

## COURSE DESCRIPTION CARD

Faculty of Civil Engineering and Environmental Sciences									
Field of study								Degree level and programme type	
Specialization/ diploma path	-							Study profile	Academic profile
Course name	Pumps and Pumping Systems							Course code	IS-FCEE-00266S
								Course type	Erasmus
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	Semester	summer
	15		15	15				No. of ECTS credits	4
Entry requirements	Mathematics, Physics								
Course content	Pumps: pump hydraulics, system head curve, operating point for pump, pump selection, pump curves, mechanical and electrical power, parallel and series pumps selection, cavitation in pumps, pump operation, hydraulic calculations .								
Teaching methods	Lectures, Laboratory classes (working independently, in pairs or as part of a small team), Project								
Assessment method	discussion of obtained research results during classes; written reports in research; written tests checking the learning outcomes, project - project completion, presentation and discussion;								
Symbol of learning outcome	Learning outcomes							Reference to the learning outcomes for the field of study	
LO1	has an elementary knowledge of pumps, ventilators and compressors.							IS1_W04 IS1_W05	
LO2	understand the basic physical phenomena in the mechanical appliances in Environmental Engineering							IS1_W04 IS1_W05	
LO3	able to selection of pump using computer program							IS1_W05	
LO4	know the basic knowledge, standards pump selection							IS1_U12 S1_U14	
LO5	able to prepare and present a presentation of the results of measurement							IS1_U07	
LO6	able to calculate and measure pump and ventilators and parameter and curves							IS1_U07 IS1_K01	
Symbol of learning outcome	Methods of assessing the learning outcomes							Type of tuition during which the outcome is assessed	
LO1	written colloquia or test from lecture and report from laboratory classes							L, LC	

<b>L02</b>	written colloquia or test from lecture and report from laboratory classes	L, LC	
<b>L03</b>	discussions during classes, report from project	P	
<b>L04</b>	discussions during classes, report from project	P	
<b>L05</b>	discussions during classes, report from laboratory classes	LC	
<b>L06</b>	discussions during classes, report from laboratory classes	LC	
<b>Student workload (in hours)</b>		<b>No. of hours</b>	
<b>Calculation</b>	lecture attendance	16	
	participation in classes, laboratory classes	32	
	preparation for raport laboratory classes, project	16	
	working on projects, reports, etc.	16	
	participation in student-teacher sessions related to the project/ laboratory classes	16	
	implementation of project tasks	6	
	preparation for and participation in exams/tests	12	
	<b>TOTAL:</b>	<b>114</b>	
<b>Quantitative indicators</b>		<b>HOURS</b>	<b>No. of ECTS credits</b>
<b>Student workload – activities that require direct teacher participation</b>		64	2
<b>Student workload – practical activities</b>		50	2
<b>Basic references</b>	1. Karassik I., Messina J., Cooper P., Heald Ch., Pump Handbook 4th Edition, 2008 2. Sulzer Pumps, Centrifugal Pump Handbook 3rd Edition, Butterworth-Heinemann, 2010 3. Pelikan B.: The Pump Book, 2010		
<b>Supplementary references</b>	1. Robert X. Perez., Operator's Guide to Centrifugal Pumps, 2008 2. Tyler G. Hicks, Handbook of Mechanical Engineering Calculations, Second Edition, McGraw-Hill Education, 2006 3. Chadwick A., Morfett J., Borthwick M., Hydraulics in Civil and Environmental Engineering 5th Edition, CRC Press,2013		
<b>Organisational unit conducting the course</b>	<b>Department of HVAC Engineering</b>	<b>Date of issuing the programme</b>	
<b>Author of the programme</b>	<b>Tomasz Teleszewski DSc, Phd, Eng.</b>	<b>23.03.2023</b>	

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