

## I. Subject Specification

### 1. Basic Data

#### 1.1 Title

Hydrology I.

#### 1.2 Code

BMEEOVVAT41

#### 1.3 Type

Module with associated contact hours

#### 1.4 Contact hours

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

#### 1.5 Evaluation

Midterm grade

#### 1.6 Credits

3

#### 1.7 Coordinator

name	Dr. József Szilágyi
academic rank	Professor
email	<a href="mailto:szilagyi.jozsef@emk.bme.hu">szilagyi.jozsef@emk.bme.hu</a>

#### 1.8 Department

Department of Hydraulic and Water Resources Engineering

#### 1.9 Website

<https://epito.bme.hu/BMEEOVVAT41>

<https://fiek2.mywire.org/course/view.php?id=461>

#### 1.10 Language of instruction

hungarian and english

## 1.11 Curriculum requirements

Compulsory in the Civil Engineering (BSc) programme

## 1.12 Prerequisites

Recommended prerequisites:

- Mathematics A1a - Calculus (BMETE90AX00)

## 1.13 Effective date

1 September 2022

## 2. Objectives and learning outcomes

### 2.1 Objectives

The objective of the course is to give an introduction to hydrology within civil engineering, to its sub-disciplines and related fields. The student will learn about the global hydrological cycle, its elements and the estimation of the related fluxes; will master basic concepts in hydrometeorology, such as precipitation, evaporation, infiltration and runoff. He/she will be acquainted with the physical properties of streamflow and descriptors of lakes and groundwater. Will learn about the basic concepts of hydrometry and hydrography and eventually will be able to complete hydrological calculations related to civil engineering design.

### 2.2 Learning outcomes

Upon successful completion of this subject, the student:

#### A. Knowledge

1. Knows the general jargon in hydrology and its relation to civil engineering applications.
2. Able to list components of the water balance.
3. Knows calculations pertaining to the water balance of small catchments.
4. Able to list groupings of streams and lakes, their most important concepts.
5. Became familiar with the methods of hydrometry and hydrography.
6. Knows basic concepts of hydrogeology and their measurement methods.

#### B. Skills

1. Can put into practice the mastered hydrological procedures.
2. Able to conduct simple hydrological calculations.
3. Employs empirical relationships in practice.
4. Can Design precipitation measurements and analyse the measured data.
5. Estimates design flood discharge levels for small catchments and understands simpler rainfall-runoff methods.
6. Interprets hydrographic data, manipulates such databases.
7. Able to express his/her thoughts in an organized fashion.

#### C. Attitudes

1. Open to the use of information technology.
2. Strives to achieve accurate problem solution.

#### D. Autonomy and Responsibility

1. Independent in solving hydrological problems with available information sources.
2. Employs a system-theory approach.

### 2.3 Methods

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

### 2.4 Course outline

<b>Week</b>	<b>Topics of lectures and/or exercise classes</b>
1.	The topic of hydrology. Subfields of hydrology and related fields of study. Forms of appearance of water. The hydrologic cycle and the water balance. Solar radiation. Air temperature. Air pressure. Descriptors of air humidity. Evaporation and its physical process. Measurement of evaporation, lysimeters, types of evaporation estimation methods.
2.	Precipitation and its forms. Generation of precipitation: theories. Cloud types. Rainfall characteristics. Measurement of precipitation. Descriptors of precipitation. Rules of precipitation. Areal average of precipitation. Calculation of precipitation characteristics.
3.	Watershed characteristics. Time of concentration ( $\tau$ ), effective precipitation. Infiltration curves. Hydrographs for $T=\infty$ , $T>\tau$ , $T$ Estimation of the effective precipitation time series. Unit hydrograph: classical approach. Determination of the isochrones. Double transformation of rainfall-runoff.
4.	Study of natural streams (potamology). Classification of streams-. Cross and longitudinal sections of streams, river-valleys. Topographic description, characterization of streams. Sediment load of streams. Ice formation over streams. Hydrometry. Measurement of water surface gradient, stage, discharge and sediment load.
5.	Basics of hydrography. Observation of stage. Calendars of hydrography, daily hydrographic maps, databases. Characteristic stages. Descriptors of the water level regime. Frequency and duration. The rating curve and its extrapolation. Permanent and non-permanent rating curves. Flood hydrographs, spatial correlation of stages and its application in rating curve spatial interpolation.
6.	Hydrology of lakes, their types and origins. Seiche. Reservoirs.
7.	Hydrogeology. Rock and deposit classifications. Characteristics of the groundwater. Unconfined and confined groundwater, artesian, karstic, and gallery wells. Descriptors of groundwater regime, its anthropogenic influences.

The above programme is tentative and subject to changes due to calendar variations and other reasons specific to

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the actual semester. Consult the effective detailed course schedule of the course on the subject website.

## 2.5 Study materials

### a) Textbooks:

1. S. L. Dingman: Physical Hydrology, Prentice-Hall.

### b) Online materials:

1. Lecture notes

## 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:

2023/2024 semester I

**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 tests and six homework assignments.

**3.2 Assessment methods**

<b>Evaluation form</b>	<b>Abbreviation</b>	<b>Assessed learning outcomes</b>
1st midterm test	ZH1	A.1-A.3; B.1-B.5, B.7; D.1-D.2
2nd midterm test	ZH2	A.1, A.3-A.6; B.1-B.3, B.5-B.7; D.1-D.2
1st homework (small homework)	HF1	B.2, B.3, B.7; C.1-C.2
2nd homework (small homework)	HF2	B.2, B.3, B.7; C.1-C.2
3rd homework (small homework)	HF3	A.3; B.5, B.7; C.1-C.2
4th homework (small homework)	HF4	A.3; B.5, B.7; C.1-C.2
5th homework (small homework)	HF5	A.5; B.6, B.7; C.1-C.2
6th homework (small homework)	HF6	A.5; B.6, B.7; C.1-C.2

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

**3.3 Evaluation system**

<b>Abbreviation</b>	<b>Score</b>
ZH1	1/3
ZH2	1/3
HF1	1/18
HF2	1/18
HF3	1/18
HF4	1/18
HF5	1/18
HF6	1/18
<b>Sum</b>	<b>1</b>

**3.4 Requirements and validity of signature**

No signature can be obtained.

**3.5 Grading system**

At least 70% of the attendance of lectures and seminars/exercise classes are expected.

A midterm tests not exceeding 50% of the maximum score is failed.

In case of fulfilling the attendance requirements and passed midterm tests and homework assignments, the final grade is the average value of the grade of the midterm tests and the homework assignments weighted according to the clause 3.3.

**3.6 Retake and repeat**

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1. Homework – after the payment of the fee as described in the Regulations – can be submitted with delay until the deadline described in the Detailed course schedule.
2. The submitted and accepted homework can be corrected without any fee until the deadline described in the point 1.
3. The two midterm tests can be retaken free of charge. The date of the retake is described in the detailed course schedule. In case of correction the previous result will be replaced with the new result.

### 3.7 Estimated workload

<b>Activity</b>	<b>Hours/semester</b>
contact hours	$14 \times 3 = 42$
preparation for the tests	$2 \times 8 = 16$
homework	$6 \times 4 = 24$
home studying of the written material	8
<b>Sum</b>	<b>90</b>

### 3.8 Effective date

1 September 2022

This Subject Datasheet is valid for:

2023/2024 semester I