UNIVERSITY OF NIŠ

Course Unit Descriptor	Faculty	Faculty of Mechanical Engineering

GENERAL INFORMATION			
Study Program	Mechanical Engineering		
Study Module (if applicable)	Energetics and Process Techniques		
Course Title	Fluid dynamics interaction		
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	Dragiša D. Nikodijević, Živojin M. Stamenković		
Teaching Mode	☒ Lectures	☐ Group tutorials	☒ Individual tutorials
	☐ Laboratory work	☒ Project work	☐ Seminar
	☐ Distance learning	☐ Blended learning	☐ Other

Purpose and Overview (max. 5 sentences)

Introduce students with contact fluid dynamic models. Make students familiar with subject so they can recognize, investigate and formulate relevant phenomena in the contact fluid dynamics. The aim of course is students to adopt knowledge from fundamental theory of fluid dynamics and acquire skills in the methodology of phenomenological research of contact fluid dynamics.

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

1) Tasks of fluid dynamics interaction: Physical phenomena in contacts. Fluid flow, fluid properties and equations, approximation of thin layer, boundary conditions. Body deformation in contact. Heat transfer. One dimensional case. 2) Fluid layer between rigid bodies: One dimensional problems. Hydrodynamic contact of cylinders, cylinder internal contact, external cylinder contact. Two-dimensional problems. The area of contact is known or unknown. Calculation of short bearing. Sphere in cylindrical cavity. Conditions at the entrance. Hydrostatic bearing. Stability of a thin layer of liquid on the surface. Exact solutions of plane problems of fluid flow between the cylinders. 3) Fluid layer between elastic bodies at constant temperature: One-dimensional problem. Modeling. Isothermal problem. Theorem on the existence and uniqueness of the solution. Thickness of the layer of fluid at high loads. Asymptotic methods. Numerical methods. One-dimensional problems with arbitrary influence function. Rigid cylinder on an elastic layer. Elastic cylinder between rigid plates. The inner cylinder contact. Contact of piston and ring. Isothermal lubrication of plain bearings. Taking into account the viscosity of velocity slip. Linear temperature change transverse to the fluid. The distance between the cylinders is changing over time. Two-dimensional problem. Contact of two arbitrary smooth bodies. Contact of rough and smooth surface. 4) Flow and heat transfer in a layer of fluid between the elastic body: Thermal analogy. Reynolds equations. Non-isothermal one-dimensional contact problem of fluid mechanics. The integral equation for the surface temperature. Thermo hydrodynamic calculation of the elastic sleeve bearing.

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**
Lecture (participation)	**5**	**Written Examination**	**0* (50)**
Homework	**5**	**Oral Examination**	**Max. 50**
Project work	**40**	**Overall Sum**	**100**
*** Refers to students who have already gained points by completing pre-exam requirements**			