

THE UNIVERSITY OF TEXAS AT EL PASO

COURSE SYLLABUS

ECE5311

Smart Grid Fundamentals

Fall 2024

Course Information

Classroom: Liberal Arts Building 208

CRN: 17272

Class Time: MW 6:00 pm - 7:20 pm

Instructor:	Eric Galvan, Ph.D.
Office:	
Phone:	
Email:	egalvan4@utep.edu
Office Hours:	MW 7:30 pm - 8:30 pm Others: by appointment
Text:	
References and Resources	<ul style="list-style-type: none">• Lecture Notes provided by the instructor.• Smart Grid: Fundamentals of Design and Analysis, IEEE Press Series on Power Engineering, by James Momoh• Research articles assigned by the instructor: Students will need to read several research articles available in the field of smart grid, e.g., papers published in IEEE Transactions on Smart Grid, other IEEE Transactions journals, IEEE conference papers, and others.• Software: Matlab/matpower

Course Description: This course serves as a graduate entry-level introduction to Smart Power Grid. The aim of this course is to provide basic concepts and principles of Smart Grid. This course will provide the working definition, the functions, the design criteria and techniques and technology needed for building Smart Grid. The focus will be on the motivation for the Smart Grid development, and analytical tools for Smart Grid design and development strategies based on various community constraints and energy needs. This course will incorporate various aspects associated with computational intelligence; distributed energy resources (DERs) such as solar, wind, energy storage, electric vehicles; demand response, prosumers, and consumers; distribution network and microgrids; energy management system (EMS); communication technology and

decision support system; and modeling and simulation of smart grid incorporating DERs using software; and smart grids in the context of cyber physical systems.

Course Objectives and Learning Outcomes: Upon successful completion of this course, students should be able to:

1. Discuss and describe the basic concepts and principles of Smart Grid.
2. Apply knowledge about the design criteria and technology needed for building the smart grid.
3. Discuss and describe the importance of adoption of smart grid technologies, practices, and service options such as:
 - Technology to improve reliability, security, and efficiency of microgrid and electric grid;
 - Demand side management (DSM), demand response and energy efficiency;
 - Optimization of grid operations and resources including cyber security;
 - Deployment and integrations of distributed energy resources including energy storage systems.
4. Design and demonstrate microgrid systems under the smart grid construct.
5. Apply fundamental concepts to solve smart grid application problems.
6. Independently study advanced materials and present the findings to others.

Course topics:

- Overview and Introduction to Smart Grid
- Smart Grid Architectural Designs
- Smart Grid Communications and Measurement Technology
- Pathway for Designing Smart Grid
- Demand Response: A Key Characteristic of Smart Grid
- Distributed Energy Resources and Integration to Grid
- Distribution Systems and Microgrid Energy Management
- Smart Grids and Cyber Physical Systems
- Performance Analysis Tool for Smart Grid Design Using software
- Student Presentations: There will be several presentations on special topics.

Grades will be given based on following distribution:

Attendance	10%
Assignments and Presentations	40%
Research Project, Presentation, and Report	50%
Total	100%

Grading Scale:

A	100-90%
B	89-80%
C	79-70%
D	69-60%
F	59-0%

Assignments: Assignments will be posted online through blackboard and/or informed via email. The homework assignments must be turned in by the due date. Late assignments will be decreased one letter grade (10 points) per day late from the actual homework grade.

Final project: The final project is a key component of the course as the deliverables demonstrate the students' ability to perform research based on the topics presented throughout the course. The project will be assigned individually. Student should be able to demonstrate a good understanding of Smart Grid through the project using software, which includes detail analysis of the case studies and a written report. Grades will be calculated based on the following: 1) demonstration of final project, 2) PowerPoint presentation, 3) project simulation included in the final report, and 4) final project report that includes schematics, project description, and results discussion. More information and deadlines about the project will be given at a later date.

Class Participation and Activities: There will be class group and individual activities. In order to get a grade for them you must participate in the activity.

There will be No Make up for assignments, presentations, or any assigned tasks. However, in case of pressing circumstances, make up will only be allowed for students with medical reason that prevents their attendance (written notification from doctor required), military duties (notification to be provided in advance), and for other compassionate reasons. Business related activities, car problems, and over sleeping are not considered compassionate reasons.

Course Drop Deadline: The deadline to drop this course with an automatic W is **Nov 1st, 2024**.

Attendance: Attendance is mandatory. When absent, the student is responsible for obtaining notes, handouts, and assignments and for meeting the same deadlines as the rest of the class. Excused absences are limited to documented medical emergencies, religious holidays and UTEP sponsored and/or required activities.

Cell Phone and Laptop Policy: Cell phones are not permitted during the lecture. Laptops may be used during assignments as specified by instructor. Students are required to turn off cell phones before entering the classroom. Cell phones should be placed out of sight (e.g., in a backpack or purse). Students should NOT receive or make any calls/text messages during class. Students using cell phones during class will be asked to leave and will receive a zero for attendance and on all group assignments completed that day.

Institutional Policies

Academic Honesty: As an entity of The University of Texas at El Paso, the Department of Electrical and Computer Engineering is committed to the development of its students and to the promotion of personal integrity and self-responsibility. The assumption that a student's work is a fair representation of the student's ability to perform forms the basis for departmental and institutional quality. All students within the department are expected to observe appropriate standards of conduct. Acts of scholastic dishonesty such as cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in the whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student, or the attempt to commit such acts will not be tolerated. Any case involving academic dishonesty will be referred to the Office of Student Conduct and Conflict Resolution (OSCCR). The Associate Dean of Students will assign a Student Judicial Affairs Coordinator who will investigate the charge and alert the student as to its disposition. Consequences of academic dishonesty may be as severe as dismissal from the University. See the OSCCR homepage at <https://www.utep.edu/student-affairs/osccr/> for more information.

Center for Accommodations and Support Services (CASS): If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass.

Harassment: Members of the UTEP community are protected from discrimination and harassment by State and Federal Laws. Jokes, comments of sexual nature, as well as racist comments will not be tolerated. The student that violates this rule will be sent to the Dean of Students for disciplinary action.

Disclaimer: The content of this Syllabus may subject to change within reasonable limits according to instructor's discretion. Any changes will be announced in blackboard or in the class.