STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Water management with elements of hydrology**		Code **1010101271010135182**
Field of study **Environmental Engineering First-cycle Studies**	Profile of study (general academic, practical) **general academic**	Year /Semester **4 / 7**
Elective path/specialty **-**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **full-time**	
No. of hours Lecture: **30** Classes: **15** Laboratory: **-** Project/seminars: **15**		No. of credits **4**
Status of the course in the study program (Basic, major, other) **major**	(university-wide, from another field) **university-wide**	
Education areas and fields of science and art **technical sciences** **Technical sciences**		ECTS distribution (number and %) **4 100%** **4 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge acquired within courses delivered earlier during First-cycle studies: Fluid Mechanics, Water Supply, Wastewater Disposal, Technologies of Wastewater, Environmental Biology and Chemistry,
2	**Skills**	Make advantage of informatics techniques, Acquaintance of basic terminology in area of environmental engineering. Self-education ability.
3	**Social competencies**	Awareness of the need to constantly update and supplement knowledge and skills.

Assumptions and objectives of the course:

Presentation of the basics of hydrology and knowledge concerning water management, especially administration structure, water balance and water needs in Poland.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Basic concepts of hydrology, methods of hydrologic measurements, organization of measurements in Poland.ce. - [K_W04]
2. Basic concepts, goals and tasks of water management, administration structure in water management. - [K_W08, K_W09]
3. Basis of evaluation of water needs and resources in a catchment, region and country. - [K_W09]
4. Goals and tasks of flood protection and water deficit mitigation. - [K_W09]
5. Goals and basis of water management balance. - [K_W09]
6. Basic economic instruments used in water management. - [K_W08]
7. Ecological aspects of sustainable development. - [K_W09]

Skills:

1. Acquisition of hydrologic data and its interpretation - [K_U11,]
2. Interpretation of regulations published by water management authorities. - [K_U12,]
3. Cooperation with water management bodies in flood protection and water deficit mitigation. - [K_U12,]

Social competencies:

1. The student sees the need for systematic incresing his skills and competences - [K_K01]
2. The student understands the need for teamwork in solving theoretical and practical problems - [K_K03, K_K04]
3. Student has consciousness of engineering activity effect on environment - [K_K02]

Assessment methods of study outcomes

Lectures:

Written acquaintance with open questions

Practical exercises:

Evaluation of report

Checking acquaintance confirming understanding of presented tasks.

Course description

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

Hydrological systems. Stages of water. Discharges measurement in rivers. Characteristic stages and discharges. Rating curve ? basis of evaluation and applications.

Probable flows ? interpretation.

Basic concepts, goals and tasks of water management.

Administration structure in water management.

Conditions of water use in large catchments. Water use permissions. Water low. Water resources. Disposal resources. Classification of water resources.

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

Surface water resources. Moving water resources, methods of computations, criteria of quality evaluation, classification of moving water resources.

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

Artificial retention as a way to disposal resources augmentation.

Evaluation of surface water resources in Poland. Water access indicators in Poland and other countries in Europe.

Spatial and time distribution of runoff as a measure of surface moving water resources differentiation.

Ground water ? disposal and exploatation resources. Quality evaluation criteria, classification of ground water resources.

Main reservoirs of ground water in Poland.

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 World.

Energy from water.

Water-management balance of resources and needs.

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

Economical instruments in water management ? taxes and penalties.

Ecological aspect of sustainable development of water management systems.

Basic bibliography:

1. Mikulski Z. Gospodarka wodna, Wyd. PWN Warszawa 1998
2. Ciepielowski A. Podstawy gospodarowania wodą, wyd. SGGW 1999

Additional bibliography:

1. Słota H. Zarządzanie systemami gospodarowania wodą, IMGW Warszawa 1997
2. Goliszewski J. Ochrona wód powierzchniowych przed zanieczyszczeniem, Arkady 1968

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	30
2. Participation in exercises	30
3. Participation in consultations related to tutorials and practical exercises	6
4. Preparation for the final test of tutorials	15
5. Preparation for the final test of the lectures	15
6. Presence at the final tests of tutorials	2
7. Presence at the final tests of lectures	2

Student’s workload

Source of workload	hours	ECTS
Total workload	100	4
Contact hours	60	2
Practical activities	0	0