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| **Study program** Chemistry |
| **Course title** Fundamentals of materials technology |
| **Name of lecturer/lecturers** Aleksandra R. Zarubica |
| **Type of course** Elective |
| **Number of ECTS allocated** 4 |
| **Course objectives**Earning basic knowledge of designing and synthesis of traditional and modern materials, and basic chemical reactions that take place during synthesis. Adopting of basic knowledge, earning ability and experiences in physico-chemical characterization of materials, and their application in selected processes – heterogeneous catalysis and/or adsorption*.* |
| **Course outcomes**Upon successful completion of this course, student should be able to: set basic elements and parameters of material synthesis of given chemical composition; list basic chemical and physical-chemical reactions that take place during synthesis; list and compare basic physical-chemical methods for materials characterization; predict and explain influence of selected fundamental physical-chemical characteristics of materials in manner of their efficiency during application; draw basic graphic dependences of selected characteristics of materials with demonstrated activities in simple/particular application processes; Adequately present fundamental and empirical data in oral and/or written form. |
| **SYLLABUS***Lectures*Basics of ceramic materials processing; Relationship of processing, structure and characteristics of materials; Synthesis of ceramic powders: Creating/formation of solid phase particles; Traditional methods of ceramic powders synthesis: Methods of synthesis from solid phase; Modern methods of ceramic powders synthesis: Liquid phase synthesis; Ceramic powders synthesis by spraying; Steam/gas phase synthesis of ceramic powders; Preparation of polycrystalline monolithic ceramics – stages in process obtaining, shaping as a phase in processing of ceramic materials; Drying as a phase in ceramic materials processing; Sintering as a phase in ceramic materials processing; Application of ceramic powders and polycrystalline monolithic ceramics; Glass – basic characteristics of process obtaining, preparation of glasses by merging method; Sintering processing in glasses production.*Laboratory work*Synthesis of MO2 by solid phase reactions (M=Zr, Ti, Sn); Synthesis of MO2 by inorganic compounds hydrolysis; Synthesis of MO2 by sol-gel method; Synthesis MO2 by hydrothermal method; Physical-chemical characterization of ceramic materials; Textural characteristics of ceramic materials; Calculation of material specific surface area and porosity analysis; Structural characteristics of material (XRD application); Examination of ceramic material crystallinity; Morphological properties of ceramic materials (electronic microscopy); Scanning electronic microscope imaging (SEM) and images analysis; Examination of acid-base centres of ceramics materials; Visit/practice to/in glass industry, Visit/practice to/in porcelain and ceramics industry. Field teaching - visit to the forensic department |
| **References**1. V. Srdić, Procesiranje novih keramičkih materijala, Tehnološki fakultet, Univerzitet u Novom Sadu, Novi Sad, 2004.2. D. Trifunović, M. Jančić, Strukture i osobine materijala, Tehnološko-metalurški fakultet, Univerzitet u Beogradu, Beograd, 1975.3. J. Ranogajec, B. Živanović, K. Kasač, R. Vasić, Opekarski proizvodi: sirovine, tehnologija, svojstva, IMS, Beograd,1998.4. D. Trifunović, Lj. Radonjić, Mehaničke osobine materijala, Tehnološko-metalurški fakultet, Univerzitet uBeogradu, Beograd, 1982.5. A. Zarubica, M. Ranđelović, Praktikum iz Hemije i tehnologije materijala, Prirodno-matematički fakultet, Niš,2013. |
| **Active teaching classes** | **Lectures** 30 | **Laboratory work** 15 |
| **Teaching mode** Lectures, interactive teaching, field teaching, laboratory exercises, consultations and seminar work. |
| **ASSESSMENT METHODS AND CRITERIA (Max 100 points)** |
| **Pre exam duties** | **Points** | **Final exam**  | **Points** |
| Activity during lectures | 10 | Written examination | 20 |
| Practical teaching | 10 | Oral examination | 40 |
| Teaching colloquia | 20 |  |  |
| Seminar |  |  |  |