|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **UNIVERSITY OF NIŠ** | | | | | | |
| **Course Unit Descriptor** | | **Faculty** | | | **Faculty of Science and Mathematics** | |
| **GENERAL INFORMATION** | | | | | | |
| **Study program** | | | | **Applied chemistry** | | |
| Study Module (if applicable) | | | | Environmental chemistry | | |
| Course title | | | | Green chemistry | | |
| Level of study | | | | Bachelor  Master’s  Doctoral | | |
| Type of course | | | | Obligatory  Elective | | |
| Semester | | | | Autumn Spring | | |
| Year of study | | | |  | | |
| Number of ECTS allocated | | | | 5 | | |
| Name of lecturer/lecturers | | | | Aleksandra R. Zarubica | | |
| Teaching mode | | | | Lectures Group tutorials  Individual tutorials  Laboratory work  Project work  Seminar  Distance learning  Blended learning  Other | | |
| **PURPOSE AND OVERVIEW (max. 5 sentences)** | | | | | | |
| Presentation of current and modern concepts and/or principles of green chemistry in industry, energy and environmental science. Knowing of numerous aspects of green chemistry in compliance with sustainable development should ensure the analysis of processes and solving problems in environment. It provides a higher level of knowledge of modern techniques aligned with the twelve principles of green chemistry and sustainable development.  Student should be able to: • know different and use sustainable principles of green chemistry in environmental science; • research literature and use information in the field of green chemistry; • (to) be familiar with the methodology of solving problems in green chemistry; • possess the knowledge and ability to reduce the risks for/in the environment; • set up a solvent-free chemical reactions; • plan and implement the processes of production, providing and storage of conventional and alternative energy sources/fuels; • perform the necessary analysis (theoretical-mathematical or software approach) data on the basis of theoretical knowledge and practical application, and establish optimized process parameters; • set and plan to work alone or in groups to an appropriate topic of/in green chemistry and harmonize it with the principles of sustainable development. | | | | | | |
| **SYLLABUS (brief outline and summary of topics, max. 10 sentences)** | | | | | | |
| Lectures  Principles of Green Chemistry (2 classes); Removing of potential hazards from the environment (2 classes); The application of instrumental techniques and methods in green chemistry (4 classes); Non-toxic solvents in the chemical synthesis and industry (2 classes); Solvent-free chemical reactions (2 classes); Ionic liquids (2 classes); Homogeneous catalysis processes in green chemistry (2 classes); Heterogeneous catalysis processes in green chemistry (2 classes); Enzyme catalysis in green chemistry (2 classes); Extraction with solvents harmless to the environment (2 classes); Alternative energy sources (4 classes); Preservation of water and energy resources (2 classes); Sustainable Development (2 classes).  Practices  Discoloration/decolourization of model solution by using a heterogeneous photo-catalyst; Heterogeneous catalysts for the production of biofuels; The enzymatic catalytic approach to obtaining alternative fuels; Physico-chemical characterization of ionic liquids; Characterization of new ionic liquids; Solvation-chromatic properties of ionic liquids; Thermo-chromatic properties of selected complex compounds in different environments/media; Materials subject to a phase change - energy storage; Practical classes - visits to solar park; Practical classes - visits to the park for the use of wind; Visits to petrochemical industry; Visits to textile industry; Practical classes in electroplating/galvanotechniques. | | | | | | |
| **LANGUAGE OF INSTRUCTION** | | | | | | |
| Serbian (complete course)  English (complete course)  Other \_\_\_\_\_\_\_\_\_\_\_\_\_ (complete course)  Serbian with English mentoring Serbian with other mentoring \_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | | |
| **ASSESSMENT METHODS AND CRITERIA** | | | | | | |
| **Pre exam duties** | **Points** | | **Final exam** | | | **points** |
| **Activity during lectures** | 15 | | **Written examination** | | | 40 |
| **Practical teaching** | 15 | | **Oral examination** | | |  |
| **Teaching colloquia** | 30 | | **OVERALL SUM** | | | 100 |
| **\*Final examination mark is formed in accordance with the Institutional documents** | | | | | | |