PhD STUDIES COURSE UNIT DESCRIPTION

Name of subject	Field of science, code	Faculty / Center	Department
Modern organic synthesis	Chemistry N 003	Faculty of Chemistry and Geosciences	Departament of Organic Chemistry
Student's workload	**Credits**	**Student's workload**	**Credits**
Lectures		Consultations	2
Independent study	5	Seminars	

Course annotation
Priciples of modern and total synthesis methods. Princiles of green chemistry. Atom economy. Photochemistry. Microwave-Assisted Organic Chemistry (MAOS). Use of ionic fluids. Flow chemistry. Optimization of chemical processes. Single bond of C-C and C-Het formation. C-H actyvation and functionalization in organic synthesis. Activated and inactivated C(sp^3)-H bond functionalization, principles of regio- and stereoselectivity. Functionalization of aromatic compounds, directing groups, ortho strategy. Selective meta functionalization of aromatic compounds. Use of C-H actyvation strategy in total synthesis. Mukayama-Aldol reaction and its use in directed organic synthesis. SmI_2 catalyzed reactions. Barbier reactions. Reformatsky and aldol type reactions. Carbonyl-ene reaction. Pinacol coupling and rearagement reactions. Fragmentation reactions. Double/Triple bond formation and reactions. Review of double bond formation reactions: Wittig, Aza-Wittig, Horner-Wadsworth-Emmons, Horner-Wittig, Julia, Peterson, Corey-Winter reactions, comparison of synthetical methods and their evaluation in directed organic synthesis. Intra- and intermolecular metathesis reactions of alkenes, alkynes and enynes, mechanism analysis and review of catalysts. Gold catalysed reactions of unsaturated substrates. Reactions catalysed by N-heterocyclic carbenes. Prins type cyclization reactions and their use in total synthesis. Multicomponent reactions. Electrophilic, nucleophilic, radical, peryciclic and metal catalyzed domino reactions.
Reading list
1. Wyatt, P.; Warren, S. Organic Synthesis: Strategy and Control, Wiley, 2007. 2. Zweifel, G.S.; Nantz M.H. Modern Organic Synthesis: An Introduction, W. H. Freeman and Company, New York, 2007. 3. Clayden J., Greeves N., Waren S., Wothers P. Organic Chemistry. Oxford, OUP. 2001. 4. Dale L. Boger, Modern Organic Synthesis: Lecture Notes, La Jolla, CA : TSRI Press, 1999. 5. K.C. Nicolaou, E.J. Sorensen, Classics in Total Synthesis, Targets, Strategies, Methods, VCH, 1996 6. Periodic publications from journals is refered during consultations.

The names of consulting teachers	Science degree	Main scientific works published in a scientific field in last 5 year period
Ieva Žutautė	Dr.	1. I. Karpavičienė, M. Jonušis, K. Leduskrasts, I. Misiūnaitė, E. Suna, I. Čikotienė, *Dyes and Pigments*, **2019**, 170, 107646. 2. J. Dinić, C. Ríos-Luci, I. Karpaviciene, I. Cikotiene, M. X. Fernandes, M. Pešić, J. M. Padrón, *Invest New Drugs*, **2020**, 38, 584 – 598. 3. T. Javorskis, I. Karpavičienė, A. Jurys, G. Snarskis, R. Bukšnaitienė, E. Orentas, *Angew. Chem. Int. Ed.*, **2020**, 59, 20120– 20128.

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Committee Chairman prof. habil. dr. Aivaras Kareiva