## Recovery Systems of Renewable Energy Sources I

Code: MK5MEF1L04KX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 2nd year/1st semester

Number of teaching hours/week (lecture + practice): 2+1

**Topics**:

The energetic situation in Hungary. Factors affecting wind energy. Measuring wind energy. Types of Wind-powered devices. Efficiency, application examples. The structure, operating principle and types of solar collectors. Concept of Efficiency and Coverage Rate. Solar systems: DHW and pool heating applications. Solar cells types. Factors influencing energy production. Elements of a solar system. Application examples. The utilization of biomass in the building engineering. The concept and types of biomass. The process of gasification and firing is a point source. Overview of biomass-based heat producers. Geothermal energy utilization. Specifications of systems utilizing geothermal energy.

**Literature:**

*Required:*

- Renewable Energy Engineering Nicholas Jenkins, Janaka Ekanayake Cambridge University Press, 2017.

**Schedule**

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| **1st week Registration week** | |
| **2nd week:**<br>**Lecture:** The energetic position of Hungary.<br>**Practice:** Discussing assignment. | **3rd week:**<br>**Lecture:** Examining a Renewable Energy System in Practice.<br>**Practice:** Returns calculation |
| **4th week:**<br>**Lecture:**<br>Factors affecting wind energy. Measuring wind energy.<br>**Practice:** Wind energy calculations. | **5th week:**<br>**Lecture:** Types of wind energy utilization. Efficiency, application examples.<br>**Practice:** Wind energy calculations. |
| **6th week:**<br>**Lecture:** The utilization of biomass in the building engineering. The concept and types of biomass. The process of gasification and firing of wood, combustion phases, chemical process, emission of pollutants.<br>**Practice:** Sizing the Biomass Storage. | **7th week:**<br>**Lecture:** Overview of biomass-based heat producers: traditional solid-fired heat producers, wood-gasifiers and pellet fireplaces, boilers.<br>**Practice:** Sizing the buffer container. |
| **8th week: 1st drawing week** | |
| **9th week:**<br>**Lecture:** Harnessing method of the geothermal heat.<br>**Practice:** Lindal diagram editing. | **10th week:**<br>**Lecture:** Direct geothermal harnessing systems.<br>**Practice:** Design of a direct geothermal harnessing systems. |
| **11th week:**<br>**Lecture:** Solar panels. The structure, operating principle and types of solar collectors. The structure, operating principle and types of solar | **12th week:**<br>**Lecture:** Solar systems: DHW heating, heating and swimming pool heating applications. |

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| collectors. Concept of Efficiency and Coverage Rate.<br>**Practice:** Dimensional principles. Solar collector system design example for selective level collector and vacuum tube collector. | **Practice:** Sizing the DHW storage |
| **13th week:**<br>**Lecture:** Solar cell types. Factors influencing energy production.<br>**Practice:** Dimensional principles. Inverter selection. | **14th week:**<br>**Lecture:** Parts of a photovoltaic system. Application examples.<br>**Practice:** Efficiency of solar cells, switches, diagrams. |
| **15th week: 2nd drawing week** | |

**Requirements**

**A, for a signature:**

Participation at practice classes is compulsory. Attendance at the lectures is recommended. Students have to attend practice classes and may not miss more than three practice classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students cannot make up any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed practice classes have to be made up for at a later date previously discussed with the tutor.

**B, for a grade:**

The course ends in a written end-term test.

The minimum requirement of the end-term test is 60%. The grade is given according to the following (score/grade): 0-59 = fail (1); 60-69 = pass (2); 70-79 = satisfactory (3); 80-89 = good (4); 90-100 = excellent (5).

If the score of the test is below 60, students can retake that test in conformity with the EDUCATION AND EXAMINATION RULES AND REGULATIONS.