Basics of Environmental Engineering - BMEEOVKAT41 - 2024/25/2

I. Tantárgyleírás

1. Alapadatok

1.1 Tantárgy neve

BASICS OF ENVIRONMENTAL ENGINEERING

1.2 Azonosító (tantárgykód)

BMEEOVKAT41

1.3 Tantárgy jellege

Kontaktórás tanegység

1.4 Óraszámok

Típus	Óraszám / (nap)
Előadás (elmélet)	2

1.5 Tanulmányi teljesítményértékelés (minőségi értékelés) típusa

Félévközi érdemjegy

1.6 Kreditszám

3

1.7 Tárgyfelelős

név	Dr. Zsolt KOZMA
beosztás	Egyetemi docens
email	kozma.zsolt@emk.bme.hu

1.8 Tantárgyat gondozó oktatási szervezeti egység

Vízi Közmű és Környezetmérnöki Tanszék

1.9 A tantárgy weblapja

https://epito.bme.hu/BMEEOVKAT41
https://edu.epito.bme.hu/course/view.php?id=459

1.10 Az oktatás nyelve

magyar és angol

1.11 Tantárgy típusa

Kötelező az építőmérnöki (BSc) szakon

1.12 Előkövetelmények

1.13 Tantárgyleírás érvényessége

2020. február 5.

2. Célkitűzések és tanulási eredmények

2.1 Célkitűzések

The aim of the course is to provide basic scientific and engineering background for further studies in environmental engineering. Main topics: the relationship of humanity and its environment, system dynamics, introduction to various environmental issues associated with human activities (such as classic water, air and soil pollution cases, disturbance of material cycles, climate change), ecosystem services, externalities, sustainability, environmental indices, energy consumption patterns and energy production technologies (with special focus on the renewables).

2.2 Tanulási eredmények

A tantárgy sikeres teljesítése utána a hallgató

A. Tudás

1. will be able to describe the relations between humans and the environment, as well as the relation between economy and the environment
2. will understand the working mechanism and building blocks of dynamic systems
3. will learn about the main geochemical material cycles and the effect of human activities on them
4. will learn about the most important pollutants, the process of pollution and the evolution of possible reactions to environment pollution
5. will know about the major water and air pollution issues
6. will understand the role and the importance of ecological systems and ecosystem services
7. will gain information about the evaluation of environmental disasters
8. will learn about the basic goals and the applicable tools of environmental management
9. will be informed about the environmental aspects of energy production and utilization

B. Képesség

1. will be able to understand and differentiate various indicators used to characterize the state of the environment and well-being of human societies
2. will be able to identify the different types of smog and point out the primary causes that lead to their formation

C. Attitűd

1. will realize the importance of the effects of human activities on the environment
2. will broaden knowledge also by gathering information from various sources, including extracullicular sources (i.e. the Internet) as well

D. Önállóság és felelősség

1. will apply a systematic approach in accomplishing tasks

2.3 Oktatási módszertan

Lectures, exercises, written and oral communications, application of IT tools and techniques.

2.4 Részletes tárgyprogram

Week	Topics of lectures and/or exercise classes
1.	**Introduction**. The relation of humanity and the environment. Economy and the environment. Symptoms of a global environmental crisis, the birth of environment protection. The limits to growth, the idea of sustainability. The "Great acceleration" and the Holocene-Anthropocene transition.
2.	**System dynamics.** Building blocks, working mechanism and limitation of dynamic systems. System stability and transition between different stable states. Links between environment, sustainability and system

	dynamics. Planetary boundaries.
3.	**Materials management.** Selected material flows and their management issues. Anthropogenic perturbation of the nitrogen, phosphorus, carbon and water cycles and associated environmental issues.
4.	**Pollution (first part).** Definitions. The pollution process and its indicators. The evolution of environmental protection paradigms through examples of water pollution: plagues and sanitation, dissolved oxygen problem in rivers and wastewater treatment, eutrophication of water bodies and watershed management. Mixing and dilution of pollutants in water.
5.	**Pollution (second part).** Classification and sources of air pollutant substances. Health-related and environmental effects of air pollution. The evolution of environmental protection paradigms through examples of air pollution: dispersion of air pollutants from point sources, the effect of atmospheric stability, smog types. A summary of end-of-pipe solutions (flue gas cleaning) and the global success story of source-control measures: stopping the depletion of the stratospheric ozone layer.
6.	**Partial summary and conclusion.**
7.	**Ecology and ecosystem services.** The importance of protecting ecological systems. What are the ecosystem services? What is the theory behind and what are the actual experiences? Types of ecosystem services illustrated by examples. Answering the question: what should be protected and why?
8.	**Environmental disasters.** Environmental problems resulting in catastrophic events – how do we interpret them? What are the common properties of environmental disasters? Spatial and temporal scales. Rethinking the usual classification based on causes and effects: "extraordinary" pondering on the extraordinary.
9.	**Benchmarking of environmental effects and well-being.** From economic to environmental indices. HDI and SDG as new socio-economic indicators of human well-being. The ecological, water and carbon footprints as integrated indicators of the effect of human activities on the environment. Introduction to ecological footprint analysis. Presentation and evaluation of global and local ecological footprints. Conclusions and criticism. Where we now and where are we heading?
10.	**Environmental regulations and management.** Externalities, regulatory toolset, legislative milestones, environmental impact assessment, life cycle analysis, voluntary decisions, "green washing".
11.	**Energy and the environment (first part).** The evolution, status and future of the "carbon economy". The alternatives of carbon-based sources: nuclear energy and renewable resources. Discussion of hydrostatic and wind energy utilization technologies in electricity generation.
12.	**Energy and the environment (second part).**

	Discussion of solar, biomass and geothermal energy utilization technologies in electricity generation and in direct forms. Possibilities of decreasing the carbon dependence of households.
13.	**Climate change.** Discussion about the role and magnitude of human activities in forming the Earth's Holocene climate system. What is known and how sure that knowledge is? What kind of reactions are possible and which of these are implemented? What are the possible outcomes in the future?
14.	**Final summary and conclusion.**

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

- Textbooks

1. Dr. Péter Budai– Dr. Zsolt Kozma: Basics of Environmental Engineering (electronic textbook, 2017)
2. BME Department of Sanitary and Environmental Engineering (2021): Basics of Environmental Engineering - Textbook for Civil Engineer (BMEEOVKAT41) and Environmental Engineer (BMEEOVKAKM1) students (electronic textbook)

- Online materials

1. WWF Living Planet Report (2016)
2. WWF Living Planet Report (2018)
3. Lecture slides

2.6 Egyéb tudnivalók

2.7 Konzultációs lehetőségek

The instructors are available for consultation during their office hours, as advertised on the department website. Special appointments can be requested via e-mail from the lecturers:
kardos.mate@epito.bme.hu, kozma.zsolt@epito.bme.hu

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 student's presentation (SP).

3.2 Teljesítményértékelési módszerek

Evaluation form	Abbreviation	Assessed learning outcomes
student presentation	SP	A.1-A.9; B.1-B.2; C.1-C.2; D.1
midterm test	MT	A.1-A.9; B.1-B.2; C.1-C.2; D.1

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
SP	100%
MT	100%
Sum	100%

Criterion for completion of the subject is to collect at least 50% of the total points of the written test (WT1).

3.4 Az aláírás megszerzésének feltétele, az aláírás érvényessége

Signature can’t be obtained.

3.5 Érdemjegy megállapítása

If the student satisfies the attendance criteria, his/her mark will be determined as follows.:

Grade	Points (P)
excellent (5)	80%<=P
good (4)	70%<=P< 80%
satisfactory (3)	60%<=P< 70%
passed (2)	50%<=P< 60%
failed (1)	P<50%

The final mark is calculated based on the midter test (MT) or the student's presentation (SP) according to the student's choice.

3.6 Javítás és pótlás

The student's presentation can not be repeated. In case the presentation fails, the student will be evaluated according to the MT assesment method. Students failing at the SP have to do a midterm test (one occassion). If the MT is unsatisfactory (failed), then the subject is failed.

3.7 A tantárgy elvégzéséhez szükséges tanulmányi munka

Activity	Hours/semester
contact hours	14×2=28
preparation for the courses	14×1=14
home studying / preparation	18
preparation for the test / presentation	30
Sum	**90**

3.8 A tárgykövetelmények érvényessége

2024. február 1.

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