

**HOURS PER SEMESTER/WEEK:** LECTURES: 15/1; CLASSES: 30/2

**FIELD OF THE STUDY:** Chemistry

**Level of study:** First-cycle (Bachelor's degree) program

**Course status:** optional \*

**Year of the study:** III

#### COURSE CONTENTS

**LECTURES:** Types of surface waters and types of sewage. Basic physicochemical processes occurring in surface waters. Factors determining the trophic state, water quality and ecological state of aquatic ecosystems. The impact of catchment conditions on the quality of rivers and lakes. Eutrophication process. Self-purification of flowing waters. Surface water status assessment systems. Qualitative characteristics of municipal and industrial sewage. Basic wastewater treatment technologies. Problems of the quality of treated wastewater and their impact on water receivers.

**CLASSES:** Health and safety rules in field work related to water and sewage testing. Practical and field classes: rules for determining the dates and locations of collection points, methods of proper sampling of water and sewage for analysis, preservation and storage of samples for laboratory analysis. Performing measurements of physical indicators in situ using selective sensors and multi-parameter probes. Laboratory determination of selected indicators in collected samples of water and sewage. The use of laboratory instrumental methods to study water and wastewater. Development of the results of field analyses and measurements. Interpretation of research results in relation to legal requirements for water and wastewater quality, and evaluation systems reflecting the ecological status of waters.

**EDUCATIONAL PURPOSE:** The aim of education is to deepen practical skills and chemical knowledge with aspects of physicochemical measurements of water and sewage. Getting acquainted with the methodology of collecting and preparing water and wastewater samples for analyses, taking measurements, as well as developing and interpreting the obtained results.

#### LEARNING OUTCOMES

**Knowledge.** The student has a basic knowledge of the properties and chemical processes occurring in inland waters and sewage. The student has knowledge of the classification systems and the methodology of conducting research enabling the qualitative assessment of water and wastewater.

**Skills.** The student is able to organize and carry out the collection of water and sewage samples for analysis, in accordance with applicable legal acts. The student is able to perform field measurements, laboratory analyses of physicochemical indicators in water and sewage, and to interpret the obtained results.

**Social competences.** The student is aware of the importance of the quality and protection of water resources, understands the need to popularize these issues. The student is aware of the need for a reliable and correct analytical process in water testing, as a prerequisite for obtaining reliable results.

#### TEACHING FORMS AND METHODS

**Lectures.** Lecture with multimedia presentation.

**Classes.** Practical classes – field and laboratory classes.

#### FORM AND CONDITIONS FOR VERIFICATION OF LEARNING OUTCOMES

**Lectures.** written test - credit with a grade.

**Classes.** Report on completed tasks, containing the results obtained and their interpretation.

#### BASIC LITERATURE

1) Brezonik P.L. 2022. Water Chemistry. Oxford University Press. 2) Sarai D.S. 2005. Basic Chemistry for Water and Wastewater Operators. 2nd ed. Amer. Water Works Assoc

#### ADDITIONAL LITERATURE

1) Stumm W., Morgan J.J. 1996. Aquatic chemistry, Wyd. John Wiley and Sons INC

#### THE TEACHER/TEACHERS CONDUCTING THE CLASSES:

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