COURSE DESCRIPTION CARD – SPECIMEN

<table>
<tr><td colspan="11">Faculty of Civil Engineering and Environmental Sciences</td></tr>
<tr><td>Field of study</td><td colspan="6"></td><td colspan="2">Degree level and programme type</td><td colspan="2"></td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6"></td><td colspan="2">Study profile</td><td colspan="2">Academic profile</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Fluid Mechanics</td><td colspan="2">Course code</td><td colspan="2">IS-FCEE-00027-1W/S</td></tr>
<tr><td colspan="2">Course type</td><td colspan="2">Erasmus</td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td colspan="2">Semestr</td><td colspan="2">Winter/Summer</td></tr>
<tr><td>30</td><td>15</td><td>30</td><td>-</td><td>-</td><td>-</td><td>-</td><td colspan="2">No. of ECTS credits</td><td colspan="2">4</td></tr>
<tr><td>Entry requirements</td><td colspan="10">mathematics, physics</td></tr>
<tr><td>Course objectives</td><td colspan="10">Participants will learn basic equations and principles of fluid mechanics in in Environmental Engineering. Basic knowledge on many aspects of fluid mechanics including hydrostatics, fluid kinematics, flow visualization, hydrodynamics.</td></tr>
<tr><td>Course content</td><td colspan="10">Fundamentals of fluid mechanics. Fluid statics. Fluid dynamics. Continuum hypothesis. Model physical effect. Mathematical nature of model. Fundamentals equations of ideal fluids. Measurement of flow velocity, flow rate, pressure. Calibration device measuring. Measurement of physical quantities. Dynamics of viscous fluids. Gas dynamics. Viscosity liquid. Newton’s law of viscosity. Navier-Stokes equations. Bernoulli's equation. Flow in pipes. Hagena-Poiseullea. Hagen-Poiseuille formula. Reynolds experiment of transition from laminar flow to turbulent flow. Measurement of loss factor. Measurement of friction coefficient of pipe. Pressure head gradient</td></tr>
<tr><td>Teaching methods</td><td colspan="10">Lecture, classes, laboratory classes</td></tr>
<tr><td>Assessment method</td><td colspan="10">Lecture - written exam, classes – test, laboratory -assessment of reports, preparation tests for exercises</td></tr>
<tr><td>Symbol of learning outcome</td><td colspan="8">Learning outcomes</td><td colspan="2">Reference to the learning outcomes for the field of study</td></tr>
<tr><td>EU1</td><td colspan="8">The student understands the issues of mathematics, physics and chemistry at an advanced level, which are the basis of the processes taking place in environmental engineering</td><td colspan="2">EC1_W02</td></tr>
<tr><td>EU2</td><td colspan="8">The student knows and understands the basic methods of analysis and modeling of thermal processes in Fluid Mechnics</td><td colspan="2">EC1_W07</td></tr>
</table>

EU3	Properly select and use the known methods and tools, including advanced information and information, numerical, simulation and experimental techniques when solving complex engineering problems based on Fluid Mechanics	EC1_U05
EU4	Plan and conduct experiments, including measurements of the physical quantities of devices used in Fluid Mechanics	EC1_U07
EU5	Explaining cognitive and practical problems, consulting experts in cases of difficulties in solving them on their own.	EC1_K03
Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
EU1	lecture written examination, accounting exercises	L, C
EU2	lecture written examination, accounting exercises	L, C
EU3	accounting exercises	C, LC
EU4	observation of work on exercises, accounting exercises	C, LC
EU5	observation of work on exercises, accounting exercises	C, LC
Student workload (in hours)		**No. of hours**
Calculation	lecture attendance	15
	participation in laboratory classes and accounting exercises	45
	preparation for reports	15
	work on reports	15
	participation in student-teacher sessions related to the reports	20
	implementation of reports	10
	preparation for and participation in exams	10
	TOTAL:	**115**

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload –activities that require direct teacher participation	**55**	**2**
Student workload –practical activities	**55**	**2**

Basic references	1. Munson B.R.: Fundamentals of fluid mechanics : international student version, Wiley 2009 2. Fox R. W., Pritchard P.J., McDonald A.T. Introduction to fluid mechanics Wiley 2010 3. .Spurk J.H.: Fluid Mechanics Springer-Verlag 1997
Supplementary references	4. Fletcher C.A.J.: Computational Techniques foFluid Dynamics. P1, P2, P3., Springer-Verlag, 1999 5. Douglas J.F. i in. Fluid Mechanics. 5th ed.Pearson Ed. Ltd. 2003

Organisational unit conducting the course	**HVAC Departmen**	**Date of issuing the programme**

Author of the programme	**dr inż. Tomasz Teleszewski** **dr inż. Piotr Rynkowski**	**18.03.2021**

L – lecture, C –classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work, S –seminar