

University of Agricultural Sciences and Veterinary Medicine of Iasi
Faculty of Horticulture
Specialization: Environmental Engineering

Discipline: WIND ENGINEERING

Study year : (IV nd Year of study, 7 rd SEMESTER)

Credit value : 4

Course category:

Domain (Imposed)

Course holder: Lecturer Ph.D.Eng. ESMERALDA CHIORESCU

Discipline objectives: The discipline aims: to deepen the theoretical and practical knowledge regarding wind energy as well as other renewable resources, explaining and interpreting concepts, approaches, models and notions regarding the alternative sources of energy as well as knowing the technical solutions of the installations and equipment for the production of thermal energy and systems using renewable sources.

Discipline objectives (course and practical works):

Course (chapters/subchapters)
1. Fluid mechanics elements specific to wind engineering.
2. Elements of thermodynamics and aerodynamics of the atmosphere
3. Wind power: 3.1 General characteristics regarding wind energy sources 3.2. The stages of installing a wind power plant. Aspects regarding energy production and efficiency 3.3. Components of wind turbines. Types of wind turbines and their applications 3.4. Conversion of wind energy into mechanical and electrical energy. Estimates and limitations 3.5. Impact of wind energy production on the environment 3.6. Wind energy use in Romania: installed capacities, perspectives and challenges 3.7. Wind energy trends and future developments
4. Solar energy: 4.1. Structure of the sun and solar energy 4.2. The characteristics of a solar energy system 4.3. Uses of solar energy 4.4. Photovoltaic micro-plant - examples of implementation and design
5. Hydropower and the environment
6. Tidal energy and the environment
7. The thermal energy of the seas and the environment
8. Geothermal energy and the environment
9. The production of biogas as a source of energy
10.1. Hydrogen - primary energy source
10.2. Conversion of ultrasound energy into light energy
11. Existing financial support systems in the field of renewable energy

Practical works
1.1. Wind classification. Main characteristics of the wind
1.2. Dynamics of the atmosphere. Horizontal distribution of atmospheric pressure.
1.3. Wind intensity. The dispersed power of the wind. Frictional force. Applications
1.4. Wind energy conversion systems. Applications
1.5. Calculation of mechanical power and power coefficient variation in wind turbines. Applications
1.6. Construction of the Darrieus wind turbine
1.7. Determination of the amount of electricity produced by a wind turbine
2.1 Vertical axis wind turbine: advantages, disadvantages, example of construction
2.2. Wind turbine with horizontal axis and self-orientation, examples
2.3. Example of a horizontal axis wind group: electronic scheme of the obtained energy
3. Calculation of the heat requirement and dimensioning of the equipment necessary for the preparation of the domestic hot water with solar energy in a single-family building
4. Presentation of flat solar collectors, with vacuum tubes for a functioning installation. Case Study
5. Calculation of the heating and preparation installation a.c.m. using heat pump with heat recovery from soil
6. Measuring instruments used in renewable energy systems

Bibliography:

- Bălan M.C., 2007, *Energii regenerabile*. Editura U.T. PRESS Cluj-Napoca.
- Burlacu Gabriel, *Studii de ecologie și de protecția mediului*, Ed. Paideia, București, 2010
- Chiorescu Esmeralda, *Note de curs*
- Cojocaru I., *Surse, procese și produse de poluare*, Ed. Junimea, Iași, 1995
- Drăgan Victor, Burchiu Victor, *Energiile regenerabile și utilizarea acestora*, Ed. Ceres, București, 2012
- Horst Crome, *Tehnica utilizării energiei eoliene*, Ed. Mast, București, 2011

Evaluation:

Evaluation form	Evaluation Methods	Percentage of the final grade
Exam	written examination	60%
Appreciation of the activity during the semester	Oral assessment during the semester, verification tests and final laboratory colloquium.	40%

Course holder:
Lecturer Ph.D.Eng
CHIORESCU ESMERALDA

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