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| **Study program:** Master studies Chemistry, module Research |
| **Course title:** Organic syntheses (H222C) |
| **Name of lecturer/lecturers:** Niko S. Radulović |
| **Type of course:** Compulsory |
| **Number of ECTS allocated:** 6 |
| **Course objectives**Getting to know the concept, materials and strategy of organic syntheses. Study of both classical and more recent reactions for the construction of the carbon skeleton, with special reference to the reactions of transformation of functional groups that are most used in organic chemistry. Systematic approach to organic synthesis through syntonic analysis (retrosynthetic planning). |
| **Course outcomes**The student should be able to independently, using a retrosynthetic approach, propose a methodology and realize the synthesis of organic compounds. The student should know the scope, possibilities, limitations, stereochemical aspect, application in synthetic processes of the most important synthetic reactions. |
| **SYLLABUS***Lectures*Retrosynthetic analysis. Basic principles: synthesis of aromatic compounds. Strategy I: The order of performing the synthetic steps. C-X disconnections of one group. Strategy II: Chemoselectivity. C-X disconnections of two groups. Strategy III: Umpolung, cyclization reactions, summary of strategies. Synthesis of amines. Strategy IV: Protective groups. C-C disconnection of one group I: alcohols General strategy A: Selection of disconnection. Strategy V: Stereoselectivity A. C-C disconnections of a group II: carbonyl compounds. Strategy VI: Regioselectivity. Alkene synthesis. Strategy VII: Alkynes in synthesis. Disconnections of two groups I: Diels-Alder reaction. Strategy VIII: Introduction to condensations of carbonyl compounds. Disconnections of two groups II: 1,3-difunctionalized retrones and α,β-unsaturated compounds. Strategy IX: Control in carbonyl condensations. Disconnections of two groups IV: 1,2-Difunctionalized retrons. Radical reactions in synthesis. Disconnections of two groups V: 1,4-difunctional isolated retrons. Strategy XII: Reconnection. Disconnections of two groups VI: 1,6-difunctionalized retrones. General strategy B: Carbonyl dis/reconnection strategy. Strategy XIII: Introduction to Ring Synthesis. Saturated heterocycles. Three-membered rings. Strategy XIV: Displacements in synthesis. Four-membered rings: Photochemistry in synthesis. Strategy XV: Ketenes in synthesis. Five-membered rings. Strategy XVI: Pericyclic displacements in synthesis. Special methods for the synthesis of five-membered rings. Six-membered rings. General strategy C: Ring synthesis strategy. Strategy XVII: Stereoselectivity B. Aromatic heterocycles.*Laboratory work*Planning and experimental execution of the five-step synthesis of the target organic compound. |
| **References**1. Ž. Čeković, Organske sinteze: reakcije i metode, Zavod za udžbenike i nastavna sredstva, Beograd, 2006.2. N. Radulović, M. Dekić, P. Blagojević, Principi organske sinteze: zbirka ispitnih zadataka sa rešenjima, Prirodno-matematički fakultet u Nišu, Niš, 2016. ISBN 978-86-6275-054-93. N. Radulović, Praktikum iz preparativne organske hemije, Prirodno-matematički fakultet u Nišu, Niš, 2015. ISBN 978-86-6275-043-34. M. B. Smith, Organic Synthesis (2nd Edition), International Edition, McGraw-Hill, 2002.5. G. Penzlin, Organic Synthesis: Concepts, Methods, Starting Materials, VCH, 1994.6. G. Li, Contributor E. J. Corey, Organic Synthesis: Concepts and Methods, Wiley-VCH, 2003.7. S. G. Warren, Workbook for Organic Synthesis: The Disconnection Approach, Wiley Science, 1982. |
| **Active teaching classes** | **Lectures 45** | **Laboratory work 60** |
| **Teaching mode:** Interactive lectures, theoretical and experimental exercises, laboratory-research work, homework, seminar work, panel discussions |
| **ASSESSMENT METHODS AND CRITERIA (Max 100 points)** |
| **Pre exam duties** | **Points** | **Final exam**  | **Points** |
| Activity during lectures | 5 | Written examination | 20 |
| Practical teaching | 20 | Oral examination | 20 |
| Teaching colloquia | 30 |  |  |
| Seminar | 5 |  |  |