

I. Subject Specification**1. Basic Data***1.1 Title***DESIGN OF HYDRAULIC STRUCTURES***1.2 Code***BMEEOVVMSFIN03-00***1.3 Type*

Module with associated contact hours

1.4 Contact hours

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

1.5 Evaluation

Midterm grade

1.6 Credits

5

1.7 Coordinator

name	Dr. Torma Péter
academic rank	Associate professor
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1.8 Department

Department of Hydraulic and Water Resources Engineering

1.9 Websiteepito.bme.hu<https://edu.epito.bme.hu/course/view.php?id=5209>*1.10 Language of instruction*

hungarian

1.11 Curriculum requirements

Compulsory in the Water and Hydro-Environmental Engineering (MSc) programme

*1.12 Prerequisites**1.13 Effective date*

1 September 2025

2. Objectives and learning outcomes

2.1 Objectives

The subject aims to learn the hydrological, hydraulic, soil mechanics, and structural design principles of different water management structures and their methods in detail through a complex design task. The subject also aims to present issues of construction, as well as the operational and maintenance tasks. Furthermore, students will learn about the challenges of design, construction, and operation, as well as the possible ways of dealing with them, taking into account environmental impacts.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. Knows the generally used terminology of flood protection and water level control works. 2. Knows the available and applicable methods for flood calculations. 3. Knows the basic relationships of flood storage. 4. Knows the types of flood diversion structures and the principles of their design, dimensioning and construction. 5. Knows the design principles of earth dams, levees, dykes, and embankments. 6. Knows the basic principles and terminology of dimensioning of large structures. 7. Knows the main methods of structure hydraulics and their application possibilities for individual types of structures. 8. Is able to prove the stability of large structures. 9. Knows the methods of calculating seepage around structures.

B. Skills

1. Can select the most applicable flood calculation methods to a given watershed and evaluate the results. 2. Can choose a suitable structure for a given aim of water management based on a comparison of their advantages and disadvantages from several aspects. 3. Is able to recognize hydraulic phenomena occurring in complex structure systems, qualitatively describe them, and hydraulically dimension the structure elements. 4. Can verify the stability of simpler earth dams and embankments. 5. With his/her IT knowledge, he/she solves complex tasks with medium computational requirements in the field of structure hydraulics. 6. Is able to calculate seepage processes around structures. 7. Can verify and prove the stability of large structures. 8. Displays complex hydraulic structures in technical drawings.

C. Attitudes

1. Cooperates with the teachers and students in gaining knowledge. 2. Expands their knowledge through continuous learning. 3. Is open to the application of information technology tools in hydraulic engineering. 4. Strives to learn about and routinely use the tools necessary to solve problems in the field of water storage and water level control. 5. Strives to solve problems accurately and without errors. 6. Strives to consider and reduce harmful environmental impacts.

D. Autonomy and Responsibility

1. Independently thinks through and solves sub-tasks related to structure design based on given sources. 2. Openly accepts well-founded critical comments. 3. Collaborates with students as part of a group in solving tasks. 4. Understands the complexity and comprehensiveness of problems and recognizing the synergies

2.3 Methods

Theoretical and practical lectures. Design guidelines and continuous consultation, oral and written communication, the application of IT tools and techniques, to prepare a larger project work, the organisation of the work.

2.4 Course outline

1. The aims of water level regulation structures: dams, weirs, and barrages. Overview of the different structures. 2. The main elements of water level regulation structures. Basic principles of their design. Hydraulic backgrounds. 3. Design of flood conveyance capacity of the structures. 4. Design and dimensioning of stilling basins. 5. Estimation of the seepage around the structure and its control. 6. Main elements of barrages and their design principles. 7. Determination of the reservoir capacity and design of the storage space. 8. Design and dimensioning of the main body of the dam. 9. Design of the diversion and outlet structures. 10. Stability of the structure: loads and resistance, design conditions, uplift and sliding. 11. Design and control of the structures' hydraulic stability. 12. Introduction of the drawing elements of the project. 13. Documentation of the design work. 14. Discussion about construction-related questions and issues.

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. 3. E. M. Shaw et al.: Hydrology in Practice. Spon Press. 2011. 4. Chanson, H.: The Hydraulics of Open Channel Flow: An Introduction. Elsevier, 2004. 5. Chanson, H.: Energy Dissipation in Hydraulic Structures. CRC Press, 2020. b) Online materials: 1. individual task specifications and solution guides 2. handouts of the lectures

2.6 Other information

None.

2.7 Consultation

During the consultation hours announced by the lecturers on the department website at the beginning of the semester, in the lecturers' office or on the subject's online channel.

This Subject Datasheet is valid for:

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 two midterm presentations, one midterm test and the final submission project work.

3.2 Assessment methods

Assessment Name (Type)	Code	Assessed Learning Outcomes
Presentation1	PR1	A.1-A.9; D.2; D.3
Presentation2	PR2	A.1-A.9; D.2; D.3
Midterm test	MT	A.1-A.9
Project work	PW	B.1-B.8; C.1-C.6; D.1; D.4

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

3.3 Evaluation system

Code	Weight
PR1	15%
PR2	15%
MT	20%
PW	50%
Total	100%

3.4 Requirements and validity of signature

No signature can be obtained.

3.5 Grading system

Grade	Score (P)
excellent (5)	$90 \leq P$
good (4)	$80 \leq P < 90\%$
satisfactory (3)	$65 \leq P < 80\%$
pass (2)	$50 \leq P < 65\%$
fail (1)	$P < 50\%$

3.6 Retake and repeat

1) The project work – after the payment of the fee as described in the Regulations – can be submitted with delay until the last day of the supplementary week, until 12:00 a.m.. 2) The submitted and accepted homework can be corrected without any fee until the deadline described in the point 1. 3) The two midterm presentations can be retaken free of charge on the dates specified in the detailed course schedule. 4) The midterm test can be made up or retaken once free of charge on the dates specified in the detailed course schedule. In case of retake, the highest score is considered.

3.7 Estimated workload

Activity	Hours/Semester
Contact hours	21
Home studying of the written materials and preparation for the test	29
Preparation for presentations	10
Homework assignment	90

3.8 Effective date

1 September 2025

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