

56S1-HPWIK

**HYDRAULIC FUNDAMENTALS OF WATERWORKS AND
SEWAGE SYSTEMS**

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: Requirements related to the execution of technical projects. Graphical markings on maps for project purposes. Water demand calculations. Principles of determining the route of the water supply network and planning its utilities. Technical parameters of the water supply network. Hydraulic calculations and determination of the pressure distribution in the computational nodes of the network in the variant of household and fire water distribution. Routing of the sewage system and arrangement of its utilities. Calculations of the amount of wastewater, determination of computational flows in sewage pipelines. Hydraulic calculations of the sewage network, determination of the basic parameters of pipelines and sewage outflow conditions. Determining the depth of pipelines and slopes of sewage pipes, plotting longitudinal profiles.

CLASSES: Liquid properties. Elements of hydromechanics. Basic laws of hydrostatics. Fluid flow - hydrodynamics. Movement of liquids in open channels. Movement of liquids in closed pipes. Hydraulic basics for calculating pressurized piping. Flow through porous layers. Source of water for waterworks. Water quality required. Water intake. Water supply stations. Waterworks - components, water supply systems, water demand structure. Water supply networks and their equipment. Tanks and water pumping stations. Operation of water supply networks. Sewerage - components, tasks of the sewage system, characteristics of sewage systems. Construction of sewage networks. Sewage pumping stations. Operation of the sewage system.

EDUCATIONAL PURPOSE: Acquainting with the theoretical foundations of designing water supply and sewage disposal networks, mastering the basic calculation techniques in the field of sanitary engineering and how to prepare construction projects.

LEARNING OUTCOMES

Knowledge. Has structured and theoretically based knowledge of the components of water supply and sewage disposal systems. Has elementary knowledge of hydrostatics and hydrodynamics necessary to perform hydraulic calculations of water supply and sewage systems. Knows and understands the methodology of designing water supply and wastewater networks with due care for the environment.

Skills. Under the supervision of a scientific supervisor, he prepares design documentation for water supply and sewage systems. Has the ability to analyze design solutions in the field of water supply and sewage disposal and to select and apply appropriate methods, technologies and materials to solve simple engineering tasks while maintaining due care for the environment.

Social competences. Is able to properly define priorities for the implementation of a task defined by himself or others. Is aware of the importance and understands the technical and non-technical aspects and effects of the engineer's activity, including its impact on the environment, and the related responsibility for decisions made.

TEACHING FORMS AND METHODS

Lectures. Informative lecture with a multimedia presentation.

Classes. Project classes.

FORM AND CONDITIONS FOR VERIFICATION OF LEARNING OUTCOMES

Lectures. Colloquium partly test, partly with open questions.

Classes. Project with its presentation, written colloquium partly test, partly with open questions and tasks.

BASIC LITERATURE

1) Spellman F.R. 2013. Handbook of Water and Wastewater Treatment Plant Operations. CRC Press. Boca Raton, ss. 923. 2) Punmia Dr.B.C., Jain A.K., Jain A.K. 2005. Water Supply Engineering. Laxmi Publications, ss. 584.3) Davis M.L. 2019. Water and Wastewater Engineering: Design Principles and Practice. McGraw-Hill Companies, ss. 1344.

ADDITIONAL LITERATURE

1) Houghtalen R.J., Osman Akan A., Hwang N.H.C. 2010. Fundamentals of Hydraulic Engineering Systems. Prentice Hall, ss. 471.

THE TEACHER/TEACHERS CONDUCTING THE CLASSES:

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