

Course Syllabus

I. General Information

Course name	Organic chemistry – basic course
Programme	Biotechnology
Level of studies (BA, BSc, MA, MSc, long-cycle MA)	BSc
Form of studies (full-time, part-time)	full-time
Form of studies	stationary
Discipline	chemistry
Language of instruction	English

Course coordinator/person responsible	ScD., Oleg M. Demchuk
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Type of class (<i>use only the types mentioned below</i>)	Number of teaching hours	Semester	ECTS Points
lecture	30	II	6
tutorial	-	-	
classes	-	-	
laboratory classes	30	II	
workshops	-	-	
seminar	-	-	
introductory seminar	-	-	
foreign language classes	-	-	
practical placement	-	-	
field work	-	-	
diploma laboratory	-	-	
translation classes	-	-	
study visit	-	-	

Course pre-requisites	General chemistry, inorganic chemistry, elements of physical chemistry
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II. Course Objectives

Acquire skills of the naming, writing formulas and classification main organic compounds, important for biotechnology, basing on their functional groups
Acquire knowledge about preparation and properties of organic compounds
Acquire skills of the assigning of biosphere components to suitable organic groups
Acquire practical skills of carrying out chemical reactions by students
Learning of the analytical methods and basics of synthesis of organics

III. Course learning outcomes with reference to programme learning outcomes

Symbol	Description of course learning outcome	Reference to programme learning outcome
KNOWLEDGE		
W_01	Student describes issues in the field of organic chemistry required to understand and interpret basic natural phenomena and processes	K_W02
W_02	Student presents the principles of health, safety work and ergonomics, indicates the psychophysical possibilities of a human in the work environment in laboratory of organic chemistry	K_W09
SKILLS		
U_01	Student applies techniques and research tools in the field of organic chemistry for biotechnology students	K_U01
U_02	Student carries out observations and performs chemical measurements	K_U02
U_03	Student describes, explains and interprets chemical and physicochemical phenomena at an advanced level	K_U08
U_04	Student performs qualitative and quantitative analyzes of organic compounds by using classical and instrumental method	K_U10
U_05	Student uses statistical methods and information technology to describe natural phenomena as well as to analyze and process experimental data	K_U14
U_06	Student designs and performs research tasks or expertise in the field of organic chemistry.	K_U15
SOCIAL COMPETENCIES		
K_01	Student possesses appropriate habits required to the work in scientific laboratories especially in organic chemistry, proceeds according to work safety regulations, knows how to react in states of danger.	K_K04

IV. Course Content

Lecture: The structure and properties of organic compounds – chemical bonds, electron configuration, polarity, intermolecular forces. Isomerism. The nomenclature of organic compounds. Saturated-, unsaturated hydrocarbons, aromatic hydrocarbons, alcohols, ethers, carboxylic acids, aldehydes, ketones, esters, amines, phenols, fats, carbohydrates – preparation, physical and chemical properties, mechanisms of reactions. Polymers, their structure and properties. Detergents and their properties. Amino acids, peptides, proteins and their properties.

Classes: Safety principles for work in the Organic Chemistry Laboratory. General laboratory glassware and accessories used in the synthesis of organic compounds. Presentation of chemical structures, chemical reaction and their molecular mechanisms. Determination of organic carbon contents by means of Turin's method. Chemical properties of alkanes, alkenes and alkynes. The techniques of distillation. Detection of carbonyl compounds and their characteristic reactions. Detection of carboxylic acids and their characteristic reactions. Properties of alcohols, esterification

and etherification reactions. Determination of heteroatoms: nitrogen, sulphur, halogens. Physical and chemical properties of lipids, saponification reaction, determination of unsaturated lipids. Determination of selected properties of detergents. Properties of aromatic compounds. Characteristic reactions of mono- and disaccharides. Determination and proteins of amino acids and properties. The crystallisation and sublimation techniques.

V. Didactic methods used and forms of assessment of learning outcomes

Symbol	Didactic methods	Forms of assessment	Documentation type
KNOWLEDGE			
W_01	Conventional lecture	Written exam	Written exam
	Laboratory analysis	Test	Completed and evaluated test
W_02	Laboratory analysis	Observation	Rating card / Report from observation
SKILLS			
U_01	Laboratory classes	Report	Protocol / Print / Report file
U_02	Laboratory classes	Report	Protocol / Print / Report file
U_03	Laboratory analysis	Test	Completed and evaluated test
U_04	Laboratory classes	Report	Protocol / Print / Report file
U_05	Laboratory classes	Report	Protocol / Print / Report file
U_06	Laboratory classes	Report	Protocol / Print / Report file
SOCIAL COMPETENCIES			
K_01	Laboratory classes	Observation	Rating card / Report from observation

VI. Grading criteria, weighting factors.

Lecture: Written exam in the form of test - 90%, participation in the lectures - 10%

Classes: Partial tests – 80%, active participation in the classes - 10%, preparation of report – 10%.

Mark	Evaluation criteria	
very good (5)	the student realizes the assumed learning outcomes at a very good level	the student demonstrates knowledge of the education content at the level of 91-100%
overgood (4.5)	the student accomplishes the assumed learning outcomes an over good level	the student demonstrates knowledge of the education content at the level of 86-90 %
good(4)	the student accomplishes the assumed learning outcomes at a good level	the student demonstrates knowledge of the education content at the level of 71-85%

quite good(3.5)	the student accomplishes the assumed learning outcomes at a quite good level	the student demonstrates knowledge of the education content at the level of 66-70%
sufficient (3)	the student accomplishes the assumed learning outcomes at a sufficient level	the student demonstrates knowledge of the education content at the level of 51-65%
insufficient (2)	the student accomplishes the assumed learning outcomes at an insufficient level	the student demonstrates knowledge of the education content below the level of 51%

VII. Student workload

Form of activity	Number of hours
Number of contact hours (with the teacher)	60
Number of hours of individual student work	100

VIII. Literature

Basic literature
Morrison R.T. , Boyd R.N. Organic Chemistry, Prentice Hall; 6th edition, 1992. Bruice P.Y. Organic Chemistry, 6th Edition, Prentice Hall, Pearson Education, Inc. 2011. Clayden J., Greeves N., Warren N., Wothers P.: Organic chemistry, Oxford University Press, 2012. Clayden J., Warren S.: Solutions Manual to accompany Organic Chemistry, 2nd edition, Oxford University Press, Oxford 2013. Loudon G.M.: Organic Chemistry, 4th edition, Oxford University Press, Oxford 2002. Solomons G., Fryhle C., Snyder S., Organic Chemistry, 11e, John Wiley & Sons, Inc. 2014.
Additional literature
Bruckner R. Organic mechanisms, Reactions, Stereochemistry and Synthesis, Springer-Verlag, Berlin, 2010. Putz M.V. Carbon Bonding and Structures, Advances in Physics and Chemistry, Springer, 2011. Seager S.L., Slabaugh M.R. Organic and Biochemistry for Today, 6th Edition, Brooks/Cole, a division of Thomson Learning, Inc. 2008. Parsons A.F. Keynotes in Organic Chemistry, Blackwell Science Ltd. 2003. Heinz Becker, Werner Berger, Günter Domschke, Organicum: Practical Handbook of Organic Chemistry, Elsevier, 2013.