STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Organic chemistry		**1010701131010720012**
Field of study: **Chemical and Process Engineering**	Profile of study (general academic, practical): **(brak)**	Year /Semester: **2 / 3**
Elective path/specialty: **-**	Subject offered in: **Polish**	Course (compulsory, elective): **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time): **full-time**	
No. of hours: Lecture: **45** Classes: **30** Laboratory: **30** Project/seminars: **-**		No. of credits: **5**
Status of the course in the study program (Basic, major, other): **(brak)**	(university-wide, from another field): **(brak)**	
Education areas and fields of science and art: **technical sciences** **Technical sciences**		ECTS distribution (number and %): **7 100%** **7 100%**

Responsible for subject / lecturer:

dr hab. inż. Aleksandra Borowiak-Resterna
email: aleksandra.borowiak-resterna@put.poznan.pl
tel. 616653689
Faculty of Chemical Technology
ul. Piotrowo 3 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	The student has a basic knowledge of general and organic chemistry at the level of general education school.
2	**Skills**	1. The student is able to solve the simple problem tasks of organic chemistry based on his knowledge. 2. The student has the ability to obtain information from the identified sources.
3	**Social competencies**	The student is aware of the need to broaden his knowledge.

Assumptions and objectives of the course:

1. Provide students with basic knowledge of organic chemistry, to the extent specified by the content of the curriculum of the chemical and process engineering field of study.

2. Develop students' ability to solve basic problems in the synthesis of simple organic compounds and the problems related to the reactivity of compounds containing various functional groups.

3. Develop students' awareness of the responsibility for their future decisions relevant to the chemical engineer work.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. The student has ordered, theoretically founded general knowledge in the field of organic chemistry; the student knows the issues related to the theory of orbitals and resonance, and characteristic reactions (including mechanisms) of major groups of organic compounds. - [K_W03]

2. The student is able to plan the method of synthesis of simple organic compounds with different functional groups which may be used in chemical industry; The student is able to characterize the substrates needed and he is able to analyze the resulting products. - [K_W09]

3. The student knows the physical-chemical properties of different groups of organic compounds and is aware of the need to use appropriate precautions when using them in laboratory work; the student understands the need for neutralization and segregation of waste substances. - [K_W08]

Skills:

1. The student is able to obtain information from the literature, electronic databases and other sources properly selected, he is able to interpret and draw conclusions, also practical. - [K_U01]

2. The student has the ability to self-education. - [K_U05]

3. The student knows the safety rules related to work in the chemical laboratory. - [K_U12]

Social competencies:

1. The student understands the need to improve his professional qualifications. - [K_K01]
2. The student is aware of the importance of the decisions on the future of engineering activities, their comprehensive impact on the environment. - [K_K02]
3. The student is able to work with full responsibility individually, and also is ready to work efficiently in a team, performing work-related tasks in the chemical laboratory. - [K_K04]

Assessment methods of study outcomes

Lectures - Assessment of knowledge and skills on the basis of written and oral examination.

Exercises - Individual oral answer, written tests summarizing the material concerning the nomenclature, methods of synthesis and reactivity of important classes of organic compounds.

Laboratories - Written test or oral response before each exercise based on materials provided by the Laboratory teacher; evaluation of the implementation of synthesis of selected organic compounds as well as purification of the crude product, while maintaining the safety rules related to work in the chemical laboratory.

Course description

Introduction: the nomenclature and stereochemistry of organic compounds (IUPAC rules), the theory of orbitals, hybridization, chemical bonding, resonance, polarity of bonds and molecules.

The concept of acidity and basicity. Types of chemical reactions and mechanisms. Transition states, the formation of intermediate products. Kinetically and thermodynamically controlled reactions. Rearrangements. Tautomerism.

Methods of synthesis and reactivity of the major classes of organic compounds: alkanes, alkenes, alkynes, aromatic compounds, alkyl halides, organometallic compounds, alcohols and phenols, aldehydes and ketones, carboxylic acids and their derivatives, amines and nitro compounds.

The basic issues concerning the construction and reactivity of biomolecules: carbohydrates, lipids, amino acids, proteins.

Laboratory techniques used in organic synthesis.

The safety rules associated with working in an organic chemistry laboratory.

Basic bibliography:

1. J. McMurry, Chemia organiczna, PWN, Warszawa 2007.
2. R.T. Morrison, R.N. Boyd, Chemia organiczna, PWN, Warszawa 1998.
3. A. Vogel, Preparatyka organiczna, WNT, Warszawa 2006.
4. A. Zwierzak, Zwięzły kurs chemii organicznej, Politechnika Łódzka, Łódź 2002.
5. D. Buza, W. Sas, P. Szczeciński, Chemia organiczna. Kurs podstawowy, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2006.
6. D. Buza, A. Ćwil, Zadania z chemii organicznej z rozwiązaniami, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2003.

Additional bibliography:

1. Przewodnik do nomenklatury związków organicznych, Polskie Towarzystwo Chemiczne, Warszawa 1994.
2. E. Białecka-Florjańczyk, J. Włostowska, Chemia organiczna, WNT, Warszawa 2005.
3. M. Mąkosza, M. Fedoryński, Podstawy syntezy organicznej. Reakcje jonowe i rodnikowe, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2006.

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures, exercises and laboratory classes	105
2. Participation in consultations related to the preparation for the tests conducted on exercises and laboratory classes	10
3. Participation in consultations related to the preparation for the exam	5
4. Preparation for the tests carried out on exercises	18
5. Preparation for laboratory classes	12
6. Preparation for the exam and the presence of the exam	28

Student's workload

Source of workload	hours	ECTS
Total workload	178	7
Contact hours	123	5
Practical activities	30	1