



UNIVERSITY OF  
CENTRAL FLORIDA

**EEL 4298 - Power System  
Economics  
Section: 0001**

*College of Engineering and Computer  
Science*

Department of Electrical and Computer Engineering

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### **Course Information**

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**Term:** Fall 2025

**Class Meeting Days:** F

**Class Meeting Time:** 09:00AM - 11:50AM

**Class Meeting Location:** CB2 O206

**Modality:** P

**Credit Hours:** 3.00

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### **Instructor Information**

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**Name:** Qun Zhou Sun

**Title:** Associate Professor

**Office Location:** HEC 358

**Email:** [qzsun@ucf.edu](mailto:qzsun@ucf.edu)

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### **Teaching Assistants**

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GTA(s):      |    Ibrahim Abbas      |    Email:      |    [mohammadibrahim.abbas@ucf.edu](mailto:mohammadibrahim.abbas@ucf.edu)

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### **Office Hours**

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M 10:30am -1:30pm

## **Course Description**

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EEL 4298 ENGR-ECE 3(3,0)Power System Economics: PR: EEL 3004C with a grade of C (2.0) or better. The course examines fundamentals of power system economics, including power market operations and power system planning. Fall

Electric power systems are undergoing major changes worldwide. The restructuring process unbundles the traditional power sector into generation, transmission and demand. Operating and planning power systems under the restructuring poses challenges and needs knowledge of power economics and market. This course introduces concepts and techniques that are used in power system economics analysis and market operations.

## **Student Learning Outcomes**

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The course is designed for students to achieve the following:

- 1) Characterize existing electric industry structure and market systems.
- 2) Solve optimization especially linear programming problems.
- 3) Understand electricity market operations.
- 4) Determine electricity and transmission prices and understand risk-hedging products.

## **Required Course Materials and Resources**

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### **Fundamentals of Power System Economics**

**Authors:** Daniel S. Kirschen, Goran Strbac

**Publisher:** John Wiley & Sons

**Publication Date:** April 2004

## **Course Assessment and Grading Procedure**

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### *Assignment*

- Assignments include weekly homework and one course project.
- Assignments are submitted online through webcourse.

- For textbook homework, please submit the derivation procedure. If python coding is required, please also submit the code.
- For the course project, submit project report, presentation slides, and python code.

#### *Midterm Exam and Final Exam*

- Both midterm and final exams will be closed-book and closed-notes.
- Tentative midterm exam is in the week of 10/10/2024 in class, please prepare ahead of time. Also note that this date may be subject to change depending on class progress.
- Final exam is cumulative, covering the entire semester with emphasis on the second half.
- Final exam will be in the Final Examination Period. The date is 11/21/2025. Time is 9am- 11am in class.

#### **Percent of Final Grade**

- Attendance: 10%
- Homework: 25%
- Project: 15%
- Midterm Exam: 25%
- Final Exam: 25%

## **Assignment Schedule**

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<b>Due Date</b>	<b>Assignment Name</b>	<b>Assignment Type</b>	<b>Points</b>
	<a href="#"><u>Attendance</u></a>	Assignment	100
8/22/25	<a href="#"><u>Financial Aid</u></a>	Quiz	1
8/29/25	<a href="#"><u>Week 1 Homework</u></a>	Assignment	10
9/5/25	<a href="#"><u>Week 2 Homework</u></a>	Assignment	10
9/12/25	<a href="#"><u>Week 3 Homework</u></a>	Assignment	10

<b>Due Date</b>	<b>Assignment Name</b>	<b>Assignment Type</b>	<b>Points</b>
9/19/25	<a href="#"><u>Week 4 Homework</u></a>	Assignment	10
9/26/25	<a href="#"><u>Week 5 Homework</u></a>	Assignment	10
10/3/25	<a href="#"><u>Market Clearing Game - Extra Credit</u></a>	Assignment	0
10/3/25	<a href="#"><u>Week 6 Homework</u></a>	Assignment	10
10/9/25	<a href="#"><u>Week 7 Homework</u></a>	Assignment	10
10/10/25	<a href="#"><u>Midterm Exam</u></a>	Assignment	10
10/17/25	<a href="#"><u>Week 9 Group Discussion in Class - Extra Credit</u></a>	Assignment	0
10/24/25	<a href="#"><u>Week 9 Homework</u></a>	Assignment	10
10/31/25	<a href="#"><u>Week 10 Group Discussion in Class - Extra Credit</u></a>	Assignment	0
10/31/25	<a href="#"><u>Week 10 Homework</u></a>	Assignment	10
10/31/25	<a href="#"><u>Week 11 in-Class Discussion - Extra Credit</u></a>	Assignment	0
11/10/25	<a href="#"><u>Week 11 Homework</u></a>	Assignment	10
11/14/25	<a href="#"><u>Week 12 Homework</u></a>	Assignment	10
11/17/25	<a href="#"><u>Course Project</u></a>	Assignment	10
11/21/25	<a href="#"><u>Final Exam</u></a>	Assignment	10

## **Grading Scale**

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### **Grading Scale**

<b>Letter Grade</b>	<b>Percentage</b>
A	94-100%
A-	90-93%
B+	87-89%
B	84-86%
B-	80-83%
C+	77-79%
C	74-76%
C-	70-73%
D+	67-69%
D	64-66%
D-	61-63%
F	0-60%

## **Policies for Course Grade**

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The Undergraduate Catalog states, “Reasons for acceptable absences may include illness, serious family emergencies, special curricular requirements (e.g., judging trips, field trips, professional conferences), military obligations, severe weather conditions, and religious holidays.” Our course policy regarding the late work includes the following:

- Late work grade reduction policy: 1 day 10% reduction, 2-day 30% reduction, 3-day 50% reduction, 4-day 70% reduction, 5-day 100% reduction.
- Policy/process to request an exception to the late/make up work policy: students are required to provide written notices with reasons identified above.
- Policy to request an extension before the due date: students are required to provide written notices with reasons identified above.

## **Disability Access & Accommodations**

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The University of Central Florida is committed to providing equal access to all students with disabilities (ADHD, learning disabilities, Autism, chronic medical conditions, physical disabilities, etc.). To receive consideration for reasonable disability-related course

accommodations, disabled students must contact Student Accessibility Services (SAS) and complete the steps required for SAS to review accommodation requests. More information can be found on the UCF [Student Accessibility Services](#) website under the Start Here tab or by contacting SAS directly (Ferrell Commons 185; [sas@ucf.edu](mailto:sas@ucf.edu); Phone - 407-823-2371).

Approved accommodations are shared with course instructors via the SAS Course Accessibility Letter. Implementing certain accommodations may require discussion about specific considerations of the course design, course learning objectives, and the individual academic and course challenges experienced by the student. While students with disabilities or chronic health needs are also encouraged to discuss any course concerns with professors in addition to contacting SAS, professors are not required to facilitate disability-related adjustments to the course unless the professor has received a Course Accessibility Letter from SAS that outlines approved accommodations.

## **Academic Integrity**

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Students should familiarize themselves with UCF's Code of Conduct at Student Conduct and Integrity Office. According to Section 1, "Academic Misconduct," students are prohibited from engaging in:

1. Academic misconduct is defined as any submitted work or behavior that obstructs the instructor of record's ability to accurately assess the student's understanding or completion of course materials or degree requirements (e.g., assignment, quiz, and/or exam). Examples of academic misconduct include but are not limited to: plagiarism, unauthorized assistance to complete an academic exercise; unauthorized communication with others during an examination, course assignment, or project; falsifying or misrepresenting academic work; providing misleading information to create a personal advantage to complete course/degree requirements; or multiple submission(s) of academic work without permission of the instructor of record.
2. Any student who knowingly helps another violate academic behavior standards is also in violation of the standards.
3. Commercial Use of Academic Material. Selling of course material to another person and/or uploading course material to a third-party vendor without authorization or without the express permission of the University and the instructor of record.

Course materials include but are not limited to class notes, the instructor of record's slide deck, tests, quizzes, labs, instruction sheets, homework, study guides, and handouts.

4. Soliciting assistance with academic coursework and/or degree requirements. The solicitation of assistance with an assignment, lab, quiz, test, paper, etc., without authorization of the instructor of record or designee is prohibited. This includes but is not limited to asking for answers to a quiz, trading answers, or offering to pay another to complete an assignment. It is considered Academic Misconduct to solicit assistance with academic coursework and/or degree requirements, even if the solicitation did not yield actual assistance (for example, if there was no response to the solicitation).

### **Responses to Academic Dishonesty, Plagiarism, or Cheating**

Students should also familiarize themselves with the procedures for academic misconduct in UCF's student handbook, [The Golden Rule](#). UCF faculty members have a responsibility for students' education and the value of a UCF degree, and so seek to prevent unethical behavior and respond to academic misconduct when necessary. Penalties for violating rules, policies, and instructions within this course can range from a zero on the exercise to an "F" letter grade in the course. In addition, an Academic Misconduct report could be filed with the Office of Student Conduct and Academic Integrity, which could lead to disciplinary warning, disciplinary probation, or deferred suspension or separation from the University through suspension, dismissal, or expulsion with the addition of a "Z" designation on one's transcript.

Being found in violation of academic conduct standards could result in a student having to disclose such behavior on a graduate school application, being removed from a leadership position within a student organization, the recipient of scholarships, participation in University activities such as study abroad, internships, etc.

Let's avoid all of this by demonstrating values of honesty, trust, and integrity. No grade is worth compromising your integrity and moving your moral compass. Stay true to doing the right thing: take the zero, not a shortcut.

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### **Title IX**

Title IX prohibits sex discrimination, including sexual misconduct, sexual violence, sexual harassment, and retaliation. If you or someone you know has been harassed or assaulted, you can find resources available to support the victim, including confidential resources and information concerning reporting options at [Let's Be Clear](#) and [UCF Cares](#).

For more information on access and community engagement, Title IX, accessibility, or UCF's complaint processes contact:

- Title IX – ONAC – [Office of Nondiscrimination & Accommodations Compliance](#) & [askanadvocate@ucf.edu](mailto:askanadvocate@ucf.edu)
- Disability Accommodation – Student Accessibility Services – [Student Accessibility Services](#) & [sas@ucf.edu](mailto:sas@ucf.edu)
- [Access and Community Engagement](#) (including the Ginsberg Center for Inclusion and Community Engagement, Military and Veteran Student Success, and HSI Initiatives)
- UCF Compliance and Ethics Office – [Compliance, Ethics, and Risk Office](#) & [complianceandethics@ucf.edu](mailto:complianceandethics@ucf.edu)
- The [Ombuds Office](#) is a safe place to discuss concerns.

## **Reporting an Incident or Issue**

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If you believe you have experienced discrimination by any faculty or staff member, contact the Office of Nondiscrimination & Accommodations Compliance via the [ONAC website](#) or at 407-823-1336. You can also choose to report using the UCF Integrity Line either anonymously or as yourself at 1-855-877-6049 or by using the [online form](#). UCF cares about you and takes every report seriously. For more information see the [Reporting an Incident or Issue Webpage](#).

## **Deployed Active-Duty Military Students**

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Students who are deployed active-duty military and/or National Guard personnel and require accommodation should contact their instructors as soon as possible after the semester begins and/or after they receive notification of deployment to make arrangements.

## Campus Safety

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At UCF's Public Safety and Police, safety is the top priority. Emergencies on campus are rare, but if one should arise, it's important to be familiar with some basic safety and security concepts.

- In an emergency, always dial 911.
- Every UCF Classroom has an Emergency Procedure Guide posted on a wall near the door, which will show you how to respond to a variety of situations. This guide can also be found online [here](#).
- In the event of an active threat, remember **AVOID, DENY, DEFEND**. Choose the best course of action and act immediately. Watch the video [here](#) to learn more.
  - **AVOID.** Pay attention to your surroundings and have an exit plan. Get as much distance and as many barriers between you and the threat as quickly as possible.
  - **DENY.** When avoiding is difficult or impossible, deny the threat access to you and your space. Lockdown by creating barriers, turning the lights off and remaining quiet and out of sight. Make sure your cell phone is silenced, but do not turn it off.
  - **DEFEND.** When you are unable to put distance between yourself and the threat, be prepared to protect yourself. Commit to your actions, be aggressive and do not fight fairly. Do whatever it takes to survive.
- For emergencies on campus, UCF will utilize the [UCF Alert](#) system. All UCF students, faculty, and staff are automatically enrolled to receive these email and text alerts, however, it's a good idea to frequently ensure your [contact information is up to date](#).

## Financial Aid Accountability

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All instructors/faculty are required to document students' academic activity at the beginning of each course. In order to document that you began this course, please complete this activity by the end of the first week of classes or as soon as possible after

adding the course. Failure to do so may result in a delay in the disbursement of your financial aid.

## **Class Schedule**

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1. Introduction and background
  - a. Power industry restructuring process from vertically integrated utilities to the market structure with competition.
  - b. Models of competition: monopoly, purchasing agency, wholesale competition, retail competition.
1. Basic concepts from economics
  - a. demand and inverse demand functions, elasticity of demand, opportunity cost, supply and inverse supply functions, elasticity of supply, revenue and cost functions.
  - b. Market equilibriums and pareto efficiency.
  - c. Spot market, forward market/contract, futures market/contract, options.
  - d. Risk management, market efficiency.
  - e. Markets with imperfect competition: Cournot model and Bertrand model.
2. Markets for electric energy
  - a. Bilateral trading and electricity pools.
  - b. Electricity spot market operations.
  - c. The settlement process.
3. Transmission networks
  - a. Physical and financial transmission rights
  - b. Transmission congestion management
  - c. Security constrained economic dispatch
  - d. Pricing electricity: Location marginal prices for energy, congestion and losses.
  - e. AC and DC power flow.
4. Power market participants

- a. Utility maximization and cost minimization.
- b. Economic dispatch and scheduling: generation no-load cost, startup cost, dynamic constraints.
- c. Linear programming and mixed-integer programming.

*If time permits,*

- 1. System security and ancillary services
  - a. System balancing need
  - b. Ancillary services