COURSE DESCRIPTION CARD – SPECIMEN

<table>
<tr><td colspan="10">Faculty of Civil Engineering and Environmental Sciences</td></tr>
<tr><td>Field of study</td><td colspan="6">Environmental Engineering</td><td>Degree level and programme type</td><td>Bachelor's degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6">-</td><td>Study profile</td><td>Academic profile</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Facilities for Water Treatment</td><td>Course code</td><td>19284206H</td></tr>
<tr><td>Course type</td><td>Compulsory</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>Semester</td><td>V</td></tr>
<tr><td>16</td><td></td><td></td><td>32</td><td></td><td></td><td></td><td>No. of ECTS credits</td><td>4</td></tr>
<tr><td>Entry requirements</td><td colspan="9">Water Technology, Industrial water treatment</td></tr>
<tr><td>Course objectives</td><td colspan="9">Introducing students to the devices used for purification of water suitable for drinking, domestic and industrial purposes. Presentation of knowledge in the scope of required technological parameters of the discussed devices and their effectiveness in water purification. Focusing on the types, principles of operation, exploitation and parameters of water purification devices. Teaching the rules of equipment selection depending on the type of treated water, its quality, demand and purpose. Applying the principles of design and selection of equipment. Systematizing the transferred knowledge, skills and competences on program excursions. Group work on projects of domestic and technological water treatment stations</td></tr>
<tr><td>Course content</td><td colspan="9">Lecture: 1. Discussing basic systems of domestic and industrial water treatment stations. Transfer of knowledge on basic methods of treatment of water taken from different sources, i.e. underground, surface and infiltration water. To present knowledge in the field of equipment for mechanical, chemical, physic-chemical and physical treatment of drinking, domestic and industrial water: straining, sedimentation, coagulation, filtration, iron and manganese removal and adsorption, disinfection, softening. Discussion of sludge management at water treatment plant.
Project: Types, operating characteristics, technological parameters, and application in real conditions of devices used for water treatment. Proper selection of devices based on flow parameters and receivers requirements for small water treatments stations. Project and design of small domestic WTS. Examples of technological and design solutions for drinking and domestic water treatment stations. Proper selection of devices based on flow parameters and technological requirements for industrial water treatments stations. Project and design of industrial domestic WTS. Examples of technological and design solutions for industrial water treatment stations..</td></tr>
<tr><td>Teaching methods</td><td colspan="9">Informational and problematic lecture,
Calculation classes, analytical study of theoretical materials. Project and design.</td></tr>
</table>

Assessment method	Lecture - written exam, Project – projects and design of WTS for domestic and industrial purposes.	
Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study**
LO1	The student has advanced knowledge in basic methods of physicochemical and physical analyses, processes and phenomena in water and the latest methods of water treatment.	**IS1_W07** **IS1_W06**
LO2	Student knows at an advanced level - issues of mathematics, physics, chemistry, biology, which are the basis of processes occurring in environmental engineering. The student is able to use scientific, popular-scientific and industry literature, subject matter norms, legal acts, Internet databases in both Polish and foreign languages, make proper use of the acquired information, draw conclusions, formulate and present opinions, evaluate and discuss various opinions.	**IS1_W02** **IS1_U14**
LO3	Students are able to plan and conduct water physico-chemical tests with the use of specialist scientific and research equipment, interpret their results and on this basis reach adequate conclusions,	**IS1_U02**
LO4	The student is able to analyze and evaluate technical, technological and organizational solutions concerning emerging pollution, he or she is able to act in a creative and entrepreneurial way, cooperate in a group, assuming different roles in it.	**IS1_U08** **IS1_U16**
LO5	The student is able to plan and conduct advanced experiments, including measurements of technical, technological and operational parameters of equipment used in environmental engineering, interpret the obtained results and draw conclusions.	**IS1_U07**
LO6	Student Is able to analyse the content of different sources and to critically assess the possibility of their use in professional practice.	**IS1_K01**
Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	Written exam	**L**
LO2	Written exam, project	**L, P**
LO3	Written exam, project	**L, P**
LO4	Written exam, project	**L, P**
LO5	Written exam, project	**L, P**
LO6	Written exam	**L**
Student workload (in hours)		**No. of hours**
Calculation	Lecture attendance	**16**
	Participation at project classes	**32**
	Preparation for exam	**16**

	Preparation for projects	**16**
	Working on projects	**16**
	Participation in student-teacher sessions related to the classes/lab/lecture	**8**
	TOTAL:	**104**

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	**56**	**2**
Student workload – practical activities	**48**	**2**

Basic references	1. MWH's Water Treatment: Principles and Design, Third Edition: Principles and Design, Third Edition, John C. Crittenden, R. Rhodes Trussell, David W. Hand, Kerry J. Howe, George Tchobanoglous, published:14 March 2012, ISBN:9781118131473 DOI:10.1002/9781118131473, Copyright © 2012 John Wiley & Sons, Inc. 2. American Water Works Association, Water Treatment Plant Design, Fifth Edition (2012), McGraw-Hill Education, ISBN: 9780071745734 3. Water Treatment Plant Operation, Volume 1, 7th Edition, 2017, ISBN 978-1-323-78665-9
Supplementary references	1. Water Treatment Principles and Design, Wiley-Interscience publication, James M. Montgomery, James Montgomery, Wiley, 1985, Uniwersytet Michigan, electronic 2007, ISBN 0471043842, 97804710438433. 2. Water enjoyment : sustainable quality, technology and design, Dirk Meyhöfer Ed.; David J Haines Ed., 2011 3. Integrated Design of Water Treatment Facilities, Susumu Kawamura, Wiley, 1991, Uniwersytet Michigan, electronic 2007, ISBN 0471615919, 9780471615910

Organisational unit conducting the course	**Department of Technology in Environmental engineering**	**Date of issuing the programme**
Author of the programme	**Prof. Iwona Skoczko**	**05.05.2022**

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