TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	ECEN 415: Physical and Economical Operations of Sustainable Energy Systems
Term (e.g., Fall 200X)	Spring 2019
Meeting times and location	TR 2:20 pm -3:35 pm, ETB1037

Course Description and Prerequisites

This course aims to introduce undergraduate students the operational issues for sustainable electric energy systems. The first part of the course will introduce basic engineering, optimization and economic concepts relevant to this course. The second part of the course will discuss the "modular" view of individual electric energy processing components (e.g., variable generation, flexible demands). The third part of this course will physical and market operations in electricity industry in support of sustainable energy integration. Computer simulations and demos will be available for students to create and evaluate examples of power systems.

Prerequisite: ECEN 214, ECEN 420/460, or permission from the instructor

Learning Outcomes or Course Objectives

We will discuss a broad variety of important engineering and economics issues related to integration of sustainable energy resources. We will introduce the key differences in operations and planning at the system level, as well as at the individual power producers' level. Classroom discussion and computer-based simulation demos will prepare the students to understand better how to plan and operate sustainable electric energy systems with many more renewable energy resources.

Instructor Information

Name	Dr. Le Xie
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Office hours	Thursdays 3:35-4:30 pm or by appointment
Office location	Wisenbaker 301H

Name	Xinbo Geng (Graduate Teaching Fellow)
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Grader Information:

Name: Athindra Venkatraman
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Office hour: by appointment
Office location: Wisenbaker 053

Textbook and/or Resource Material

1. D.S. Kirschen and G. Strbac, Fundamentals of Power System Economics, Wiley
2. Published papers assigned by the instructor

Grading Policies

Homework Assignments (20%) + Mid-term Exam (30%) + Final Exam (35%) + In-class Quiz (15%)
If students choose to complete a term project, their term project score will add up to 10% as bonus points.

Course Topics, Calendar of Activities, Major Assignment Dates (Subject to Change)

Lecture	Date	Topic
#1		Course Motivation and Overview; Syllabus
#2		Basic Concepts from Economics [1] Ch 2
#3		Basic Concepts from Economics [1] Ch 2
#4		Basic Concepts from Optimization
#5		Basic Concepts from Optimization
#6		Conventional Generation Resources
#7		Renewable Variable Energy Resources: Wind
#8		Renewable Variable Energy Resources: Solar, and others
#9		Conventional Electricity Demands
#10		Flexible Electricity Demands in Smart Grids
#11		Electric Power System Fundamentals: Power Flows
#12		Balancing Supply and Demand: ED and Optimal Power Flows
#13		Balancing Supply and Demand with many Variable Generation Resources
#14		Balancing Supply and Demand in the Regulated Industry and Electricity Markets
#15		Material Review; Simulations Demonstrations
#16		Midterm Exam
#17		Balancing Supply and Demand Deviations from Forecast in the Regulated Industry;
#18		Ancillary Service Markets as a Means of Balancing Demand Deviations from Forecast in the Changing Industry
#19		Participating in Markets for Electric Energy [1], Ch 4
#20		Participating in Markets for Ancillary Services
#21		Power Delivery under System Constraints in the Regulated Industry (Optimal Power Flow)
#22		Transmission Networks and Electricity Markets
#23		Nodal Markets: LMP Fundamentals
#24		Nodal Markets: LMP Fundamentals
#25		Financial Transmission Rights
#26		Guest Lecture on ERCOT Market Operations
#27		Coordinating Variable Generation Through Flexible Demands
#28		Course Summary
#29		TBA

Other Pertinent Course Information

Americans with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call **979-845-1637**. For additional information, visit **http://disability.tamu.edu**.

Academic Integrity

For additional information please visit: http://www.tamu.edu/aggiehonor

“An Aggie does not lie, cheat, or steal, or tolerate those who do.”