"ZATWIERDZAM"

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KARTA INFORMACYJNA PRZEDMIOTU/ZAJĘĆ (wersja anglojęzyczna w przypadku przedmiotu/zajęć w j. angielskim)

nazwa przedmiotu	Współczesne metody syntezy organicznej	Modern methods of organic synthesis
Kod przedmiotu	WTCCXCSM-MMOS	
Język wykładowy	english	
Profil studiów	general academic	
Forma studiów	stationary	
Poziom studiów	II level studies	
Rodzaj przedmiotu	elective	
Obowiązuje od naboru	2022/2023	
Forma zajęć, liczba godzin/rygor, razem godz., pkt ECTS	Lectures 20 / + Excersices 10 / + together: 30 hours., 2 ECTS	
Przedmioty wprowadzające	Organic Chemistry, Organic Chemistry II, Instrumental Analysis. Prerequisites: basic and structured knowledge of organic chemistry including functional groups found in organic compounds, as well as reaction mechanisms characteristic of different types of organic com- pounds.	
Semestr/kierunek studiów	semester III / major: Chemistry	
Autor	dr inż. Jakub Herman	
Jednostka organizacyjna odpowiedzialna za przedmiot	WTC	
Skrócony opis przedmiotu	An advanced course in organic chemistry with emphasis on gaining the ability to plan the syntheses of complex organic compounds. Use of modern organic synthesis techniques.	
Pełny opis przedmiotu (treści programowe)	Lectures: 1. Organofluorine chemistry. Unique properties of organofluorine compounds. Physical, chemical properties. (2h) 2. Synthesis of complex organofluorine compounds. Perfluorination and selective direct fluorination. Nucleophilic fluorination (ECF). Finkelstein exchange. Lewis acid-assisted fluorination. (2h) 3. Synthesis of fluoroaromatic compounds. Reductive aromatization. The Balz-Schiemann reaction. Transition metal-assisted oxidative fluorination. Aromatic nucleophilic substitution. Activation of the car- bon-fluorine bond by transition metals. Activation of fluoroaromatic compounds by ortho-methalation. Transformation of functional groups. (4h) 4. Application of organofluorine compounds. Halofluorocarbons and related compounds. Polymers and lubricants. Liquid crystals for	

	active liquid crystal displays. Pharmaceuticals and other biomedical applications. Agricultural chemistry. (4h)	
	5. Flow Chemistry in Organic Synthesis. Transforming the conven- tional multi-step organic synthesis by using integrated synthetic sys- tems. Prospect and advantage. System set-ups, types of Flow Reac- tors. Examples of reactions and processes. (4h)	
	6. High-Pressure Organic Reactions. Benefits and theory. Examples of High-Pressure Reactions. High-pressure hydrogenation, High- pressure oxidation, High-pressure polymerization, High-pressure syn- thesis of pharmaceuticals. Experimental Safety Considerations. (4h)	
	Exercises: consist of solving synthetic problems assigned in advance for self-preparation. Knowledge of the basics of retrosynthetic analy- sis is required to plan and verify the correctness of a multi-stage syn- thesis process.	
	 Transformation of functional groups – solving synthetic problems. (2h) Synthesis of fluoroaromatic compounds – solving synthetic prob- 	
	 lems. (2h) 3. Aromatic nucleophilic substitution - solving synthetic problems. (2h) 4. High pressure organic reactions – solving synthetic problems. (2h) 5. Continuous flow organic reactions – solving synthetic problems. (2h) (2h) 	
Literatura	 F.A. Carey, R.I. Sundberg, "Advanced Organic Chemistry", Part A and Part B, Springer, 2007 J.Clayden, N. Greeves, S. Warren, P. Wothers, "Organic chemis- try", Oxford University Press; 2nd edition. 	
	3. P. Kirsch, Modern Hubroorganic chemistry, Wiley-vch 2004	
Efekty uczenia się	W1 / Has a well-established and expanded knowledge of the chosen specialty. Has knowledge of the fundamentals of organic materials and the re- lationship between molecular structure and properties / K_W02. W2 / Has an extended knowledge of organic and inorganic synthesis techniques, methods of separation and purification of chemical com- pounds and their identification using classical and instrumental meth- ods. / K_W04	
	U1 / Can use a foreign language at the B2+ level of the Common European Framework of Reference for Languages, to a degree that allows communication in speech and writing in general and to a higher degree in specialized terminology / K_U01 U2 / Can assess the suitability of routine methods and tools for solving tasks in the synthesis of chemical compounds, composition of materials, determination of their chemical composition and structure and physicochemical properties based on the results of literature and experimental studies. / K_U04 U3 / Can plan and carry out experimental research or observations in a chemical laboratory in accordance with the principles of occupational safety and health, safe handling of chemicals and selection and disposal of chemical waste. Can apply knowledge of chemical sciences to related scientific fields and disciplines. / K_U11 U4 / Can find the necessary information in the literature, databases and other sources, is familiar with the basic scientific journals in the field of chemistry and has the ability to assess the reliability of the information obtained. Is able to interact with others in teamwork and take a leading role in teams / K_U10, K_U16	

	K1 / Understands the social aspects of practical application of the ac- quired knowledge and skills (especially in business) and the associ- ated responsibility. / K_K04
Metody i kryteria oceniania (sposób sprawdzania osiągnięcia przez studenta zakładanych efektów uczenia się)	Passing mark in written form. The requirements for passing the course is receiving a positive grade from the colloquium and passing the exercises.
	Achievement of effects W1-W2 is verified during the colloquium and final conversation. Achievement of effects U1-U4 and K1 is verified during the implementation of exercises. The final grade consists of the grade obtained from the passing colloquium, as well as the student's commitment and approach to learning.
	 The mark 5 is given to the student who possesses the knowledge, skills and competencies provided for by the educational effects, and, in addition, shows interest in the subject, creatively approaches the assigned tasks and demonstrates independence in acquiring knowledge. He demonstrates perseverance, independence in overcoming difficulties and systematic work. The mark 4 is given to a student who has acquired the knowledge and skills provided for in the curriculum to a good degree. He is able to solve tasks and problems, with an average degree of difficulty. The mark 3 is given to a student who has the knowledge and skills provided for in the curriculum to a sufficient degree. He independently solves tasks and problems with a low degree of difficulty. There are not student who has the knowledge and skills provided for in the curriculum to a sufficient degree. He independently solves tasks and problems with a low degree of difficulty.
	noticeable gaps in his knowledge and skills, but he is able to fill them under the guidance of the teacher, - The mark 2 is given to a student who has not possessed the knowledge, skills and competencies within the necessary require- ments.
Bilans ECTS (nakład pracy studenta)	 Activity / student workload in hours: 1. participation in lectures / 20 2. independent study of the subject matter of lectures / 18 3. participation in exercises / 10 4. independent preparation for exercises / 10 5. participation in consultations / 2
	Total student workload : 60 hours / 2 ECTS Classes with the participation of the teacher : 32 hours / 1 ECTS Classes related to scientific activities : 58 hours / 2 ECTS

autor

kierownik jednostki organizacyjnej odpowiedzialnej za przedmiot

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