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| **Course code** | CC2 |
| **Type and description** | **CC** – Core Course |
| **ECTS credits** | 2 |
| **Course name** | **Advanced Organic Chemistry** |
| **Course name in Polish** | Zaawansowana Chemia Organiczna |
| **Language of instruction** | English |
| **Course level** | 8 PRK |
| **Course coordinator** | prof. dr hab. inż. Łukasz Albrecht |
| **Course instructors** | prof. dr hab. inż. Łukasz Albrecht |
| **Delivery methods and course duration** | |  | **Lecture** | **Tutorials** | **Laboratory** | **Project** | **Seminar** | **Other** | **Total of teaching hours during semester** | | --- | --- | --- | --- | --- | --- | --- | --- | | Contact hours | 25 | 0 | 0 | 0 | 0 | 0 | 25 | | E-learning | No | No | No | No | No | No |  | | Assessment criteria (weightage) | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |  | |
| **Course objective** | The goal of the course is to familiarize students with the basic knowledge and concepts of advanced organic chemistry related to reactive intermediates (such as carbocations, carbanions, radicals or carbenes) and typical organic reaction mechanisms. During the lecture methods to predict the reactivity of organic compounds based on their structure and reaction conditions will be discussed. Furthermore, the ability to predict feasible reaction mechanism using curved-arrow notation will be acquired. |
| **Learning outcomes** | A PhD student after completing the course (***W1 P8S\_EG, U1 P8S\_UW, K1 P8S\_KK***):  1. can recognize and knows selected examples and can write using curved-arrows notation, various types of organic reaction mechanisms;  2. has the ability to apply the knowledge of previously encountered reaction mechanisms and reaction conditions to write feasible reaction mechanism for new reactions;  3. has extended knowledge on the structure, properties and rearrangements of reactive intermediates;  4. can propose a reasonable mechanistic pathway for a given type of reaction involving reactive intermediate. |
| **Assessment methods** | Verification methods of learning outcomes  effects ***W1 P8S\_EG, U1 P8S\_UW, K1 P8S\_KK*** - written exam  The final grade consists of:  The result of the written test - 100% |
| **Prerequisites** | none |
| **Course content with delivery methods** | LECTURE  Review of organic reaction mechanisms: a) polar reactions under acidic or basic conditions; b) free radical reactions; c) pericyclic reactions (electrocyclic reactions, cycloadditions, sigmatropic rearrangements); d) transition metal-mediated and –catalyzed reactions.  Carbocations: structure, reactivity and stability of carbocations. Direct observation of carbocations – superacids. Generation of carbocations. Mechanism of rearrangement of carbocations. Bridged (nonclassical) carbocations.  Free radicals: generation and properties of free radicals. Structure and stereochemistry of free radicals. Nucleophilicity and electrophilicity of free radicals. Charged radicals – radicals cations and radical anions. Characteristics of reactions involving radicals. Chosen radicals reactions. Rearrangement reactions of free radicals. Intramolecular functionalization of organic compounds involving radicals intermediates – selected aspects.  Carbenes: structure, stability and reactivity of carbenes. Generation of carbenes. Addition reactions. Insertion reactions. Rearrangement of carbenes.  Carbanions: acidity of hydrocarbons. Structure and stability of carbanions. Carbanion character of organometallic compounds. Carbanions stabilized by functional groups. Generation and properties of enolates and chosen stabilized carbanions. |
| **Basic reference materials** | 1.Materials provided by lecturer.  2. Clayden, J.; Greeves, N.; Warren, S. "Organic Chemistry", Second Edition, Oxford University Press, Oxford, 2012.  3. Smith, M. B. "March's Advanced Organic Chemistry" 7th Edition, John Wiley & Sons, New York, 2013.  4. Carey, F. A.; Sundberg, R. J. “Advanced Organic Chemistry Part A: Structure and Mechanism”, 5th ed. Springer, 2007. |
| **Other reference materials** | current scientific papers |
| **Average student workload outside classroom** | 20 hrs |
| **Comments** | - |
| **Last update** | 2019-04-08 |