ECE 333 Green Electric Energy
MIDTERM 1, October 20, 2014
Review List

Lecture 1: Introduction and Overview

Lecture 2: Power System Basics

- chapter 1 (sections 1.1 through 1.4)
- chapter 3 (sections 3.1 through 3.5)

Major topics - *Avg* and *RMS* value of waveforms, *AC* network analysis(*R, L & C)*, power factor, power triangle, power factor correction and 3-phase circuits.

Lecture 3: Energy Conversion Principle

Lecture 4: Wind as an Energy Resource

Major topics - wind turbine classification

Lecture 5: Wind Power

Major Topics - rotor basics, power in wind, temperature and altitude impacts on air density and dependence on tower height

Lecture 6: Limits on Conversion of Wind into Electricity

Major Topics – Betz limit, Betz efficiency and tip speed ratio

Lecture 7: Wind Technologies Report and Issues

Major Topics – 2013 *US* and global wind status, wind farm and wind turbine placement

Lecture 8: Wind Data Analysis

- chapter 7 (sections 7.1, 7.2, 7.4, 7.5, 7.6, 7.7.1, 7.7.2 and 7.8)

Major Topics –wind speed histogram, Weibull distribution, Rayleigh distribution, wind power output distribution, design parameter impacts on wind power and ideal wind turbine power curve

Lecture 9: Energy Economics Concepts

Major Topics – *NPV*, cash flows, discount rate, internal rate of return, inflation impacts on cash flow and annualized investments

Lecture 10: Basic Concepts in Power System Economics

Major Topics – heat rate, annualized fixed and variable costs

Lecture 11: Wind Energy Economics

Major Topics – approximate wind capacity factor, capital recovery factor, annualized wind generated electricity costs, tax incentives for wind and *O&M* economics

- appendix A
- chapter 7 (section 7.9)