

Course title: <b>Hydrology</b>		
Programme: <b>Environmental Engineering</b>		Code: <b>5.6</b>
Type of course: <b>Elective subject, module 5, block IIA</b>	Course level: <b>I degree</b>	Semester: <b>II</b>
Form of classes: <b>Lecture, laboratory</b>	Number of hours per week/meeting: <b>1L, 1Lab</b>	Credit points: <b>2</b>
Education profile: <b>General academic studies</b>		Course language: <b>English</b>
Enrolment: yes/ <del>no</del>		

## **GUIDE TO THE SUBJECT**

### **I. COURSE CHART**

#### **COURSE OBJECTIVES**

- C.1. Transferring the knowledge of the general characteristics of hydrological processes that form the main components of the water cycle in nature and their impact on engineering objects
- C.2. Instructing the student the methods of determining the fundamental hydrological properties and acquiring the ability to use hydrological data in environmental engineering

#### **PRELIMINARY COURSE REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Basic knowledge of chemistry, physics, dynamic geology and mineralogy
2. Ability to carry out engineering calculations
3. Ability to use literature sources individually

#### **LEARNING OUTCOMES**

- EK 1 -knows the basic phenomena and hydrological processes occurring in geocosystems
- EK 2 -is able to characterize the elements of hydrological systems and forecast extreme hydrological phenomena
- EK 3 -can determine the basic parameters describing the hydrogeological properties and properly interpret the results of the research

#### **COURSE CONTENT**

<b>Form of classes - lectures</b>	<b>Hours</b>
Circulation of water in nature - water circulation, size and distribution of precipitation, evaporation, precipitation measurements. Water balance and its components	2
Surface waters. Watercourse and drainage basin. Basin characteristics	1
States and flows of water in rivers - measurements and observations of water states, hydrological curves, states and flows, measurements of flow velocities, determination of flow volumes	3
Probability and hydrological forecasts and floods	2
Underground waters - origin, properties, chemical composition, aeration and saturation zone waters. Groundwater level - graphical representation of the shape and descent of the groundwater level	2
Groundwater sources - types and productivity. Possibilities of exploitation of groundwater	2
Fundamental laws of underground water movement	2
Final test	1
<b>Form of classes - laboratory</b>	<b>Hours</b>
Introduction to the subject: health and safety training, discussion on the conditions and requirements of passing the laboratory, presentation of the subject and scope of the course	1
Determination of the filtration coefficient using an ITB-ZW-K <sub>2</sub> apparatus	2
Determination of the suction coefficient	2
Determination of the smell of underground water	1
Granulometric analysis of soils to determine their hydrogeological properties	2
Determination of the filtration coefficient using Kamienski tube	2
Determination of the permeability coefficient of rocks based on the filtration coefficient	2
Final test	1
Working out the lacking exercises	2

### **COURSE STUDY METHODS**

1. multimedia presentation
2. classic blackboard/whiteboard
3. lab stands
4. instructions to lab stands

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

<b>F1.</b> – Evaluation of self preparation for classes
<b>F2.</b> – Evaluation of group work in laboratory exercises
<b>F3.</b> – Evaluation of the correctness of calculations and laboratory reports
<b>S1.</b> – Final test of the theory given during lectures
<b>S2.</b> – Final test of the theory related to the laboratory exercises

### **STUDENT WORKLOAD**

<b>Form of activity</b>	<b>Workload (hours)</b>
Participation in lectures	15 h

Participation in classes	–
Laboratory	15 h
Participation in project classes	–
Participation in seminar	–
Preparation course on e-learning	–
Test	2 h
Entrance test for laboratory classes	1 h
Project's defence	–
Exam	–
Consultation hours	2 h
<b>DIRECT TEACHING, hours/ ECTS</b>	<b>35 h / 1,4 ECTS</b>
Preparation for tutorials	–
Preparation for laboratories	5 h
Preparation for projects	–
Preparation for seminars	–
Preparation for e-learning classes	–
Participation in e-learning classes	–
Working on project - Sporządzenie sprawozdań z ćwiczeń laboratoryjnych	5 h
Preparation for tests	5 h
Preparation for exam	–
<b>SELF-STUDY, hours/ ECTS</b>	<b>15 h / 0,6 ECTS</b>
<b>TOTAL (hours)</b>	<b>Σ 50 h</b>
<b>TOTAL ECTS</b>	<b>2 ECTS</b>

### PRIMARY AND SUPPLEMENTARY TEXTBOOKS

Fetter C.W., Applied Hydrogeology, Prentice Hal, Inc, New Jersey 2001
Ward A. D., Trimble S. W., Burckhard S. R., Lyon J.G., Environmental Hydrology, CRC Press, Taylor & Francis Group, 2016 (Electronic edition)
Dingman S. L., Physical Hydrology, Waveland Press, 2015 (Electronic edition)
Singh V. P., Elementary Hydrology, Prentice Hall of India, Nev Delhi 1994
Manning J., Applied Principles of Hydrology, Waveland Press, Inc, 2016
Eagleson P.S., Dynamic Hydrology, McGraw-Hill, 1970
Todd D. K., Mays L. W., Groundwater Hydrology, John Wiley & Sons, Inc, Printed in the United States of America 2005
Maidment D.R., Handbook of Hydrology, McGraw-Hill Education, 1993
Chapra S.C., Surface Water-Quality Modeling, McGraw-Hill, New York 1997
Applegate G., The Complete Book of Dowsing: The Definitive Guide to Finding Underground Water Hardcover, Vega Books, London 2002
Younger P. L., Groundwater in the Environment: An Introduction, Wiley-Blackwell, 2006

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

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**NAME OF LECTURER (s) (NAME, SURNAME, E-MAIL ADDRESS)**

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<b>Learning outcome</b>	<b>In relation to the learning outcomes specified for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Course study methods</b>	<b>Methods of assesment</b>
<b>EK 1</b>	<b>K_W05</b>	<b>C1</b>	Lecture/ laboratory	<b>1, 2</b>	<b>F1, P1</b>
<b>EK 2</b>	<b>K_U06</b>	<b>C1, C2</b>	Lecture/ laboratory	<b>1, 2</b>	<b>F1, P1</b>
<b>EK 3</b>	<b>K_U06</b>	<b>C2</b>	Laboratory	<b>2, 3, 4</b>	<b>F1, F2, F3, P2</b>

## **II. 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](http://www.is.pcz.pl)
2. The information about the consultation hours is provided to students on the first class meeting and posted online at the Faculty internet web
3. The information on course completion and grade is provided to students on the first class meeting.