

Syllabus

EE-490/590 Energy Economics

College of Engineering
Klipsch School of Electrical and Computer Engineering
New Mexico State University

Date and Time:	MW	1:30 - 2:45pm
Room:	EC II - 110	
EE Instructors:	Joydeep Mitra	Satish Ranade
Office:	TB – 114	TB - 327
Office Hours:	TBA	M-F 3-4 PM
Phone:	TBA	646-3704
Email:	jmitra@nmsu.edu	sranade@nmsu.edu
Econ. Instructors:	Tom McGuckin	Doug Gegax
Office:	GU-308	GU-214
Office Hours:	TBA	TBA
Phone:	646-6302	646-1903
Email:	jmcgucki@nmsu.edu	dgegax@nmsu.edu

Course Description from the Graduate Course Catalog:

This course introduces the student to the basics of electric power systems, power markets and power economics. Lectures include the history of the North American Power System, its structure and operation, the basics of electricity and the operation of power systems and power markets. Major concepts and principles of power markets and power economics are discussed so that students interested in power and/or economics will be equipped with a fundamental knowledge and understanding of the restructured power industry in the U.S.

Pre-requisites: none

Textbook and Other Materials

A textbook is not required. However, you will find the following books useful.

1. Stoft, Steven “ Power System Economics – Designing Markets for Electricity”, IEEE Press/ Wiley-Interscience, 2002
2. Rothwell and Gomez “ Electricity Economics – Regulation and Deregulation”, IEEE Press/ Wiley-Interscience, 2003
3. Shahidepour, Yamin, Li “Market Operations in Electric Power Systems”, IEEE Press/ Wiley-Interscience, 2003

Instructor's notes and related materials will be posted at <http://www.ece.nmsu.edu/~sranade>.

References to specific websites will be provided as appropriate. The following sites are useful in general.

Energy Information Administration <http://www.eia.doe.gov/>
NERC <http://www.nerc.com>

Course Objectives:

- To introduce students to the basic concepts of the North American Power System, its structure and operation and its markets and economics.
- To provide the power and/or economics student with the understanding necessary to progress to more advanced studies and work in their chosen specialty.

Contribution of EE-490/590 to Meeting Professional Competence:

This course is unique. The traditional power industry has been replaced by the new restructured industry. The course is especially designed for undergraduate and entry level graduate students in power and/or economics as an introduction to power systems theory and operation and to power markets and economics in the new restructured power industry.

Relationship of the Course to Program Objectives:

The educational program objectives of the Department of Electrical and Computer Engineering are to provide students with a broad educational background and skills necessary for a successful, fulfilling and life long career in electrical and computer engineering. This particular course serves several purposes: (1) Introduces undergraduate and graduate students in power and/or economics to power systems theory and operation, power markets and power economics. (2) Prepares these students for advanced studies in electrical power engineering and/or economics.

Class Attendance, Format, Grades

Attendance Policy: All on-campus students are required to attend the classes.

Course Evaluation and Final Grade: There will be two exams and a Final. Each Exam will be weighted as 20% of the final grade, homework will be weighted as 20%, and the Final Exam will be weighted as 20% of the final grade. A report (below) is required and will be weighted as 20% of the final grade.

A report is required. The student will select a topic from a list, either in Power or in Economics, and write a report of not more than 20 pages. The report must be neatly typed and formatted with sources and references provided. The web is a viable source, but don't believe everything you see and read.

Students with Disabilities:

If you have or believe you have a disability, you may wish to self-identify. You can do so by providing documentation to the Office for Services for Students with Disabilities, located at Garcia annex (phone 646-6840). Appropriate accommodations may then be provided for you. If you have a condition which may affect your ability to exit safely from the premises in an emergency or which may cause an emergency during class, you are encouraged to discuss this in confidence with the instructor and/or the director of Disabled Student Programs. If you have general questions about the Americans with Disabilities Act (ADA), call 646-3635.

Tentative Schedule

Lecture Series 1: Basics of Electric Power Systems

Week	Day	Date	Dept.	Lecture Title
01	M	8/18	EE	Class Orientation and Overview
	W		EE	History/Structure of the North American Electric System
▶ 02	W	8/27	EE	Key Bulk-Power Institutions of North America
	F		EE	Generation, Transmission & Distribution
* Labor Day				
03	W	9/3	EE	Basics of Electricity & Electric Power
04	M	9/8	Econ	Economics, Markets, Regulation, Deregulation
	W		Econ	Fundamentals of Energy Markets
05	M	9/15	EE	Basic Operation of Power Systems & Markets
	W		EE	Transmission, Losses & Capacity Limits
06	M	9/22	EE	AC and DC Power Flow (PowerWorld Demo)
	W		EE	Current Issues in Restructuring/Deregulation
07	M	9/29	EE	Exam I

Lecture Series 2: Design of Electric Energy Markets

Week	Day	Date	Dept.	Lecture Title
07	W	10/1	Econ.	Design of Energy Markets
08	M	10/6	Econ.	Power, Energy and Generation Capacity
	W		Econ.	Supply and Demand and Competition
*Fall Break				
09	W	10/15	Econ.	Operation of the Auction Markets
10	M	10/20	Econ.	Spot Markets and Forward Markets

Lecture Series 3: Transmission Congestion Management

Week	Day	Date	Dept.	Lecture Title
10	W	10/22	Econ.	Transmission Losses, Limits and Congestion
11	M	10/27	Econ.	Market Models and Congestion Pricing
	W		Econ.	Congestion Management in a Pool
12	M	11/3	Econ.	Nodal Pricing with Bilateral Contracts
	W		Econ.	Nodal Pricing Methods
13	M	11/10	Econ.	Review
	W		Econ.	Exam II

Lecture Series 4: Unit Commitment and Ancillary Services

Week	Day	Date	Dept.	Lecture Title
14	M	11/17	EE	The Unit Commitment Problem
	W		EE	Production Simulation/Pricing of Generation
15	M	11/24	EE	Types of Ancillary Services

*Thanksgiving

Lecture Series 5: Comparison of Major Deregulated Markets

Week	Day	Date	Dept.	Lecture Title
16	M	12/1	EE	The California and Eastern Markets
	W		EE	ERCOT – The Texas Market
17	W	12/11	All	Final Exam