Subject code: VŽHTB07E
Subject title: Water supply
Subject title in Lithuanian: Vandentieka
Credit value 5 ECTS, 133 hours: 70 contact hours, 63 student independent work hours.

Types of student learning activities

<table>
<thead>
<tr>
<th>Classwork and tutorials</th>
<th>Hours</th>
<th>Student independent work/self-study</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>36</td>
<td>Preparation for laboratory works</td>
<td>12</td>
</tr>
<tr>
<td>Laboratory works</td>
<td>15</td>
<td>Preparation for practicums</td>
<td>10</td>
</tr>
<tr>
<td>Practicums</td>
<td>15</td>
<td>Intermediate test</td>
<td>14</td>
</tr>
<tr>
<td>Tutorials/consultations</td>
<td>2</td>
<td>Preparation for exam</td>
<td>27</td>
</tr>
<tr>
<td>Examination</td>
<td>2</td>
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</tr>
</tbody>
</table>

Subject purpose

<table>
<thead>
<tr>
<th>Study cycle</th>
<th>Study programme</th>
<th>Type of the subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>First cycle</td>
<td>Hydraulic engineering&lt;br&gt;Water protection engineering and management</td>
<td>Compulsory</td>
</tr>
</tbody>
</table>

Subject objectives: to define the water supply systems; to be aware the basic technologies of drinking water preparation; to design the main components of water supply systems by applying innovative technologies.

Prerequisites: Students should have basic knowledge of mathematics, physics, chemistry, hydrogeologics, and hydraulics before starting studies of this subject.

Learning outcomes:

Knowledge and understanding: by accomplishing of the subject students will obtain the knowledge of innovative technologies of using for water supply construction and the planning methods used for construction of water supply systems.

Special abilities and skills: to be able carry out the major calculations of water supply networks; to design the main components of water supply equipment and elements; to evaluate the state of existing water supply and to find the solutions of various problems arising during the exploitation and reconstruction of water supply systems; to be able to choose effective methods of drinking water preparation; to recognize the impact of water supply structure for the environmental and the health of people; to be capable of predict and evaluate possible the environmental changes and means of reduce the impact.

Transferable abilities and skills: to be able to assess the results of design of water supply systems and laboratory works and do reasonable conclusions and them rightly interpret; to have skills in compilation of information and evaluation, calculation and handling of data, to be able to work in command.
Values and attitudes: during the course of study are offered in problem solving, responsibility, responsible and diligent and creative work provisions; the positive approach to creative work and the nature as an integral part of our living environment, storage and conservation provisions.

Assessment criteria of learning outcomes: the understanding and using of the major concept of the studding subject; the assimilate of knowledge described in studding results; the applying of knowledge in simple situations; quality of self-depended works, the formulation of conclusion and summation; quality of performance of laboratory works and the ability to formulate clearly conclusions.

Subject content:

Lectures: 36/27 h. (contact hours/student independent work hours)
1. Major definitions of water supply. Historical review of water supply. Water supply legislation. 2/2 h.
2. Schemes of drinking water supply systems and major equipment. 2/2 h.
3. Water users and computation of discharge. 4/2 h.
4. Water extraction. Constructions and calculations of equipment of water extractions of surface water and groundwater. 4/3 h.
5. Station of drinking water and major methods of drinking water. 4/3 h.
7. Design of water supply network using software. 4/3 h.
8. Pipe and pipeline construction and fitting. 3/2 h.
9. Installation technology of water distribution network, hydraulic testing of pipe. 4/2 h.
10. Structures for regulation of pressure and discharge and calculations. 3/2 h.
11. Preparing of project of water supply system. 1/2 h.
12. Maintenance of water supply systems. 1/1 h.

Laboratory works: 15/12 h. (contact hours/student independent work hours)
1. The gathering of water by siphon from group wells. 3/2 h.
2. The testing of looped network. 3/2 h.
3. Hydraulic loses in PVC, glassy and aluminium pipes. 3/2 h.
4. Installation of pipes. 3/2 h.
5. Practical outing to watering-place of Kaunas city and drinking water station. 3/2 h.

Practicums: 15/10 h. (contact hours/student independent work hours)
1. Computation of water demand and discharge. 3/2 h.
2. Computation of groundwater extraction. 3/2 h.
3. Design of water supply network. 3/2 h.
4. Computation of structure for regulation of pressure and discharge. 3/2 h.
5. Design of water supply network using software. 3/2 h.

Methods of learning: Lectures material is visualized using multimedia. In the beginning of the lecture the relevance of the topic is defined, introduces the purpose and content of the sources of information on which is ready for a lecture. During the lecture, if possible, a form of discussion is applied, i.e. students asked questions in order to incorporate them into a short discussion. It the ends of the lecture are presented summaries. Laboratory work is performing in groups. Work performance is mandatory. Work performed in the laboratory of Water supply. All needed laboratory equipment are completed in this laboratory. Laboratory work led by leading professor. Laboratory works and practicum descriptions are in electronic database that is freely available to students. The students carry out according to individual task by methodology guidelline.
**Assessment methods of student learning outcomes:** For learning outcomes assessment a cumulative system is applied. Students' theoretical knowledge will be assessed in exam. The main criteria for this assessment are adoption and appliance interpretation of gathered knowledge. Adopted knowledge of laboratory works and practicums is assessed according to works reports, written conclusions and ability to systemize and summarize work results.

Knowledge of the subject treated in the ten-point system, carried out separately for laboratory work, work practice and theoretical knowledge. The results are scored multiplying by the weight factor and summed.

Subject knowledge is assessed using ten point grading scale separately for laboratory works-practicums, control (individual) work and theory knowledge. The results in points are multiplying by weight score and scored up.

<table>
<thead>
<tr>
<th>Types of students’ independent work</th>
<th>Weight score</th>
<th>Deadlines of assessment</th>
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</thead>
<tbody>
<tr>
<td>Exam</td>
<td>0.5</td>
<td>At the end of semester</td>
</tr>
<tr>
<td>Practicums</td>
<td>0.3</td>
<td>During semester</td>
</tr>
<tr>
<td>Laboratory works</td>
<td>0.2</td>
<td>During semester</td>
</tr>
</tbody>
</table>

**Interaction between study programme learning outcomes and learning methods and methods of student learning outcomes assessment**

<table>
<thead>
<tr>
<th>Study programme learning outcomes</th>
<th>Subject learning outcomes</th>
<th>Learning methods</th>
<th>Assessment methods of student learning outcomes</th>
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</thead>
<tbody>
<tr>
<td>Knowing the materials</td>
<td>To know the materials and structural elements used in water supply systems, their properties and operation fields, to understand the principles of building design.</td>
<td>Lectures, case analysis, the visual material.</td>
<td>Knowledge testing in the exam, discussion with teacher.</td>
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<tr>
<td>and structural elements used in water engineering, their properties and fields of use, understanding the principles of building design</td>
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<tr>
<td></td>
<td>To understand the basic elements of water supply system design principles.</td>
<td>Lectures, exercise work, analysis of the regulatory literature.</td>
<td>Knowledge testing in exam, presentation of problematic cases, practicum performance presentation and defense.</td>
</tr>
<tr>
<td>Use of engineering design</td>
<td>Will be able to identify the water users and to calculate the amount of discharge in the object projected</td>
<td>Lectures, exercise work, analysis of the regulatory literature.</td>
<td>Knowledge testing in exam, the presentation and defense of results of practicum, formulation of conclusions.</td>
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<tr>
<td>and computing skills to the specific tasks of water engineering</td>
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<tr>
<td></td>
<td>To calculation of groundwater discharge and water extraction quantity and select the most suitable drinking water treatment method.</td>
<td>Exercises and laboratory work, measurement and evaluation.</td>
<td>The presentation and defense of results of practicum and laboratory works, formulation of conclusions.</td>
</tr>
<tr>
<td></td>
<td>To perform hydraulic calculation of design network manually and software.</td>
<td>Lectures, practicum works</td>
<td>The presentation and defense of results of practicum, formulation of conclusions.</td>
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<tr>
<td></td>
<td>To choose the correct pressure and flow control</td>
<td>Lectures, exercise work, analysis of</td>
<td>Knowledge testing in exam, the presentation and defense.</td>
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</tbody>
</table>
equipment and make the necessary calculations. | the regulatory literature. | defense of results of practicum, formulation of conclusions.  
---|---|---
Deepen the skills of teamwork, responsibility and diligent work provisions, to build a systematic approach to the phenomena. | Lectures, laboratory work and practicum. | Individual written exam, quality of individual assignments and group products, the presentation and defense of results of practicum and laboratory works, formulation of conclusions, discussion with the teacher.

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**Required literature references for subject study:**


**Recommended literature references for subject study:**


**Coordinating teacher:** assoc. prof. dr. Gražina Žibienė, Department of Hydraulic Engineering

**Teachers:** lect. Alvydas Žibas

**Author of the subject description:** assoc. prof. dr. Gražina Žibienė

**Reviewer of the department:** lect. V. Damulevičius, Department of Hydraulic Engineering

**Reviewer of the faculty:** Lect. dr. Rytis Skominas, Department of Building Constructions

**Approval at department:** 22 February 2012, Minute No. 5.

**Approval at programme committee:** 27 February 2012, Minutes No.2.

**Subject description valid until:** 31 August 2014.