

EE 523 – Fundamentals of Renewable Energy

CREDIT HOURS

3 Hours

CONTACT HOURS (Hours/week)

Lecture: 2; Tutorial: 2

COURSE COORDINATOR

Dr Hady El Helw

TEXT BOOK:

Boyle, Godfrey. 2004. Renewable Energy (2nd edition). Oxford University Press.

COURSE DESCRIPTION:

This course provides an introduction to energy systems and renewable energy resources, with a scientific examination of the energy field and an emphasis on alternate energy sources and their technology and application. The class will explore society's present needs and future energy demands, examine conventional energy sources and systems, including fossil fuels and nuclear energy, and then focus on alternate, renewable energy sources such as solar, biomass (conversions), wind power, geothermal, and hydro. Energy conservation methods will be emphasized.

PREREQUISITE:

EE 424

RELATION OF COURSE TO PROGRAM:

Elective

COURSE INSTRUCTION OUTCOMES:

The student gains knowledge on the nature and characteristics of renewable energy resources, technologies, economic aspects and environmental impacts.

TOPICS COVERED:

- Classification and history of renewable energy resources.
- Wind energy basics.
- Fixed speed wind turbines.
- Variable speed wind turbines.
- Vector control of Power electronics converters for wind generators.
- Solar energy basics.
- Photovoltaic and fuel cells.
- Power electronics in solar systems

- Hydropower.
- Biomass.
- Grid integration for electricity generated from renewable energy.
- Effect of government regulation (grid code) on the renewable energies industry.
- State of the industry.

CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:

Professional Component Content			
Math and Basic Sciences	Engineering Topics	General Education	Engineering Design
	✓	✓	

RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:

Student Outcomes		Course Outcomes
a.	An ability to apply knowledge of mathematics, science, and engineering.	
b.	An ability to design and conduct experiments, analyze and interpret data.	
c.	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	✓
d.	An ability to function on multi-disciplinary teams.	✓
e.	An ability to identify, formulate, and solve engineering problems.	
f.	An understanding of professional and ethical responsibility.	
g.	An ability to communicate effectively.	
h.	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal content	✓
i.	A recognition of the need for, and an ability to engage in life-long learning.	
j.	A knowledge of contemporary issues within and outside the electrical engineering profession.	✓
k.	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	✓