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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 | Theory of turbulent flows |
| Level of Study | ☐Bachelor | ☐ Master’s | ☒ Doctoral |
| Type of Course | ☐ Obligatory | ☒ Elective |
| Semester | ☐ Autumn | ☒ Spring |
| Year of Study | I |
| Number of ECTS Allocated | 10 |
| Name of Lecturer/Lecturers | dr Stevanović Žarko, dr Jovanović Miloš, dr Živković Predrag |
| Teaching Mode | ☒ Lectures | ☐ Group tutorials | ☐ Individual tutorials |
| ☐ Laboratory work | ☒ Project work | ☒ Seminar |
| ☐ Distance learning | ☐ Blended learning | ☐ Other |
| **Purpose and Overview (max. 5 sentences)** |
| *Students should acquire knowledge in the field of turbulent flows. Acquired the ability to independently and on scientific basis recognize, explain and define turbulent flows phenomena. Give students the basis for easy adoption of the subject that rely on the turbulent transfer of momentum, heat and mass transfer* |
| **Syllabus (brief outline and summary of topics, max. 10 sentences)** |
| *1) Introduction to turbulent flows: Nature of turbulent flows. Research methods of turbulent flows. Turbulent diffusivity. Turbulent scales. 2)The turbulent transfer of momentum, heat and mass: Reynolds equations. The turbulent transfer of scalars. 3) Reynolds stresses. Turbulent scalar fluxes. Estimation of Reynolds stresses. Evaluation of turbulent scalar fluxes. 4) Statistical description of turbulence: The statistical correlation. Fourier transformations and characteristic functions. Correlation functions and spectrum. The central limit theorem. 5) The characteristic scales of turbulence and similarity parameters:**Length interference. Integral scale of turbulence. Turbulent micro-scales. 6) The dynamics of turbulent interaction:**The kinetic energy of the basic flow. Turbulent kinetic energy. The dynamics of vorticity. Fluctuations dynamics. 7)The dynamics of turbulent spectra: One-dimensional and three dimensional spectra. Local isotropy. Energy cascade. Turbulent energy spectra. The effects of the production and dissipation. Time spectra . The spectra of passive scalar.* |
| **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** | **5** | **Written Examination** | **Max 40, depending on Teaching Colloquia**  |
| **Practical Teaching** | **5** | **Oral Examination** | **50** |
| **Teaching Colloquia** | **40** | **Overall Sum** | **100** |
| **\*Final examination mark is formed in accordance with the Institutional documents** |