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| **UNIVERSITY OF NIŠ** |
| **Course Unit Descriptor** | **Faculty** | Faculty of Mechanical Engineering |
| **GENERAL INFORMATION** |
| Study Program | **Mechanical Engineering** |
| Study Module (if applicable) | - |
| Course Title | **PLANT AND PROCESS OPTIMIZATION IN ENERGY AND PROCESS ENGINEERING**  |
| Level of Study |  ☐Bachelor |  ☐ Master’s | ☒ Doctoral |
| Type of Course | ☐ Obligatory | ☒ Elective |
| Semester | ☒ Autumn | ☐ Spring |
| Year of Study | II |
| Number of ECTS Allocated | 10 |
| Name of Lecturer/Lecturers | Mitrović M. Dejan, Živković S. Dragolјub, Laković-Paunović S. Mirjana |
| Teaching Mode | ☒ Lectures | ☒ Group tutorials | ☐ Individual tutorials |
| ☐ Laboratory work | ☒ Project work | ☒ Seminar |
| ☐ Distance learning | ☐ Blended learning | ☐ Other |
| **Purpose and Overview (max. 5 sentences)** |
| Goal of the course is to acquire scientific competences and academic skills in the subject of optimization of energy and process systems, plants, machines and devices. This includes developing capabilities for problem analysis, problem solving and critical thinking. |
| **Syllabus (brief outline and summary of topics, max. 10 sentences)** |
| Theoretical background for optimization of thermal and process plants and devices: - Main tasks of optimization methods in thermal and process plants and devices. Methods and criteria for optimization, levels of optimization and cost functions; - Basic principles of optimization. Linear programming. Decomposition of optimization problem. Non-linear programming. Mixed integer problems. Metaheuristics; - Multi-criteria optimization. Fuzzy logic; - Artificial intelligence. Neural networks; - Optimization of grid-connected heat exchangers. Pinch method; - Inverse problems of heat transfer; - Operation optimization of energy supply systems. Cogeneration. Trigeneration. Energy storage; - Structure and design parameter optimization of energy supply systems; - Structure and design parameter optimization of thermal power plants-district heating systems; - Optimization of industrial facilities. Exergy analysis; - Optimization of heating energy distribution system. *Study and research work* * Preparing students for research within PhD thesis through seminar directly related to problem formulation in the thesis.

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| **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** |  | **Written Examination** |  |
| **Practical Teaching** |  | **Oral Examination** | **100** |
| **Teaching Colloquia** |  | **Overall Sum** |  |
| **\*Final examination mark is formed in accordance with the Institutional documents** |