Hydraulic Engineering, Water Management - BMEEOVVAT43

I. Subject Specification

1. Basic Data

1.1 Title

Hydraulic Engineering, Water Management

1.2 Code

BMEEOVVAT43

1.3 Type

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	2
Seminar	1

1.5 Evaluation

Exam

1.6 Credits

3

1.7 Coordinator

name	Dr. Hajnal Géza
academic rank	Associate professor
email	hajnal.geza@emk.bme.hu

1.8 Department

Department of Hydraulic and Water Resources Engineering

1.9 Website

https://epito.bme.hu/BMEEOVVAT43
https://fiek2.mywire.org/course/view.php?id=463

1.10 Language of instruction

hungarian and english

1.11 Curriculum requirements

Compulsory in the Civil Engineering (BSc) programme

1.12 Prerequisites

Strong prerequisites:

- Hydrology I. (BMEEOVVAT41)
- Hydraulics I. (BMEEOVVAT42)

Recommended prerequisites:

- Soil Mechanics (BMEEOGMAT42)

1.13 Effective date

1 September 2022

2. Objectives and learning outcomes

2.1 Objectives

The main aim is to introduce basic elements of water management and hydraulic engineering, the fundamentals of water management planning, the basic tasks and principles, solution possibilities, structures and other constructions of the regulation of creeks, rivers and lakes, the basic elements of flood protection, river utilisation (hydroelectric power, inland navigation, water storage), the water management problems of flat and hilly regions, including dewatering, irrigation and fisheries, the main items of water demand and resources in Hungary

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. Knows general terminology of water management planning and water resources management.
2. Knows the basic requirements and possibilities of the regulation of the different watercourses.
3. Knows the basic requirements and possibilities of the utilisation of rivers.
4. Understands the possibilities of agricultural ware management of Hungary.
5. Knows the main directives of Hungary and the EU in the field of water management.

B. Skills

1. Able to identify and locate problems in the field of hydraulic engineering and water management.
2. Able individually for the collection, understanding and utilisation of information to solve simpler problems in the field of hydraulic engineering and water management.
3. Able for the decision making on case of simpler problems in the field of hydraulic engineering and water management.
4. The basis of informatics makes him/her able to solve problems of simpler computation requirements.
5. Able to express her/his thoughts orderly.

C. Attitudes

1. Cooperate with the teacher during the learning process on such a level that is needed for the engineering work requiring individual responsibility and decision making.
2. Is open to the use of IT tools and equipment.
3. Pursue to know and use of the toolkit which need for the solution of problem in the given field.
4. Pursue to the exact and errorless task solution.
5. Aims to find solutions that takes energy efficiency and environmental requirements into consideration in the field of hydraulic engineering and water management.

D. Autonomy and Responsibility

1. Is able to individually identify and solve hydraulic engineering and water management problems and to find solutions with the help of the information made available.
2. Is open to well-founded criticism.
3. Applies system approach in his/her thinking.

2.3 Methods

Lectures, exercise classes, written and oral communications, application of IT tools and techniques, assignments solved individually.

2.4 Course outline

Week	**Topics of lectures and/or exercise classes**
1.	The aim of water management, tendencies, main fields. Water management planning, categories of water balance.
2.	Water management problems of lowlands. Water balance. Polders, their canals and other structures.
3.	The main elements of water resources management. The distribution of water resources along a river. Fisheries. Pumping stations and other structures to divert water
4.	The fundamentals of irrigation, irrigation methods, irrigation plants.
5.	Dewatering. Technical and agricultural dewatering. Hydraulic dimensioning of drains, ditches, and structures.
6.	Water management problems of hilly regions. Hydrologic characteristics, The cause and influencing factors of erosion. The forms of erosion. The technical and agricultural methods to protect the topsoil.
7.	The regulation of creeks and other small streams. Bottom drops, culverts and othes structures. The main elements of lining.
8.	The general characteristics of rivers, their layout and their development. The basic elements of river regulation.
9.	Prevention of flood damages. The methods to reduce runoff, spillway canals, levees, regulation.
10.	Flood protection systems. Stability of levees, protection during flood. Non structural solutions.
11.	Dams and river barrages. Main types, main elements and their tasks. Fish passes.
12.	The basic elements of hydroelectric power generation. Depleted and renewable energy. Main parts of a power plant, types of turbines. Pumped storage.
13.	The main structures of inland navigation. Ports and harbours. The operation of navigation locks.
14.	The water policy of EU, the Water Framework

	Directives

The above programme is tentative and subject to changes due to calendar variations and other reasons specific to the actual semester. Consult the effective detailed course schedule of the course on the subject website.

2.5 Study materials

a) Textbooks:

1. Robertson, J.: Hydraulic Engineering, Houghton Mifflin, Boston, 1998.
2. Chen, Sheng-Hong: Hydraulic structures, Springer, Berlin, 2015.

b) Online materials:

1. individual task specifications and solution guides
2. handouts of the lectures

2.6 Other information

None

2.7 Consultation

The instructors are available for consultation during their office hours, as advertised on the department website at the beginning of the semester.

This Subject Datasheet is valid for:

Inactive courses

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

The assessment of the learning outcomes specified in clause 2.2. above and the evaluation of student performance occurs via four homework assignments and written examination.

3.2 Assessment methods

Evaluation form	Abbreviation	Assessed learning outcomes
homework	HF	A.2-A.3; B.1-B.5; C.1-C.4; D.1-D.3
examination	V	A.1-A.5; B.1-B.3, B.4; C.5; D.2-D.3

The dates of deadlines of assignments/homework can be found in the detailed course schedule on the subject's website.

3.3 Evaluation system

Abbreviation	Score
HF	1/3
Total achievable during the semester	**1/3**
V	2/3
Sum	**1**

3.4 Requirements and validity of signature

Criterion for the signature is to visit at least 70 % of the lectures and 70 % of the seminars, and all the homework has to be prepared at least at "passed" level.

For those, who have valid signature, and do not choose course only for examination, the midsemester results revise the former one.

3.5 Grading system

If the student satisfies the attendance criteria, his/her mark will be determined as follows:
If both each homework and the examination grade reaches the "passed" level, the grade is given by the weighted average of homework assignments and exam due to point 3.3.

3.6 Retake and repeat

1. Late submission of HF is possible until the date given in the Detailed semester schedule after the payment of the fee determined in the Regulation.
2. The submitted and accepted homework can be corrected without any fee until the deadline described in the point 1.

3.7 Estimated workload

Activity	Hours/semester
contact hours	14×3=42
homework	4×5=20
home studying of the written material	6
preparation for the e×amination	22
Sum	**90**

3.8 Effective date

1 September 2022

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