

I. Tantárgyleírás**1. Alapadatok***1.1 Tantárgy neve***HYDRAULICS I.***1.2 Azonosító (tantárgykód)***BMEEOVVAT42***1.3 Tantárgy jellege*

Kontaktórás tanegység

1.4 Óraszámok

Típus	Óraszám / (nap)
Előadás (elmélet)	2
Gyakorlat	1

1.5 Tanulmányi teljesítményértékelés (minőségi értékelés) típusa

Vizsga

1.6 Kreditszám

3

1.7 Tárgyfelelős

név	Dr. János Józsa
beosztás	Egyetemi tanár
email	jozsa.janos@bme.hu

1.8 Tantárgyat gondozó oktatási szervezeti egység

Vízépítési és Vízgazdálkodási Tanszék

1.9 A tantárgy weblapja<https://epito.bme.hu/BMEEOVVAT42><https://edu.epito.bme.hu/course/view.php?id=462>*1.10 Az oktatás nyelve*

magyar és angol

1.11 Tantárgy típusa

Kötelező az építőmérnöki (BSc) szakon

1.12 Előkövetelmények

Recommended prerequisites:

- Mathematics A1a - Calculus (BMETE90AX00)

1.13 Tantárgyleírás érvényessége

2020. február 5.

2. Céltűzések és tanulási eredmények*2.1 Céltűzések*

The purpose of the subject is the students' acquiring knowledge upon the basic elements of hydrostatics, pipe hydraulics, channel hydraulics, hydraulic structures, seepage hydraulics and the application of the principles of mass, momentum and energy balance for these processes.

2.2 Tanulási eredmények

A tantárgy sikeres teljesítése után a hallgató

A. Tudás

1. Becomes familiar with the generally accepted terminology of hydraulics.
2. Knows Euler's basic equations of hydrostatics and hydrodynamics and the relations derived from thereof.
3. Understands the concepts of continuity and the possibilities of its applications.
4. Understands Bernoulli's equation and the hydraulic relations derived from thereof.
5. Becomes familiar with the momentum principle and is able to apply it to simple hydraulic phenomena.
6. Becomes experienced in the application of Chézy's formula.
7. Understands the basic phenomena occurring in the subsurface environment.
8. Knows the most important types of hydraulic machines and their usual application.

B. Képesség

1. Able to establish simplified description of real hydraulic systems.
2. Able to formulate the fundamental processes of hydraulic systems using mass, momentum and energy balances.
3. Able to identify simple hydraulic problems, to explore their practical backgrounds and, eventually, solve them.
4. Expresses his or her ideas in an organized way both verbally and in writing.

C. Attitűd

1. Attempts to perceive and routinely apply the methodology of hydraulic problem solving.
2. Makes efforts to solve the problems without errors and with appropriate precision.
3. Aims energy efficiency and environmental awareness in hydraulic design.

D. Önállóság és felelősség

1. Performs the analysis and solution of basic hydraulic problems solely.
2. Open to accept critical arguments.
3. Applies systematic approach in his or her thinking.

2.3 Oktatási módszertan

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

2.4 Részletes tárgyprogram

Week	Topics of lectures and/or exercise classes
1.	The subject of hydraulics. Physical properties of water and other fluids. Hydrostatics Part 1: pressure, Euler's fundamental equation of hydrostatics.
2.	Hydrostatics Part 2: pressure distribution, pressure diagrams; buoyancy, absolute and relative equilibrium.
3.	Fluid flow: basic concepts, Euler's fundamental equation of hydrodynamics.
4.	Flow of ideal fluid under gravity. Bernoulli's equation for ideal and real fluids, its extension to the whole cross section of the flow.

5.	Efflux from openings of hydraulically small and large sizes. Submerged entry.
6.	The operating principle and types of weirs; free and submerged entry.
7.	The dynamical equilibrium in pipe flow, shear stress profile, wall shear stress. Velocity profiles in laminar and turbulent flow. Moody's diagram.
8.	Uniform flow in open channels. Chézy's formula. Hydraulic design of channels.
9.	Surface elevation of gradually varying flows. Sharp variation of flow. Sub- and supercritical flow.
10.	The momentum principle of hydraulics and its application. The hydraulic jump.
11.	Design of stilling basins with constant width.
12.	Seepage in porous media. Darcy's law and its application.
13.	Streamlines in two dimensional seepage. The characterization of seepage below structures. Hydraulic machines.
14.	Rotary pumps.

A félév közbeni munkaszüneti napok miatt a program csak tájékoztató jellegű, a pontos időpontokat a tárgy honlapján elérhető "Részletes féléves ütemterv" tartalmazza.

2.5 Tanulástámogató anyagok

a) Textbook:

1. Mott: Applied Fluid Mechanics (3rd edition)

b) Online materials

1. As listed on the course website (www.oktatas.bme.hu/BMEEOVVAT42).

2.6 Egyéb tudnivalók

None

2.7 Konzultációs lehetőségek

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

Jelen TAD az alábbi félévre érvényes:

II. Tárgykövetelmények

3. A tanulmányi teljesítmény ellenőrzése és értékelése

3.1 Általános szabályok

The assessment of the learning outcomes specified in Clause 2.2 above and the evaluation of student performance occurs via two midterm tests and written or oral examination.

3.2 Teljesítményértékelési módszerek

Evaluation form	Abbreviation	Assessed learning outcomes
1st midterm test	ZH1	A.1-A.4; B.1-B.4; C.1-C.2; D.1, D.3
2nd midterm test	ZH2	A.1, A.4-A.6; B.1-B.4; C.1-C.2; D.1, D.3
Written or oral examination	V	A.1-A.8; B.1-B.2, B.4; C.1, C.3; D.2-D.3

A szorgalmi időszakban tartott értékelések pontos idejét, a házi feladatok ki- és beadási határidejét a "Részletes féléves ütemterv" tartalmazza, mely elérhető a tárgy honlapján.

3.3 Teljesítményértékelések részaránya a minősítésben

Abbreviation	Score
ZH1	25%
ZH2	25%
Total achievable during the semester	50%
V	50%
Sum	100%

3.4 Az aláírás megszerzésének feltétele, az aláírás érvényessége

Criterion of obtaining the signature is at least 70% attendance rate to lectures and seminars/exercise classes and reaching at least 40% of the obtainable points of both midterm tests.

Whenever someone enrolls with an already valid signature to the normal course instead of the examination course, then his/her midterm results overrule any previous midterm results, including the validity of signature.

3.5 Érdemjegy megállapítása

A midterm test or a written examination is considered unsuccessful if a score of less than 40% of the maximum achievable points is reached: this results a 'failed' final grade. Otherwise the final grade is calculated as the weighted average of the midterm tests and the examination as specified in Clause 3.3.

Grade	Points (P)
excellent (5)	85%≤P
good (4)	70%≤P<85%
satisfactory (3)	55%≤P<70%
passed (2)	40%≤P<55%
failed (1)	otherwise

3.6 Javítás és pótlás

- Both midterm tests 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 A tantárgy elvégzéséhez szükséges tanulmányi munka

Activity	Hours/semester
contact hours	14×3=42
preparation for the courses	7×1=7

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preparation for the tests	2×8=16
home studying of the written material	5
preparation for the examination	20
Sum	90

3.8 A tárgykövetelmények érvényessége

2020. február 5.

Jelen TAD az alábbi félévre érvényes: