

I. Subject Specification

1. Basic Data

1.1 Title

Drinking Water and Wastewater Treatment

1.2 Code

BMEEOVKA-H1

1.3 Type

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	3

1.5 Evaluation

Exam

1.6 Credits

4

1.7 Coordinator

name	Dóra Laky
academic rank	Associate professor
email	laky.dora@emk.bme.hu

1.8 Department

Department of Sanitary and Environmental Engineering

1.9 Website

<https://epito.bme.hu/BMEEOVKA-H1>

<https://fiek2.mywire.org/course/view.php?id=3596>

1.10 Language of instruction

english

1.11 Curriculum requirements

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1.12 Prerequisites

Water Quality Management (BMEEOVKAI44)

1.13 Effective date

28 February 2023

2. Objectives and learning outcomes

2.1 Objectives

Drinking water treatment:

The aim of the course is to introduce the different water sources, the potential contaminants and their main sources. The course will also cover the sizing of the capacity of each process of the drinking water treatment plant for both surface water and groundwater. It will also focus on the removal of different contaminants such as dissolved gases, iron, manganese, arsenic and ammonium ion. The course deals with the adverse health effects of certain water quality compounds and the possibilities to minimize their concentration in the water.

Wastewater Treatment:

The goal of the course is to master the basic concepts of wastewater treatment and getting familiar with both extensive and intensive technologies. The first lectures are expected to be interactive, discussing the matter with a holistic approach. The subject includes introductory to technologies of mechanical treatment (screening, grit chambers, primary clarifier) and types of activated sludge treatments (SBR, continuous flow, fix-filmed technologies, secondary settling); Additional topics: Plant layouts, calculation of parameters and methods for different technologies ; C,N,P removal; Deficiencies and floc formation; German planning and operating aspects -ATV-A 131 Modelling of WWTP with dynamic models; Environmental regulations.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. Knows the most typical pollutants in different water bases and knows the adverse effects of them
2. Understands the main aspects of drinking water treatment processes for both surface water and groundwater
3. Knows how to size the capacity of the different drinking water treatment process
4. Knows the difference between treating surface water and groundwater
5. Understands the basic concepts of wastewater treatment technologies.
6. Knows adverse effects of wastewater quality compounds and possibilities to minimize effluent concentrations.
7. Knows about the design parameters of WWTP in practice.

B. Skills

1. Is able to prepare treatment technological scheme(s) for raw water (Surface water and groundwater), which contains dissolved gases, iron, manganese, ammonium ion and arsenic
2. Is able to solve drinking water quality problems in a case study area
3. Is able to design the different drinking water treatment process and make preliminary estimation about the needed chemical dosages and size of the filters for a given raw water quality and flow rate
4. Is able to deduce possible deficiency of a wastewater treatment plant by measured state variables and floc formation, settling problems.
5. Is able to prepare treatment technological scheme for wastewater treatment plant.

C. Attitudes

1. Collaborates with the instructor and groupmates
2. He/she constantly expands his/her knowledge, and in addition to the compulsory curriculum, he/she searches answers from web resources as well
3. Strives for comprehensible, precise wording in oral communication

D. Autonomy and Responsibility

1. Use of systematic approach in problem solving
2. Cooperation with fellow students in teamwork

2.3 Methods

Lectures with theoretical knowledge; written and oral communication. Use of IT tools and techniques. Solving drinking water quality problems in a case study area together or in group work.

2.4 Course outline

Week	Topics of lectures and/or exercise classes
1.	Drinking water sources and possible pollutants
2.	Drinking water sources and possible pollutants (cont.)
3.	Surface water treatment plant design I. - calculations
4.	Surface water treatment plant design II. - calculations
5.	Groundwater treatment plant design
6.	Complex technological schemes for drinking water treatment
7.	Drinking water supply network issues
8.	Introduction to wastewater treatment, holistic approach discussion; health effects
9.	C,N,P removal, bacterial floc formation, biofilm
10.	Regulations; extensive technologies
11.	Intensive technologies - mechanical treatment stage
12.	Intensive technologies – biological stage; plant layouts; design parameters
13.	ATV-A 131 basic concepts
14.	Dynamic modelling of wastewater treatment, modelling in practice

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

1. Water Treatment Plant Design (American Water Works Association)
2. German ATV-DVWK Rules And Standards (Wastewater)
3. Slides of the lectures
4. Henze M., Harremoes P., Cour Jansen J. la, Arvin E. (2002) Wastewater Treatment – Biological and Chemical Processes (Springer)

2.6 Other information

Attendance at lectures is mandatory. Missing out more than 30% of the lectures means failing the subject.

2.7 Consultation

Consultations: At the beginning of the semester at the consultation time announced on the department's website or contact the lecturers via e-mail (Souha Naguez: naguez.souha@gmail.com; Tamás Koncsos:

koncsos.tamas@emk.bme.hu).

This Subject Datasheet is valid for:

Inactive courses

II. Subject requirements

Assessment and evaluation of the learning outcomes

3.1 General rules

The learning outcomes defined in point 2.2 are assessed based on two mid-term tests, and a written and oral exam in the exam period. The exam will cover both drinking water and wastewater treatment, The students get questions related to both topics, and they need to reach minimum grade 2 (passed) in both topics.

3.2 Assessment methods

Evaluation form	Abbreviation	Assessed learning outcomes
Midterm 1	MT1	A1, A2, A3, A4, B1, B2, B3, C1, C2, D1, D2
Midterm 2	MT2	A5, A6, A7, B4, B5, C1, C2, D1, D2
Exam	E	A1 - A6, B1 - B5, C3, D1

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
MT1	20%
MT2	20%
E	60%
Sum	100%

3.4 Requirements and validity of signature

The criterion for completion of the subject is to: collect at least 45% of the total points of the written test (MT1 and MT2) and get at least Passed (2) grade at the exam.

3.5 Grading system

Grade	Points (P)
excellent (5)	$85 \leq P$
good (4)	$70 \leq P < 85\%$
satisfactory (3)	$57 \leq P < 70\%$
passed (2)	$45 \leq P < 57\%$
failed (1)	$P < 45\%$

3.6 Retake and repeat

Drinking Water and Wastewater Treatment - BMEEOVKA-H1

It is possible to retake both mid-terms (MT1 and MT2) once for free, and one of the mid-terms can be repeated second time for extra fee.

3.7 Estimated workload

Activity	Hours/semester
contact hours	14*3=42
preparation for the midterms	48
preparation for the exam	30
Sum	120

3.8 Effective date

28 February 2023

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