

(Table 5.2) Course unit description

Study program: Chemistry			
Type and level of studies: Doctoral academic studies of Chemistry			
Course unit: Advanced Methods in Organic Synthesis			
Teacher in charge: Violeta Marković			
Language of instruction: English			
ECTS: 15			
Prerequisites: Enrolled in doctoral academic studies in Chemistry			
Semester: winter			
Course unit objective Detailed understanding of the physico-chemical properties and reactivity of organic compounds, including modern synthetic methods, stereoselective synthesis, and reaction mechanisms. Developing the ability to plan different synthetic routes and mastering the synthetic approaches for the preparation of complex molecules (e.g. bioactive and/or natural compounds) through a problem-solving approach.			
Learning outcomes of Course unit Students can apply mechanistic reasoning, propose appropriate synthetic strategies based on retrosynthetic analysis, evaluate organic reactions with respect to stereochemical, selectivity, environmental, and safety outcomes analysis, and carry out advanced reactions, including multistep syntheses.			
Course unit contents Organic reactions with mechanisms: oxidation; reduction; substitution, addition and elimination reactions; alkylation of enolates and enamines; palladium-catalyzed coupling reactions. Chemoselectivity, regioselectivity, and stereoselectivity. Use of protecting groups in organic synthesis. Flow chemistry in organic synthesis with industrial applications in modern chemical production. Solid-phase synthesis (SPS) in organic chemistry. Retrosynthetic analysis of the molecular structure and design of a synthetic route for a given target molecule, e.g. a natural product or a pharmaceutical compound. Analysis of organic reaction protocol on stereochemical, selectivity, environmental and safety outcomes. Organic compound structure elucidation by combining different techniques, such as infrared (IR) and nuclear magnetic resonance (NMR) spectroscopy and mass spectrometry (MS).			
Literature 1. Carey, F.A.; Sundberg, R.J. <i>Advanced Organic Chemistry Part B: Reactions and Synthesis</i> , 5th ed. Springer, 2007. 2. Nicolaou, K.C.; Snyder, S.A. <i>Classics in Total Synthesis II</i> , VCH: New York, 2003. 3. Warren, S.; Wyatt, P. <i>Organic Synthesis: The Disconnection Approach</i> , 2nd ed. Wiley, 2004. 4. Hand-outs distributed in class 5. Current scientific literature related to the subject			
Number of active teaching hours			Other classes:
Lectures: 6	Practice: /	Other forms of classes: Independent work:	
Teaching methods Lectures, exercises, consultations			
Examination methods (maximum 100 points)			
Exam prerequisites	No. of points	Final exam	No. of points
Practical classes		Written examination	40
Tests		Oral examination	20
Homework		Other	
Seminars	40		
Project			
Grading system			
Grade	No. of points	Description	
10	>= 91	Excellent	
9	81-90	Exceptionally good	
8	71-80	Very good	
7	61-70	Good	
6	51-60	Passing	
5	<=50	Failing	