(faculty stamp)

COURSE DESCRIPTION

1. Course title: HYDRAULICS	**2. Course code:**
3. Validity of coursedescription: 2017/18	
4. Level of studies:BSc programme	
5. Mode of studies: intramural studies	
6. Field of study: Biotechnology	
7. Profile of studies: general	
8. Programme: BIOTECHNOLOGY IN ENVIRONMENTAL PROTECTION, INDUSTRIAL BIOTECHNOLOGY , BIOINFORMATICS	
9. Semester: 2	
10. Faculty teaching the course: INSTITUTE OF POWER ENGINEERING AND TURBOMACHINERY	
11. Course instructor: **Sebastian Rulik, PhD**	
12. Course classification: generalsubjects	
13. Course status: compulsory	
14. Language of instruction: English	
15. Pre-requisite qualifications: none	
16. Course objectives: Study basic theoretical problems of fluid mechanics. The ability to solve elementary problems in the field of fluid statics and dynamics.	

17. Description of learning outcomes:

Nr	Learning outcomesdescription	Method of assessment	Teachingmethods	Learning outcomes referencecode
1	Student knows basic properties of fluids.	Test	Lecture	K_W03, K_W06
2	Student knows and understands basic laws of fluid statics.	Test	Lecture	K_W03, K_W06
3	Student knows and understands basic laws of fluid dynamics.	Test	Lecture	K_W03, K_W06
4	Student is able to solve basic problems regarding fluid statics.	Test	Classes	K_U10
5	Student is able to solve basic problems regarding fluid dynamics.	Test	Classes	K_U10

18. **Teachingmodes and hours**
Lecture / BA /MA Seminar / Class / Project / Laboratory
Lecture 15 / Classes 15 Sem. 2

19. Syllabus description:

Lectures:

Subject of fluid mechanics and its basic division. Fluid properties. General forces acting in fluids. Surface tension and capillarity effects. Fluid equilibrium conditions. Balance of the atmosphere. Pascal's law. Hydrostatic pressure and hydrostatic force. Buoyancy and Archimedes principle. Continuity equation. Basic equations of motion of inviscid fluids. Bernoulli's equation. Dynamic pressure. Flow measurement techniques. Flow from a tank through a hole. Draining time of the tank. Equations of motion of viscous fluid. Dynamic similarity of flows. Resistance forces in flow. Free falling. Laminar and turbulent flows. Calculation of losses in flows.

Classes:

Solving examples illustrating scope of the lecture regarding surface tension and capillarity effects, equilibrium conditions, hydrostatic force, buoyancy, Archimedes principle, continuity equation, Bernoulli equation for viscous flow

20. Examination: no

21. Primary sources:

Nakayama Y., Boucher R. F., Introduction to Fluid Mechanics, Butterworth-Heinemann, 1999

Cengel Y. A., Cimbala M. J., Fluide Mechanics. Fundamentals and Applications, McGraw-Hill 2010

Clayton T. Crowe, Donald F. Elger, John A Roberson, Barbara C Williams, Engineering Fluid Mechanics, Wiley 2009

22. Secondary sources:

Robert W. Fox, Alan T. McDonald, Philip J. Pritchard, Introduction to Fluid Mechanics, Wiley 2011

G. M. Homsy et al., Multi-Media Fluid Mechanics 2nd Edition (DVD-ROM), Cambridge University Press 2008

23. Total workload required to achieve learning outcomes

Lp.	Teachingmode :	Contact hours / Student workload hours
1	Lecture	15/15
2	Classes	15/15
3	Laboratory	
4	Project	
5	BA/ MA Seminar	
6	Other	15/15
	Total number of hours	45/45

24. Total hours: 90

25. Number of ECTS credits: 3

26. Number of ECTS credits allocated for contact hours: 1.5

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 0

26. Comments:

Approved:

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(date, Instructor's signature)

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(date, the Director of the Faculty Unit signature)