



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Water management with meteorology

### Course

Field of study

Environmental Engineering Extramural First

Area of study (specialization)

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

4/8

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

18

Laboratory classes

18

Other (e.g. online)

Tutorials

Projects/seminars

18

### Number of credit points

6

### Lecturers

Responsible for the course/lecturer:

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ul. Berdychowo 4, 61-131 Poznań

Responsible for the course/lecturer:

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### Prerequisites

1.Knowledge:Fluid Mechanics, Water Supply, Sewerage, Water Technology and Wastewater Technology. Environmental Chemistry and Environmental Biology: water chemistry, the processes of pollutants biodegradation. Urban Development with GIS

2.Skills: Application of knowledge of the above mentioned subjects. Acquiring knowledge from the literature, electronic resources and databases. The ability to self-education, the ability to conceptual thinking and reasoning.

3.Social competencies:



Group work. Awareness of the need to constantly update and supplement knowledge and skills.

### Course objective

Acquisition of basic knowledge in the field of the sustainable and integrated water management and meteorology, with a particular focus on the balancing of water resources and demand for water, classification and methods for improving the water quality and the basics of the strategy in water management. Acquiring the ability to solve the complex problems related to the subject in an interdisciplinary perspective, with taking into account the existing organizational and legal conditions

### Course-related learning outcomes

#### Knowledge

1. The student has the basic knowledge in terms of water management, hydrology and meteorology suitable to formulate and solve simple problems of environmental engineering (obtained at the lecture) - [KIS\_W02]
2. The student has the basic knowledge in terms of life cycle of devices and technical systems in hydrology (obtained at the lecture) - [KIS\_W06]
3. The student knows the basic methods techniques and tools applied to solve simple engineering tasks in water management, hydrology, meteorology and water protection (obtained at the lecture) - [KIS\_W07]
4. The student has the basic knowledge necessary to understand social, economic, legal and other non-technical conditions of engineering activities, including the principles of sustainable development (obtained at the lecture) - [KIS\_W08]

#### Skills

1. The student when formulating and solving engineering tasks in water management, can notice the systemic and non-technical aspects as well as the need to apply the principles of sustainable development (obtained at the laboratory classes and project) - [KIS\_U05]
2. The student is able to perform preliminary economic and ecological analysis of engineering activities concerning water management and hydrology (obtained at the laboratory classes and project) - [KIS\_U06]
3. The student is able to utilize appropriate methods, technologies and tools, can design and implement a simple system typical for hydrology (obtained at the laboratory classes and project) - [KIS\_U10]
4. The student can cooperate and work in a team (obtained at the project classes) - [KIS\_U16]

#### Social competences

1. The student aware of non-technical aspects and effects of engineering activity, including its environmental impact, concerning water management and hydrology (obtained at the lecture) - [KIS\_K01]



### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures:

Written exam, within the period fixed at the beginning of the semester (50% to pass the exam) (the effect of (efekt W02, W06, W07, W08, K01, U13))

Project

Preparation of the project (70%) and project defense - written and / or oral defense (30%) (the effect of U05, U06, U10, U16).

Continuous assessment in the classroom.

Laboratories

Written reports on individual exercises - 50% to pass (the effect of U05, U06)

### Programme content

Circulation of water in nature. Hydrological cycle. Water balance.

Hydrological systems. Watercourses: stages of water and water discharges and probable flows, methods for determining the relationship: rainfall runoff.

Basic concepts, goals and tasks of water management. Administration and water management.

Conditions of water use in large catchments. Water use permissions. Water law. Water resources.

Resources of water from rainfalls. Climatic deficit at precipitation. Spatial distribution of rainfalls and their regional deficit in Poland.

Surface water resources. Flowing water resources, criteria of quality evaluation, classification.

Still water resources, natural and artificial retention of resources. Functions and tasks of retention reservoirs.

Water access indicators in Poland and other countries in Europe.

Ground water resources - the disposal and exploitation resources. Quality evaluation criteria, classification of ground water resources. Water needs. Classification of needs as a basis for dividing of water resources.

Structure of water consumption according to sources of resources and sectors of management in Poland and other countries in Europe and all over the world. Hydropower. Water-management balance of resources and needs.

Flood and drought protection. Mitigation of water deficit consequences. Areas vulnerable to floods and water deficit.



Economical instruments in water management - taxes and penalties.

Development trends in the field of water management in industry (including energy), agriculture, and urban areas. Criteria for evaluation of water management systems. Renewal of water. (BAT (Best Available Technologies) in the field of water management in large industrial plants.

Ecological and social aspect of sustainable development of water management systems.

Basic information in the field of meteorology: energy in the atmosphere, temperature, water in the atmosphere, meteorological observations, weather forecasting, the impact of human activities on the climate.

### Teaching methods

Lectures: lectures with multimedia presentations and problem lectures.

Project: project method (practical project), case analysis.

Laboratories: exercise method based on the use of various tools.

### Bibliography

Basic

1. Więzik B. Hydrologia w inżynierii i gospodarce wodnej. T. 1, KIŚ PAN, 2010
2. Ackerman S. A., Knox J. A. Meteorology, Understanding the atmosphere, wyd. Johns and Barlett Learning LLC, 2015
3. Szymkiewicz R., Gąsiorowski D.: Podstawy hydrologii dynamicznej, Wydawnictwa Naukowo-Techniczne, Warszawa 2010
4. Byczkowski A.: Hydrologia, tom II, Wydawnictwo SGGW, warszawa 1999
5. Wąsowicz M. Podstawy ekonomiki gospodarki wodnej, Wydawnictwo OWPW, 2000
6. Mikulski Z. Gospodarka wodna, Wyd. PWN Warszawa 1998
7. Ciepeliowski A. Podstawy gospodarowania wodą, wyd. SGGW 1999
8. Ustawa Prawo Wodne

Additional

1. Wojciechowska E., i in. Zrównoważone systemy gospodarowania wodą deszczową, WPG, 2015
2. Gromiec M. Słownik terminów związanych z gospodarowaniem zasobami wodnymi, Politechnika Krakowska, 2006



### Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,0
Classes requiring direct contact with the teacher	54	2,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests/exam, project preparation) <sup>1</sup>	106	4,0

<sup>1</sup> delete or add other activities as appropriate