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|  **UNIVERSITY OF NIŠ** |
| **Course Unit Descriptor** | **Faculty** | Faculty of technology |
| **GENERAL INFORMATION** |
| Study program  | **Chemical technologies** |
| Study Module (if applicable) | ECOLOGICAL ENGINEERING MODULE |
| Course title | Chemical engineering thermodinamics |
| Level of study | ☒Bachelor ☐ Master’s ☐ Doctoral |
| Type of course | ☐ Obligatory☒ Elective |
| Semester  | ☒ Autumn ☐ Spring |
| Year of study  | 3nd |
| Number of ECTS allocated | 6 ECTS |
| Name of lecturer/lecturers | Ivica S. Stamenkovic |
| Teaching mode | ☒Lectures ☐Group tutorials ☐ Individual tutorials☒Laboratory work ☐ Project work ☐ Seminar☐Distance learning ☐ Blended learning ☐ Other |
| **PURPOSE AND OVERVIEW (max. 5 sentences)** |
| *Students’ training for the analysis and evaluation of air pollution, projecting the protection and monitoring of the air. By combining the acquired knowledge, students will contribute to project and manufacturing organisation at selecting the location for building energetic and industrial plants, solving problems related to emission of exhausted fumes, determining the height and position of the emission source in order to protect the air.* |
| **SYLLABUS (brief outline and summary of topics, max. 10 sentences)** |
| **Lectures:** CHEMICAL POTENTIAL IN CHEMICAL THERMODYNAMICS AND CHEMICAL TECHNOLOGY. The chemical potential of a pure substance. Calculation of experimentally measurable size over the fundamental unit (3 classes). THERMODYNAMIC CONDITIONS IN MULTICOMPONENT SYSTEMS. One-component system. Multi-component system (3 classes). Thermodynamicsof solution. Lewis Randellrule. Henry's law. Activity and activity coefficient. Relative enthalpy. The formation of the solution. Heat and Merkel diagrams. Mixing the solution. The process of evaporation and condensation. Distillation. Extraction. Reification (3 classes). THERMODYNAMICS OF ONE-COMPONENT GAS SYSTEMS. Thermodynamic relations with one-component ideal and real gas. Chemical potential, fugacity and activity of real gas (2 classes). THERMODYNAMIC PROPERTIES OF GASES. The calculation of the activity coefficient. Calculation of enthalpy and entropy (2 classes).Thermodynamics of gas mixtures. Mixtures of ideal gases. Mixtures of real gases. The ideal gas or perfect gas mixtures. P-V-T behavior of real gas mixtures. Determination of thermodynamic properties of mixtures. The calculation of the activity coefficient (4 classes).Phase equilibrium. The condition of phase equilibrium. Gibbs rule. Phase diagrams. Calculation of the multicomponent equilibrium stream-liquids. Calculation of equilibrium liquid-liquid. Models activity coefficients (4 classes).ENGINEERING PROCESSES - ENERGY BALANCE: distillation. Extraction. Rectification. Crystallization (2 classes). REACTION BALANCE. Degree of progress of the reaction - reaction coordinates. The constant chemical equilibrium. Reactions in the vapor phase. The reactions in the liquid phase. The reactions in heterogeneous systems (4 classes). |
| **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 | 10 | written examination | 30 |
| practical teaching | 5 | oral examination | 55 |
| colloquium | 30 |  |  |
| **\*Final examination mark is formed in accordance with the Institutional documents** |