

WATER TREATMENT

Course Code/Course ID : Oczyszczanie miast 02PBUD_pNadGen7DIV1

Type of course: compulsory

Teaching language: English

Director of studies: dr Izabela Krupińska

Name of lecturer: IEE teachers

| Form of instruction | Number of teaching hours per semester | Number of teaching hours per week | Semester | Form of receiving a credit for a course | Points ECTS |
|--------------------------|---------------------------------------|-----------------------------------|----------|---|-------------|
| Full-time studies | | | | | 7 |
| Lecture | 30 | 2 | | Exam | |
| Laboratory | 30 | 2 | | Grade with notes | |
| Project | 30 | 2 | | Grade with notes | |

THE AIM OF THE LECTURE:

The introduction to the technology of ground and surface water treatment as well as preparation to independent projecting the objects of water treatment plants.

ENTRY REQUIREMENTS:

Formal: no requirements

SCOPE OF COURSE TOPICS:

Lecture:

Physical and chemical characteristic of source waters used for drinking water production. The standards of water for people consumption. Guide to selection of water treatment processes. Unit processes: sedimentation, flotation, coagulation, filtration, adsorption, corrosion control, iron and manganese removal, disinfection and chemical oxidation, infiltration. The facilities for water treatment: application and design considerations. Water treatment plant waste management.

Laboratory:

The influence of pH and coagulant dosage on the coagulation effectivity, removal of organic compounds by adsorption on activated carbon, removal of iron and manganese from groundwater, corrosion removal, analysis of head loss pattern during filter run, chlorine consumption curve.

Project:

Groundwater treatment plant design including: iron and manganese removal, chemical neutralisation, ammonium removal and disinfection.

TEACHING METHODS:

Giving methods: information and problem lecture with the use of multimedia techniques.

Searching methods: classrooms and practical, laboratory method, project method.

LEARNING OUTCOMES:

| Symbol | Learning outcomes after completion of the course. Student: | The reference to the effects of education in the field of technical sciences |
|---------------------------|---|--|
| Knowledge | | |
| K_W21 | Is well - informed in low regulations related to drinkin-water requirements | T1A_W08 |
| K_W14 | Has the basic knowledge of the unit processes applied in water treatment: aeration, neutralisation, coagulation, filtration, sedimentation, disinfection, chemical oxidation, removing iron and manganese | T1A_W04; T1A_W05; T1A_W06; T1A_W07 |
| Skill | | |
| K_U15 | Is able to execute and to prepare the simple technological project water treatment plant and prepare detailed drawing of pressure filtration | T1A_U16 |
| K_U16 | Is able to plan and to conduct in laboratory conditions the isolated processes of water treatment, to interpret the results of investigations and to draw a conclusion | T1A_U08; T1A_U09; T1A_U16 |
| K_U08 | Complies to of safety required in laboratory work, principles knows to estimate on basis of laboratory analysis the quality of water | T1A_U08; T1A_U09 |
| K_U07 | Uses from net with solving technical problems connected with water treatment | T1A_U07 |
| Social competences | | |
| K_K04 | Works in group in laboratory investigations and working out the Results | T1A_K03 |

ASSESSMENT CRITERIA:

The project - the realization, devotion in deadline as well as the obtainment the positive note of design work
The laboratory - realization of all laboratory practices, obtainment the positive notes with supervisory tests as well as final reports.

Lecture - Obtainment positive opinion from practices is the condition of accession of to examination project and laboratory,examination has written form and it contains 6 problematic questions, have estimated since 0 to 3 points. Got points / Opinion - 0-8 / insufficient; 9-11 / sufficient; 12-13 / sufficient plus; 13-14 / good; 15-16 / good plus; 17-18 / very good positive exam note. The basis for determining the cumulative rating is the weighted average obtained by adding: 0.44 lecture grade, 0.28 laboratory assessment grade, and 0.28 assessment from project classes. The weighted average is rounded to two decimal places. The total rating is based on the weighted average according to the rule: below 3.24 - sufficient, from 3.25 to 3.74 - satisfactory plus, from 3.75 to 4.24 - good, from 4.25 to 4.74 - a good plus, from 4.75 – very good.

SELF STUDENT'S WORK:

Independent student work: full-time studies - 25 hours,

Contact hours: full-time studies 150 hours.

RECOMMENDED READING:

1. Water quality and treatment. AWWA McGraw-Hill, Inc.1990
2. Water treatment plant design. AWWA McGraw-Hill, Inc. 1998
3. Water Treatment: Principles and Design. MWH, 2end ed. USA 2005

OPTIONAL READING:

1. Ferhan C., Ozgur A.:Activated Carbon for Water and Wastewater Treatment: Integration of Adsorption and Biological Treatment, Wiley VCH, 2012
2. Nyer K.E.: Groundwater Treatment Technology. ITP Inc, 1992

REMARKS:

As part of the course, students participate in a technical trip to station the water treatment plant.