Hydrology 2 - BMEEOVVAI41

I. Tantárgyleírás

1. Alapadatok

1.1 Tantárgy neve

Hydrology II.

1.2 Azonosító (tantárgykód)

BMEEOVVAI41

1.3 Tantárgy jellege

Kontaktórás tanegység

1.4 Óraszámok

Típus	Óraszám / (nap)
Előadás (elmélet)	2
Laboratóriumi gyakorlat	2

1.5 Tanulmányi teljesítményértékelés (minőségi értékelés) típusa

Félévközi érdemjegy

1.6 Kreditszám

3

1.7 Tárgyfelelős

név	Dr. József Szilágyi
beosztás	Egyetemi tanár
email	szilagyi.jozsef@emk.bme.hu

1.8 Tantárgyat gondozó oktatási szervezeti egység

Vízépítési és Vízgazdálkodási Tanszék

1.9 A tantárgy weblapja

https://epito.bme.hu/BMEEOVVAI41
https://edu.epito.bme.hu/course/view.php?id=3580

1.10 Az oktatás nyelve

angol

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1.11 Tantárgy típusa

Kötelező az építőmérnöki (BSc) szak Infrastruktúra-építőmérnöki ágazatán

1.12 Előkövetelmények

Strong prerequisites:

- Hydrology I (BMEEOVVAT41)

Recommended prerequisites:

- Mathematics A1a (BMETE90AX00)
- Mathematics A3 for civil engineers (BMETE90AX07)

Exclusion:

- Hidrológia II (BMEEOVVAI13)

1.13 Tantárgyleírás érvényessége

2022. szeptember 1.

Hydrology 2 - BMEEOVVAI41

2. Célkitűzések és tanulási eredmények

2.1 Célkitűzések

This course focuses on probability and statistics, time series and linear models most frequently employed in hydrology. It also covers fundamentals in reservoir design and flood level estimation both in gauged and ungauged basins. Solution of the practical problems with the help of MATLAB will enable one to successfully apply such concepts for water resources management and civil engineering design.

2.2 Tanulási eredmények

A tantárgy sikeres teljesítése utána a hallgató

A. Tudás

1. Familiarity with the most frequently encountered concepts in hydrology.
2. Knows the basic concepts in mathematical statistics (including hypothesis testing) and their applications in water resources management and civil engineering design.
3. Awareness of the conditions necessary for applying linear regression models.
4. Familiarity with time series model applications, basics in reservoir design, and details in flood level estimation.

B. Képesség

1. Problem solving capacity in water resources management and civil engineering design by hydrological statistics, linear and time series models.
2. Thorough knowledge of linear models in hydrology, their modifications and problem-specific applications, including Monte-Carlo type simulations for reservoir design.
3. Thorough understanding and correct application of statistical concepts often employed in hydrology and water resources management.
4. Aptitude for writing MATLAB code for solving problems in hydrology and civil engineering design.
5. Capacity of simplifying complex problems and finding solutions.

C. Attitűd

1. Cooperates with the instructor during the learning process.
2. Continuously and actively seeks ways of gaining knew knowledge even beyond the required curriculum and employs the internet for finding intuitive answers to research problems.
3. Open to learn new software skills.
4. Attempts to perform precise problem solutions.

D. Önállóság és felelősség

1. Resolution to solving homework on one's own within feasible limits.

2.3 Oktatási módszertan

Lectures on theory. Practical guidance about the steps needed for solving computational/modelling problems and the software required. Consultation of the homework individually or in groups using one's own laptop on top of written (e-mail) and personal oral communication during consultation hours.

2.4 Részletes tárgyprogram

Week	**Topics of lectures and/or exercise classes**
1.	Engineering hydrology, probability theory and statistics. Relative frequency, probability. Random variable.
2.	Distributions of random variables. Theoretical and empirical (cumulative) distribution functions (CDF & DF). Properties of DFs. Statistical moments.
3.	Common distribution functions applied in hydrology. Parameter estimation by the method of moments.
4.	Application of CDFs in hydrology. Representativeness, independence, homogeneity.
5.	Fitting of CDFs to measurements. Goodness of fit.
6.	Correlation and regression. Best-fit equation for linear regression. Properties.
7.	Cross- and auto-correlations. Trend analysis. Periodical components of time series.
8.	Autoregressive models.
9.	Forecasting with time series. Monte-Carlo simulation of time series.
10.	Reservoirs in civil engineering. Types of reservoirs. Morphological and hydrological characteristics.
11.	Characteristics of water supply reservoirs. Reservoir sizing. Water supply reliability calculations. Monte-Carlo simulation of water-supply reliability.
12.	Flood-mitigation reservoirs and their sizing.
13.	Empirical peak discharge estimation on ungauged watersheds. The rational method.
14.	Additional empirical flood level estimation methods.

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) Textbooks:

1. McCuen, R. H., 1998. Hydrologic analysis and design, Prentice Hall, USA.
2. Haldar, A., Mahadevan, S., 2000. Probability, reliability, and statistical methods in engineering design, John Wiley, New York, USA.

2.6 Egyéb tudnivalók

2.7 Konzultációs lehetőségek

Time of consultations: advertised on the course's webpage (occasionally by specific request), in the office of the course instructor or on the website of the course instructor.

Jelen TAD az alábbi félévre érvényes:

Inactive courses

II. Tárgykövetelmények

3. A tanulmányi teljesítmény ellenőrzése és értékelése

3.1 Általános szabályok

Evaluation of the participant's learning progress described in A 2.2. is performed by two written tests and six homework assignments.

3.2 Teljesítményértékelési módszerek

Evaluation form	Abbreviation	Assessed learning outcomes
1st homework (partial performance evaluation)	HW1	B.1-B.4; C.1-C.4; D.1
2nd homework (partial performance evaluation)	HW2	B.1-B.4; C.1-C.4; D.1
3rd homework (partial performance evaluation)	HW3	B.4-B.5; C.1-C.4; D.1
4th homework (partial performance evaluation)	HW4	B.5; C.1-C.3; D.1
5th homework (partial performance evaluation)	HW5	B.1-B.2, B.5; C.1-C.4; D.1
6th homework (partial performance evaluation)	HW6	A.1; B.1-B.2, B.5; C.1-C.4; D.1
1st written test (partial performance evaluation)	WT1	A.1-A.4; B.3-B.5
2nd written test (partial performance evaluation)	WT2	A.1-A.4; B.1-B.5

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
HW	50%
WT1-WT2	25%-25%
Sum	**100%**

3.4 Az aláírás megszerzésének feltétele, az aláírás érvényessége

Non-relevant.

3.5 Érdemjegy megállapítása

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

Each test and homework must be completed by at least 40% of the maximum score.

3.6 Javítás és pótlás

1. The homework is due back within two weeks always.
2. The homework can be corrected within that time limit.
3. There is a make-up test in the 15th week of the semester.

3.7 A tantárgy elvégzéséhez szükséges tanulmányi munka

Activity	**Hours/semester**
participation in contact classes	14×3=42
preparation for the tests	2×8=16
preparation of homework	6×4=24
study from notes, textbooks	8
Sum	**90**

3.8 A tárgykövetelmények érvényessége

2022. szeptember 1.

Jelen TAD az alábbi félévre érvényes:

Inactive courses