UNIVERSITY OF NIŠ

Course Unit Descriptor	Faculty	Faculty of Mechanical Engineering

GENERAL INFORMATION	
Study Program	Mechanical Engineering
Study Module (if applicable)	-
Course Title	Transport Processes in Energy and Process Engineering
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	Gradimir S. Ilić, Mića V. Vukić, Miloš M. Jovanović, Dragiša D. Nikodijević, Dragoljub S. Živković, Gordana M. Stefanović
Teaching Mode	☒ Lectures ☐ Group tutorials ☐ Individual tutorials ☐ Laboratory work ☒ Project work ☒ Seminar ☐ Distance learning ☐ Blended learning ☐ Other

Purpose and Overview (max. 5 sentences)

Students gain knowledge on which they can independently solve problems related to turbulent flow and gas dynamics. Also they gain the knowledge that will allow them to independently solve problems of conductive and convective heat transfer and become familiar with the processes of combustion.

Syllabus (brief outline and summary of topics, max. 10 sentences)

1) Heat and mass transfer: Basic laws for transport of quantities, momentum, heat, chemical species ...; The generalization of conservation laws; Unambiguity conditions (boundary, initial conditions,...); Control volume method. **2) Basics of turbulent flow:** Nature and major qualitative universal features of turbulent flows; Representative examples of turbulent flows; Methods of describing and studying turbulent flows; Kinematics; Dynamics; The structure of turbulent flows; Turbulent transport equations. **3) Dynamics of viscous fluid flow:** Mathematical models of viscous fluid flow; Analytical solutions of viscous fluid flow; Low Reynolds number flows; Stokes approximation; Oseen's approximation; Higher approximations; Boundary layer; Unsteadiness and turbulence. **4) Gas dynamics:** Basic equations of compressible fluid flow; Propagation of disturbances in compressible fluids; Quasi one-dimensional isentropic steady flow; Shock waves; Angled expansion waves; Quasi one-dimensional steady flow of compressible fluid with friction; Quasi one-dimensional steady diabatic flow of compressible fluid; Method of characteristics. **5) Combustion theory:** The general energy conservation equation for combustion process; The four functional steps of the combustion process; Laminar flames; Premixed laminar flames; Turbulent combustion; Turbulent flames; Combustion modelling.

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**	**Max. 30**
Practical Work or Teaching Colloquia or Seminar	**70**	**Overall Sum**	**100**
***Final examination mark is formed in accordance with the Institutional documents**			