TREATY

Course Handbook

Empowering European Universities to Lead Deep Tech Innovation in *Sustainable Energy & Clean Technologies*

Renewable energy sources in agricultural production

Instructors: Mykola Tregub, Lesia Karpuk

Supported by eit Climate-KIC

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EIT HEI Initiative – Innovation Capacity Building for Higher Education – eit-hei.eu

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Course Information

Renewable energy sources in agricultural production

Instructor(s): Mykola Tregub, Lesia Karpuk.

ECTS credits: 2

Course structure:	60 hours
Lecture classes	10 hours
Laboratory classes	10 hours
Personal Activities	40 hours

Mode of delivery: hybrid

Course Summary

This course aims to develop an understanding among participants of the modern principles and technologies for using Renewable Energy Sources (RES) in agriculture. It covers the production and application of biodiesel, bioethanol, biogas, and the use of solar and wind energy for energy supply in agricultural production. The course combines the theoretical foundations of energy processes with practical calculations of energy potential, installation energy efficiency, and the possibilities for integrating RES into production cycles

Upon completion of the course, participants will acquire competencies in the assessment, design, and modeling of energy systems for farms, as well as in applying the principles of sustainable development and energy independence in the agricultural sector.

The competencies gained during the course will enable graduates to work effectively in the field of renewable energy, environmental consulting, energy project management, and contribute to achieving sustainable development goals.

Course Participants

This course is designed for a diverse audience, including engineering students, young specialists in the agricultural sector, and researchers who seek to master alternative energy technologies.

Potential participants are:

- ✓ Students at the bachelor's, master's, or doctoral level in engineering, agronomy, or related fields who wish to expand their knowledge of the fundamentals of producing and applying renewable energy sources.
- ✓ Specialists and practitioners from industry (manufacturing, automation, logistics, energy, etc.) who seek to improve their knowledge and practical skills in calculating energy potential,

installation energy efficiency, and the possibilities of integrating renewable energy sources into production processes.

- ✓ Academic and non-academic staff of research institutes, universities, and companies interested in research into the processes of production and use of renewable energy sources.

Prerequisites:

- ✓ A basic understanding of general physics, thermal engineering, and an understanding of agricultural technological processes will be an advantage.
- ✓ In-depth knowledge of engineering is not required; however, participants should be interested in alternative energy sources and the fundamentals of energy.
- ✓ The course is open to participants with diverse disciplinary and professional backgrounds, and a readiness to work in an interdisciplinary environment will be an advantage.

Learning Outcomes

Upon completion of the course, participants will be able to:

1) Identify the main types of renewable energy sources and their application in the agricultural sector.
2) Explain the principles of production of biodiesel, bioethanol, and biogas.
3) Evaluate the energy potential of solar, wind, and bioenergy systems.
4) Calculate the capacity and efficiency (KPD) of solar panels, wind turbines, and biogas plants.
5) Analyze the effectiveness and environmental benefits of implementing RES in agriculture.
6) Be able to conduct an energy analysis of production systems.

Assessment

In order for each participant to complete successfully the course and be awarded the corresponding ECTS credits, they must pass the course assessment. The outcome of the assessment can be either Pass or Fail.

Assessment methods

- Exam. 30 different topics are offered to assess the obtained by the participants' competencies. The content of the exam work includes: topic importance, description of state-of-the-art level of technologies and modern practical trouble killers, tendencies of development. An exam work must include schemes, formulas, plots, text, etc. Number of words > 500. Provided calculations benefit an exam work. The proper format: A4, 14 pt + Times New Roman.

Assessment Methods	Examples of Assessment
• Identify the main types of renewable energy sources and know the specifics of their application in the agricultural sector.	Exam + Oral Presentation
• Explain the principles of obtaining energy from biomass of plant origin.	Exam + Oral Presentation

• Evaluate the energy potential of solar, wind, and bioenergy systems.	Exam + Report
• Calculate the capacity and efficiency (KPD) of solar panels, wind turbines, and biogas plants.	Exam + Report
• Justify the effectiveness of applying alternative energy sources;	Exam + Oral Presentation
• Apply methods of energy-ecological analysis to optimize autonomous energy supply systems.	Exam + Quiz

Mentoring

As part of the course, participants will receive individual mentoring during the completion of their assignment/project, or will gain practical experience in evaluating the possibilities of applying RES in the conditions of a specific agricultural enterprise or community.
Depending on their experience and interests, they may focus on areas such as:

- ✓ Applied research based on the analysis of the effectiveness of photovoltaic systems at agricultural production facilities;
- ✓ Integration of solar and wind installations into farm energy supply systems;
- ✓ Calculation of the energy potential of the region's biomass;
- ✓ Development and design of equipment for obtaining energy from biomass of plant origin;
- ✓ Research based on determining the potential for implementing renewable energy sources.

This mentoring component ensures that each participant develops practical competencies while adapting the learning outcomes to their individual professional or academic goals.

Bibliography

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Other Important Information

Course evaluation: Upon successful completion of the course, participants are required to fill in the course evaluation questionnaire.

Certificate: Upon successful completion of the course, participants will be issued a certificate of achievement provided by The Cyprus Institute and EIT Climate KIC.

Plagiarism: CyI has explicit rules concerning academic dishonesty including plagiarism. Course participants are reminded that all work submitted as part of the requirements for any examination (including coursework) of CyI must be expressed in their own words and incorporated in their own ideas and judgements.

Course Timetable

Session	Date and Time	Instructor	Venue
1st	October 20th, 14.00-15.20	Mykola Tregub, Lesia Karpuk	Auditorium 14, Campus 1
2nd	October 21th, 14.00-15.20	Mykola Tregub, Lesia Karpuk	Auditorium 14, Campus 1
3rd	October 22th, 14.00-15.20	Mykola Tregub, Lesia Karpuk	Auditorium 14, Campus 1

4th	October 23th, 14.00-15.20	Mykola Tregub, Lesia Karpuk	Auditorium 14, Campus 1
5th	October 24th, 14.00-15.20	Mykola Tregub, Lesia Karpuk	Auditorium 14, Campus 1
6th	October 27th, 14.00-15.20	Mykola Tregub, Lesia Karpuk	Auditorium 14, Campus 1
7th	October 28th, 14.00-15.20	Mykola Tregub, Lesia Karpuk	Auditorium 14, Campus 1
8th	October 29th, 14.00-15.20	Mykola Tregub, Lesia Karpuk	Auditorium 14, Campus 1
9th	October 30th, 14.00-15.20	Mykola Tregub, Lesia Karpuk	Auditorium 14, Campus 1
10th	October 31th, 14.00-15.20	Mykola Tregub, Lesia Karpuk	Auditorium 14, Campus 1

Contact Details of Instructor(s)

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