

Course title: Computer modeling of water supply and sewage systems		
Programme: Environmental Engineering		Code:
Type of course: module 5.2	Course level: II	Semester: II
Form of classes: Lectures, project	Number of hours per week/meeting: 2W, 2P	Creditpoints: 4
Education profile:		Course language: english

GUIDE TO THE SUBJECT

I. COURSE CHART

COURSE OBJECTIVES

- C.1.** Gain knowledge in the use of computer programs to design new systems and analysis of existing water supply and sewer systems
- C.2.** The ability to create a simulation model of the sewage system and water supply

PRELIMINARY COURSE REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of water supply and wastewater systems
2. Basic knowledge in hydrology

LEARNING OUTCOMES

- EK 1 -** Has general knowledge of the application of numerical models to the design, rehabilitation and operation of wastewater and water supply systems
- EK 2 -** Ability to create the model of wastewater and water supply system along with their basic elements (conduits, overflows, storage tanks, etc.),
- EK 3 -** Ability to identify and properly assume the most important parameters of the object models, and interpret the simulation results

COURSE CONTENT

Form of classes - lectures	Hours
W 1, W 2 – Introduction. Classification of models, an overview of the software.	2
W 3, W 4 – Principles of mapping the sewerage systems in computer models	2
W 5, W 6 – Modelling stormwaters (rainfall) and wastewaters	2
W 7, W 8 – Modelling of surface runoff	2
W 9, W 10 – Hydraulics of pipes	2

W 11, W 12 – Modeling of storage reservoirs and infiltration devices	2
W 13, W14 – Modeling of overflows, flow regulators and pumping stations	2
W 15, W16 – Modeling of the wastewates quality	2
W 17, W18 – Analysis of simulation results . Rating errors modeling results	2
W 19, W20 – Calibration and verification of the models	2
W 21, W 22 – Principles of of water supply system modelling	2
W 23, W 24 – Water demand and flows in the supply network	2
W 25, W 26 – Water reservoirs and pumping stations	2
W 27, W 28 – Test on knowledge	2
W 29, W 30 – Future challenges of water and wastewater modelling	2
Form of classes - project	Hours
P 1, P 2 – Introduction to software (SWMM5 and EPANET2)	2
P 3 ÷ P 6 – Implementation of the sewerage network model (nodes, conduits)	4
P 7 ÷ P 10 – Model of the urban catchment. Surface runoff .	4
P 11, P 12 –Stormwater and wastewater flows. Rainfall data aqustion and analysis	2
P 13, P 14 – Presentation and analysis of the simulation results in SWMM5	2
P 15, P 16 – Modeling of combined sewer overflows	2
P 17, P 18 – Modeling of storage tanks and infiltration devices in drainage systems	2
P 19, P 20 – Modeling of sewage pumping stations	2
P 21 ÷ P 24 – Implementation of the water supply network model. Water demand.	2
P 25, P 26 – Water reservoirs. Pumping stations	4
P 27, P 28 – Presentation and analysis of the simulation results in EPANET2	2
P 29, P 30 – Completion of the course	2

COURSE STUDY METHODS

1. Lectures using multimedia presentations
2. Classes in computer room using EPA software: SWMM5 and EPANET2

METHODS OF ASSESMENT (F - formative; S - summative)

F1. – Aassessment of preparation for classes
F2. – Evaluation of the particular parts of projects
S1. – Evaluation of the final test
S2. – Evaluation of the projects

STUDENT WORKLOAD

Form of activity	Workload (hours)
Lectures	30
Project.....	30
Preparation for project	5
Creation of project	25
Consultation hours	10

Total	Σ100 h
Total ECTS	ECTS 4

PRIMARY AND SUPPLEMENTARY TEXTBOOKS

James W., Rossman L., Huber W., Dickinson R., Roesner L., Aldrich A., User's guide to SWMM5, CHI, Ontario, 2008
Environmental Protection Agency, 2005, SWMM 5users manual, Cincinnati
Environmental Protection Agency, 2000, Epanet 2 users manual,report EPA600R-00/057, Cincinnati
Walski T, Barnard T, 2004, Wastewater Collection System Modeling and Design
Mrowiec M., 2009 – Efektywne wymiarowanie i dynamiczna regulacja kanalizacyjnych zbiorników retencyjnych, Wydawnictwo politechniki Częstochowskiej, Częstochowa

SUBJECT COORDINATOR (NAME, SURNAME, E-MAIL ADDRESS)

1. dr hab. inż. Maciej Mrowiec, mrowiecm@is.pcz.czest.pl
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NAME OF LECTURER (s) (NAME, SURNAME, E-MAIL ADDRESS)

1. dr hab. inż. Maciej Mrowiec, mrowiecm@is.pcz.czest.pl
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Learning outcome	In relation to the learning outcomes specified for the field of study	Course objectives	Course content	Course study methods	Methods of assesment
EK 1	K_W28	C.1	W1÷W30	1	F1, P1
EK 2	K_U33	C.2	P1÷P5, P7, P8, P15, P17, P19, P21÷P24, P29÷P30	2	F2,P2
EK 3	K_U33	C.2	P6, P9, P11÷P14 P25÷P30,	2	F2,P2

II. EVALUATION

Learning outcomedescription	Mark 2	Mark 3	Mark 4	Mark 5
EK 1 - Has general knowledge of the application of numerical models to the design, rehabilitation and	Has noknowled ge in themodelin gof sewer and water supplysyste	Has knowledge of theclassificat ion ofsimulation models and	Hasknowledge of thegeneralrules for the operationof sewer and water supply networks modelsandtheircalibrationp rocess	Hascompleteknowle dgein the field ofmodelingof sewage and water supply systems

operation of wastewater and water supply systems	ms	their purposes		
EK 2 - Ability to create the model of wastewater and water supply system along with their basic elements (conduits, overflows, storage tanks, etc.),	Is not able to create basic model of water supply and sewage systems.	Has ability to create a network model of water supply and sewage systems containing only conduits and nodes	Has ability to create a network model of water supply and sewage systems containing conduits and nodes and one additional element (i.e. storage tank)	Is able to create a complete model of water supply and sewage systems.
EK 3 - Ability to identify and properly assume the most important parameters of the object models, and interpret the simulation results	Cannot determine the basic parameters for the model objects	Can identify most of the parameters of the model objects	Has ability to identify most of the parameters of the model objects and to present the main results of the modeling	Can identify all relevant parameters of the model objects and make a logical interpretation of obtained results

III. OTHER USEFUL INFORMATION

1. All the information on the class schedule is posted on the student information board and online at: www.is.pcz.pl
2. The information about the consultation hours is provided to students on the first class meeting and posted online at...
3. The information on course completion and grade is provided to students on the first class meeting.