

COURSE	Name	: Renewable Energy
	Code	: EE184912
	Credits	: 3
	Semester	: Elective

Description of Course

This course provides an overview of global energy conditions and the role of new and renewable energy (RE) as an alternative energy source other than fossil fuel. Potential, conversion principles and characteristics of RE sources, especially photovoltaic, wind power, hydropower are explained through simple modeling. Components of the RE-based generation system are introduced in stand-alone, grid-connected, and hybrid topologies. This topology is discussed with a simple energy equilibrium analysis accompanied by a practical example. In this course is also given simple economic analysis such as Simple Payback Period, IRR, and NPV to calculate investment of RE-based generation system.

Learning Outcomes

Knowledge

(P02) Mastering the concepts and principles of engineering, and implementing them in the form of procedures for analysis and design in power systems, control systems, multimedia telecommunications, or electronics.

Specific Skill

(KK01) Able to formulate engineering problems in power systems, control systems, multimedia telecommunications, or electronics.

General Skill

(KU11) Able to implement sustainability principles and develop knowledge.

(KU12) Able to implement information and communication technology (ICT) in the context of implementation of his/her work.

Attitude

(S06) Working together, having social sensitivity and caring for community and environment.

(S09) Demonstrating attitude of responsibility on work in his/her field of expertise independently.

(S12) Working together to be able to make the most of his/her potential.

Course Learning Outcomes

Knowledge

- Understanding the potential of RE and master its conversion principle
- Understanding the system of generation of RE and its main components.

Specific Skill

- Able to design RE generation system
- Able to make technical and economic analysis of RE generation system

General Skill

Able to compile reports of equipment testing results and conduct evaluation.

Attitude

Demonstrate a responsible attitude towards the work in the field of expertise independently.

Working together to be able to take full advantage of their potential.

Main Subjects

1. World energy and the role of RE
2. The spectrum of sunlight, semiconductors as solar cells, types and technologies of solar cells
3. Single diode model for solar cell
4. The potential energy of water and its conversion principle
5. Small scale hydroelectric power plant
6. Wind potential energy and its conversion
7. Modeling of wind turbines
8. Small-scale generation system based on RE and electric energy storage
9. Cost analysis, Simple Payback Period, IRR, and NPV based generation of RE

Reference(s)

- [1] Gilbert M. Masters , “Renewable and Efficient Electric Power Systems”, 2004 by John Wiley & Sons.
- [2] Thomas Ackermann, “Wind Power in Power Systems”, 2005 John Wiley & Sons
- [3] Mukund R. Patel, Wind and Solar Power Systems - Design, Analysis, and Operation”, 2006 by Taylor & Francis Group

Prerequisite(s)

EE184402 Introduction to Power System
