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| ***Title of the course:*****Environmental Technologies and Operations II.- (energy in environmental protection)** | ***NEPTUN-code:***RKXKM2ABNF | ***Weekly teaching hours:*** *l+cw+lw*1+2+0 | ***Credit:*** 4***Exam type****:* e  |
| ***Course leader:***Rita Kendrovics-Boda, Ph.D.**Teachers:**Norbert Berecz | ***Position:*** associate professor | ***Required preliminary knowledge: -*** |
| ***Curriculum:*** |
| The aim of the course is to introduce the basic concepts of energy, the energy chain, energy transformation, efficiency, and forms of energy. Students will learn about the types of renewable energy sources, their importance, and environmental benefits. They will be introduced to the history of wind power, the components of wind energy, wind turbines and the basics of their operation. Students will learn about the concept of biomass, its possible applications and biogas production. Hydropower, hydroelectric power plants, and geothermal energy sources and applications will be introduced. The potential of solar energy (solar collectors and solar panels) will be introduced at a basic level, including the types of solar collectors and solar panels, and the calculation of efficiency and payback time. |
| ***Curriculum Description:*** |
| **Week** | **Topic of lectures and practices** |
| 1.2025.09.09. | Introduction to electrical energy, basic concepts |
| 2.2025.09.16. | Single-phase systems, three-phase systems |
| 3.2025.09.23. | Production of electricity, types of power plants |
| 4.2025.09.30. | Electric energy converters I. |
| 5.2025.10.07. | Electric energy converters II. |
| 6.2025.10.14. | Electric energy transmission network |
| 7.2025.10.21. | Electrical energy transmission devices, cables, consumers |
| 8.2025.10.28. | Electrical operation, operational safety |
| 9.2025.11.04. | 1st Mid-term |
| 10.2025.11.11. | Utilization of solar energy, utilization of wind energyUtilization of geothermal energy, utilization of biomass and biogas |
| 11.2025.11.18. | Rector’s break |
| 12.2025.11.25. | Energy storage systems |
| 13.2025.12.02. | Project work presentation |
| 14.2025.12.09. | Retake |

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| ***Mid-semester Requirements:*** |
| *Attendance:*Compulsory |
| *Midterms, lab reports, etc.:*Completion of 1 (theory+practice in one) midterm at least at a sufficient level.The project work is the planning, documentation and presentation of a renewable energy system. |
| *The method of obtaining a signature / mid-term mark:*Basis of marking: attendance at lectures and laboratory works/practice.Written tests min. + project work min. = 2 (pass) (separately).In case of mid-semester mark fail (1), correction opportunities are available according to the Student Requirements System (SRS.) of Óbuda University. |
| ***Professional competencies:*** |
| * Able to perform basic tests of the quantity and quality characteristics of environmental elements and systems by state-of-the-art measuring instruments; to draw up and implement measurement plans; and to evaluate data.
* Able to carry out management duties subject to sufficient professional experience.
* Able to reveal deficiencies in the technologies applied and process risks and to initiate mitigation measures after getting familiarized with the technology concerned.
* Collaboration with civil organizations engaged in environment protection, but willing to argue in order to develop optimal solutions.
* Taking responsibility towards society for their decisions made in the scope of environment protection.
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| ***Literature:*** |
| 1. Ristinen R.: Energy and the Environment, John Wiley and Sons Ltd, 2022, ISBN: 9781119800255
2. Bent Sørensen: Renewable Energy, 4th Edition, Physics, Engineering, Environmental Impacts, Economics and Planning, Academic Press, 2010, eBook ISBN: 9780080890661
3. Hardcover ISBN: 9780123750259
4. B Viswanathan: An Introduction to Energy Sources, Indian Institute of Technology 2006, 289 pages, https://nccr.iitm.ac.in/ebook%20final.pdf
5. Robert Ferry, Elizabeth Monoian: A Field Guide to Renewable Energy Technologies, Society for Cultural Exchange 2012, ISBN/ASIN: 061561597X, ISBN-13: 9780615615974; Number of pages: 71
6. Vaclav Smil: Energy in Nature and Society: General Energetics of Complex Systems (MIT Press) First Edition (1st printing) Edition, ISBN-13: 978-0262693561; ISBN-10: 0262693569
7. Gyorgy Elmer Dr. – Electrical engineering – University of Pécs
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