UNIVERSITY OF WARMIA AND MAZURY IN OLSZTYN

UNIVERSITY OF WARMIA AND MAZURY
Faculty of Agriculture and Forestry

56S1-INZW **WATER ENGINEERING** **ECTS: 3.0**

HOURS PER SEMESTER/WEEK: LECTURES: 15/1; CLASSES: 30/2
FIELD OF THE STUDY: Environmental protection
Level of study: First-cycle (Engineer's degree) program

Course status: optional *
Year of the study: II

COURSE CONTENTS
LECTURES: Economic significance of water. Water balance of the catchment area. The needs of water management. The systemic approach to water management. Water retention in the catchment area, human intervention in water circulation - resource enrichment, reduction of deficiency, prevention of flood. Droughts and floods, flood hazards and countermeasures, organization of the fight against floods in Poland, flood damage. Main sources of water pollution. Threats, degradation, and protection of water resources. Self-purifying water. Methods for improving the quality of groundwater. Water management equipment, classes of water constructions. Basic water structures: damming, regulating. Types of water reservoirs, their environmental impact, methods of water management in a retention reservoir. Special water management buildings. Hydroelectric power plants, the state of hydropower in Poland, and the ecological side of this form of energy generation. Classification (standards) and usability of water.

CLASSES: Graphic designations on maps. Hydrological basics of water structures design. Hydraulic foundation for water building design. Water resource management in the river valley. Principles of reservoirs and watercourses protection. Water reservoir design. Choosing the location of the water reservoir. Elements of a water damming structure. Hydraulic calculations of the damming construction. Determining the impact range of the projected damming. Dimensioning of the hydro-technical structures. Technical drawing and projection of structural elements of a damming structure.

EDUCATIONAL PURPOSE: Familiarizing students with the state of water management in Poland, discussing the most important problems of water management in individual sectors of the economy, and familiarizing students with the role of engineering structures in water management and environmental protection.

LEARNING OUTCOMES
Knowledge. Knowledge of the principles of water and economic planning, understanding of the needs of water management in the country Knowledge of water management methods. Knows the types of flood hazards, and methods of flood control, can discuss the main sources of water pollution, and understands the problems of water threat and protection. Describes water management devices, and knows the basics of designing a water reservoir and the damming structure.
Skills. He has the ability to interpret maps, he has the ability to locate a water reservoir. Mastering the hydrological basics of dimensioning and the basics of designing water structures.
Social competences. He is aware of the importance of lifelong learning and is able to work independently and in a group. Is aware of the responsibility of proper water management, is aware of the risk, and understands the consequences of improper water management.

TEACHING FORMS AND METHODS
Lectures. Informative lecture with a multimedia presentation
Classes. Project classes

FORM AND CONDITIONS FOR VERIFICATION OF LEARNING OUTCOMES
Lectures. Colloquium test - written test with open questions
Classes. Project classes (Colloquium test) - execution of the assignment: project development, oral passing/colloquium.

BASIC LITERATURE
1) Depczyński W., Szamowski A., Budowle i zbiorniki wodne., Tom t.1/1, Wyd. wyd. Wydawnicza Politechniki Warszawskiej, 1999. 2) Ciepielowski A., Podstawy gospodarowania wodą., Tom t.1/1, Wydawnictwo SGGW, 1999. 3) Mioduszewski W., Mała retencja. Ochrona zasobów wodnych i środowiska naturalnego., Tom t.1/1, Wydawnictwo IMUZ, 2003.

ADDITIONAL LITERATURE
International journals on water resources and hydro-technical infrastructure.

THE TEACHER/TEACHERS CONDUCTING THE CLASSES:
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* note: optional course availability depends on Polish students' choice!