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| ***Title of the course:***  **Biomass production and recovery** | | ***NEPTUN-code:***  RKWMU1EBNF | ***Weekly teaching hours:*** *l+cw+lw*  2+2+0 | ***Credit*:** 6  ***Exam type****:* tm |
| ***Course leader:***  Csaba Ágoston, Ph.D. | | ***Position:***  senior lecturer | ***Required preliminary knowledge:***  - | |
| ***Curriculum:*** | | | | |
| During the semester all biomass raw materials that are used energetically in domestic and / or foreign biomass power plants will be presented.  One of these is herbaceous and woody plants grown specifically for biomass use. These raw materials cover not only the basic aspects of cultivation, but also other environmental technology linkages such as brownfield revitalization, phytoremediation, etc.  Wastes that can be used as biomass feedstock, waste from the biological industries, and rdf and srf from the fraction of municipal waste sorting, as feedstock for biomass and / or power plant boilers, or from so-called municipal waste. Raw materials for the "dry" biogas process will be presented in the second half of the semester. The standards, legal requirements and technical aspects of these materials as well as the technological and organizational aspects of production will also be introduced during the course.  In addition to the main mechanical / mechanical parameters of each type of biomass firing equipment, the course material is detailed along with the main material groups. | | | | |
| ***Detailed schedule of the course:*** | | | | |
| **weeks, date** | ***Topics of lectures*** | | | |
| 19.02.2025 | The concept of biomass, the classification of its types, the cycles of its components in nature. Importance of biomass in the circular economy and climate protection. Production of plant biomass, energy plantations. | | | |
| 2.  26.02.2025 | Biomass energy recovery in combustion plants. Biological components of MSW, collection of used cooking oil and household green waste. | | | |
| 3.  05.03.2025. | Energy recovery of SRF, and RDF. Use of RDF and SRF in the cement industry. Treatment and processing of animal carcasses. | | | |
| 4. 12.03.2025. | Production and types of biofuels. First, second, third and fourth generation biofuels. I.-II. | | | |
| 5. 19.03.2025. | Production and types of biofuels. First, second, third and fourth generation biofuels. I.-II. | | | |
| 6. 26.03.2025. | The aerobic treatment of biomass, composting and the use of composts. Community and residential composting. The importance of composting in raising public awareness. | | | |
| 7. 02.04.2025. | Anaerobic treatment of biomass, biogas production, quality and utilisation. Pyrolysis of biomass, the resulting products and their utilisation. | | | |
| 8. 09.04.2025. | Environmental impacts of biomass treatment. Environmental emissions from biogas plants, composting plants, animal waste treatment plants. | | | |
| 9. 16.04.2025. | Biomass production and use in different countries (student presentations) I. | | | |
| 10. 23.04.2025. | educational holiday | | | |
| 11. 30.04.2025. | Biomass production and use in different countries (student presentations) II. | | | |
| 12. 07.05.2025. | Biomass production and use in different countries (student presentations) III. | | | |
| 13. 14.05.2025. | **Written test.** | | | |
| 14. 21.05.2025. | Written test replacement. (If it is needed.) | | | |
| **Requirements** | | | | |
| *Attendance at lectures:*  It is compulsory to attend the lectures. The rules of education and exam directory (TÜ) are the guidelines.  One essay is necessary. | | | | |
| *Exams and test (types, data)*  One written test. | | | | |
| *Methods of qualification:*  One essay is necessary.  Basis of marking: attendance at lectures and practical works. Written test (100 points).  Marking: Total points = 100 points  0-40 points: fail (1), 41-55 points: pass (2), 56-70 points: satisfactory (3), 71-85 points: good (4), 86-100 points: excellent (5) | | | | |
| ***Professional competencies:*** | | | | |
| Knowledge of the learning, knowledge acquisition, and data collection methods of the special fields of environment protection, their ethical limitations and problem-solving techniques.  Knowledge of the basics of energy management, options for energy production, their advantages, and disadvantages, as well as the concept and feasibility options of sustainable development.  Able to participate creatively in engineering work based on their multidisciplinary skills, as well as to adapt to continuously changing circumstances. | | | | |
| ***Literature:*** | | | | |
| Erik Dahlquist: Biomass as Energy Source: Resources, Systems and Applications, March 31, 2017 by CRC Press, ISBN 9781138073227  Ram Chandra: Environmental Waste Management, 2015 by Taylor and Francis Group, U.S. | | | | |