

I. Subject Specification**1. Basic Data***1.1 Title***ENVIRONMENTAL PROTECTION***1.2 Code***BMEEOVKBsFC001-00***1.3 Type*

Module with associated contact hours

1.4 Contact hours

Type	Hours/week / (days)
Lecture	2
Seminar	14

1.5 Evaluation

Midterm grade

1.6 Credits

4

1.7 Coordinator

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academic rank	Associate professor
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1.8 Department

Department of Sanitary and Environmental Engineering

1.9 Websiteepito.bme.hu<https://edu.epito.bme.hu/course/view.php?id=5098>*1.10 Language of instruction*

hungarian

1.11 Curriculum requirements

Compulsory in the Civil Engineering (BSc) programme

*1.12 Prerequisites**1.13 Effective date*

1 September 2025

2. Objectives and learning outcomes

2.1 Objectives

The aim of the course is to introduce civil engineering students to sustainable construction and operation solutions, the use of environmentally friendly materials and ways of reducing the ecological footprint. During the course, students will learn the application of environmental regulations and standards, as well as water, air and soil protection aspects in civil engineering practice. Special attention is given to the sustainable operation of urban management and infrastructure, with particular emphasis on energy efficiency, waste management, environmentally friendly solutions for water supply and sanitation, and the sustainability of transport systems. Students will also learn about strategies to mitigate the effects of climate change and the principles of sustainable urban development. With this knowledge, engineers will be able to make responsible decisions in the design and operation of the built environment, contributing to the creation of a sustainable built environment and liveable cities.

2.2 Learning outcomes

Upon successful completion of this subject, the student:

A. Knowledge

1. Sustainable civil engineering solutions – They know the impact of the used construction materials, technologies and construction processes on the environment, sustainability aspects, alternative solutions. 2. Environmental regulations and standards – They understand the relevant laws, standards and the importance of environmental permitting processes during civil engineering activities. 3. Urban management principles – They learn the principles of sustainable operation of settlements, including energy optimization, green infrastructure and climate adaptation strategies. 4. Sustainable operation of infrastructure – They learn about transport systems, the role of energy efficiency in maintaining urban environmental protection. The strategic importance of water supply and wastewater treatment, its sustainable solutions and waste management strategies. 5. Water, air and soil protection – They understand the environmental impacts of construction activities and are familiar with technologies to reduce and prevent pollution. 6. Climate change impacts and adaptation – They are able to identify the impacts of climate change on the built environment and apply sustainable design and operation solutions to mitigate them. 7. Environmentally conscious design and decision-making skills – They learn how to optimize their engineering decisions from an environmental perspective, taking into account long-term sustainability. 8. Innovative and intelligent urban solutions – They learn the concept of smart cities, the role of digitalization and automation in sustainable urban management.

B. Skills

1. Sustainable engineering design and decision-making – They will be able to apply environmentally friendly construction and operational solutions, taking into account sustainability issues. 2. Apply of environmental legislation and standards – They consciously use legislation and standards during the design and construction processes. 3. Practical application of urban operation and infrastructure management knowledge – They are able to operate and maintain urban infrastructure efficiently, optimizing energy and resource use. 4. Conducting and evaluating environmental impact assessments – They recognize the ecological consequences of construction activities and are able to make proposals to reduce environmental burdens. 5. Application of innovative and smart technologies – They know how to integrate digital and automated systems into sustainable urban operation and infrastructure management. 6. Interdisciplinary Collaboration and Communication – They work effectively with other professionals (e.g. urban planners, environmental experts, transportation engineers) and communicate sustainable engineering solutions clearly. 7. Problem identification and creative solution-finding – They are able to find innovative and practical solutions to environmental challenges in the field of civil engineering.

C. Attitudes

1. Responsibility and environmentally conscious approach – Students recognize the long-term impacts of civil engineering activities on the environment and are committed to the application of sustainable solutions. 2. Openness to innovation and development – They are open to incorporating new, environmentally friendly technologies and intelligent systems into engineering practice. 3. Interdisciplinary and collaborative mindset – They are able to collaborate effectively with other professionals for sustainable urban development and infrastructure management. 4. Proactivity and problem-solving attitude – They not only recognize environmental problems, but also actively seek and propose solutions during civil engineering design and operation. 5. Ethical and socially responsible thinking – They take into account social and economic factors and prioritize the

interests of the community and sustainable development in their decisions.

D. Autonomy and Responsibility

1. Responsible decision-making – Students are able to independently consider sustainability and environmental aspects and make responsible engineering decisions. 2. Independent problem-solving – They recognize environmental challenges in civil engineering practice and are able to develop innovative solutions on their own initiative. 3. Professional and ethical responsibility – They consciously take responsibility for the long-term effects of their work, taking into account the social, economic and environmental consequences. 4. Continuous self-development and learning – They are open to independently mastering new technologies and regulations and actively seek opportunities for their professional development.

2.3 Methods

Lectures: 14 weeks of theory. Practices: field and laboratory work, 3 sessions. In the practical part of the course, students participate in small groups, where each group delve into a given topic. During the practical training, which are organised in three sessions, students acquire knowledge related to the given field through practical tasks, case studies and problem-solving activities.

2.4 Course outline

1. Thematic orientation. Global environmental challenges. Environmental Baseline - Current State and Target State. Urbanisation. Climate Change. Epidemics. Wars. Migration. Case studies. 2. Buildings and Environment I. Environmental principles. Ecological principles. Material flow principles. Economic principles. Case studies. 3. Building and Environment II. Noise pollution. Air Quality. Water quality. Light Pollution. Case studies. 4. Environmental Geospatial Information and Digitisation. Satellite, drone remote sensing. Data processing. Modelling, process monitoring. Case studies. 5. Water environment. Qualitative and quantitative challenges to water resources. Micro and macro pollutants. Conflicts over water infrastructure. Case studies. 6. Urban environment. Building, civil engineering, linear infrastructure, water engineering and water management systems and the relationship with natural waters. Green-blue infrastructures. Case studies. 7. Drinking water basics. Safety of drinking water supply. Water management. Water quality. Human impact. Water challenges. Case studies. 8. Stormwater and wastewater management. Stormwater, urban flooding. Water uses, water pollution, wastewater treatment and its importance. Water recycling. Alternative options. Case studies. 9. Energy management, renewable energy. Fossil and green energy. Biogas. Wind turbines. Solar panels. Geothermal energy. Case studies. 10. Materials management, recycling. Production and use of building materials, environmental impact. 11. Territorial Sustainability, Ecosystem Services. Natural processes and resources that support human well-being, safeguards for a sustainable economy and society. 12. Soil protection, groundwater management. Soil as a buffer and reactor space. Hungarian soils. Soil pollution, case studies. 13. Large industrial facilities and the environment. The effects of food industry, oil industry, power plants, battery factories on environmental elements. Case studies. 14. Midterm Test

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

Slideshow of the lectures. Materials uploaded to Moodle. Guidelines for practices.

2.6 Other information

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2.7 Consultation

According to the timetable given during the introductory lecture, or in advance by e-mail with the lecturers.

This Subject Datasheet is valid for:

II. Subject requirements**Assessment and evaluation of the learning outcomes***3.1 General rules*

Attendance at lectures according to Study and Examination Regulations (TVSZ). Attendance at practical sessions is mandatory. In the case of a justified absence, it is possible to retake the practice held during the repetition week. In that case the entire practical course must be repeated. The condition for completing the semester is to write the midterm test (at least 50% score must be achieved) and to obtain at least a sufficient practical grade. Practical performance is evaluated by preparing an individual or group task related to the practice topic (e.g. measurement protocol, data evaluation, calculation task, paper writing, etc.).

3.2 Assessment methods

Assessment Name (Type)	Code	Assessed Learning Outcomes
Midterm Test (summary evaluation)	MT	A1-A8, B1-B7, C1-C5
Practical assignment (continuous performance measurement)	PW	D1-D4

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
MT	50%
PW	50%
Total	100%

3.4 Requirements and validity of signature

Signature can not be obtained.

3.5 Grading system

Grade	Score (P)
excellent (5)	$80 \leq P$
good (4)	$70 \leq P < 80\%$
satisfactory (3)	$60 \leq P < 70\%$
pass (2)	$50 \leq P < 60\%$
fail (1)	$P < 50\%$

3.6 Retake and repeat

The midterm test can be repeated – once without fee – during the repetition week, Replacement of practice sessions: in the case of a justified absence, it is possible to retake the practice held during the repetition week. In that case the entire practical course must be repeated.

3.7 Estimated workload

Activity	Hours/Semester
Participation at contact classes	$3 \times 14 = 42$
Preparation for midterm tests	18
Home assignment, preparation for the practical sessions	60

3.8 Effective date

1 September 2025

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