King Fahd University of Petroleum & Minerals

Electrical Engineering Department

EE 468: Renewable Energy (132)

Course Objectives

The general Objectives of this course are to understand :

1. The role renewable energy sources in the electric power grid structure and policy.
2. The performance of wind, solar power system.
3. The integration of green energy into power grid and the associated problems

Student Outcomes

- Upon the completion of this course the students will be able to Apply knowledge of mathematics, science, and engineering
- Function on multi-disciplinary teams
- Understand professional and ethical responsibility
- Acquire the broad education necessary to understand the impact of electrical engineering solutions in a global and societal context
- Recognize the need for, and be able to engage in life-long learning
- Acquire knowledge of contemporary issues

Tentative Weekly Breakdown

Week	Topics
1-2	**Energy and Civilization** • Fossil Fuels: availability and depletion • Nuclear Energy • Global Warming • Green and Renewable Energy Sources • Estimates of Energy costs • Components of Electric grid • Electric Energy Outlook in Saudi Arabia.
3	**Distribution Generation Technologies & Economics**
4-5	**Fundamentals of Solar Power Systems** Photovoltaic Power conversion Photovoltaic Material Modeling of Photovoltaic Systems Design of Photovoltaic Systems
6	**Concentrated Solar Power**
7-8	**Fundamentals of Wind Power Systems** Wind Power conversion Modeling of Wind Power Systems Design of Wind Systems
9-10	**Energy Storage** **Other Renewable Energy Sources**
11-12	**Integration of Distribution Generation into the Grid** DC/AC Inverters Analysis of DC/ AC Inverter DC/DC Converters Design of Converters for Grid Operation
13-14	**Impact of Distribution Generation on Power System Operation** Voltage Variations Circuit Overloading System protection Ride Through and fault mitigation Power quality disturbances
15	Energy Economics and Tariff Project presentations

Textbook

Design of Smart Power Grid Renewable Energy Systems, Ali Keyhani , John Wiley 2011, ISBN 978-0470-62761-7

References

The Integration of Distributed Generation in the Power System , Math Bollen. Fainan Hassan, John Wiley 2011, ISBN 978-0470-64337-2