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			