of Energy Research and Fuels
Lecturer:	Prof. Janusz Gołaś
Modified:	January, 2009