



SYLLABUS

EE4395 (CRN: 19255), EE5383 (CRN: 15529) Smart Grid Fundamentals

Fall 2020 Online Course

Instructor:

Paras Mandal, Ph.D.
Associate Professor
Department of Electrical and Computer Engineering
Office A-339
Ph: (915) 747-8653; E-mail: pmandal@utep.edu

Online Class Hours: Course material and lecture notes (recorded) will be delivered in advance (see *Section IV*)

Online Office Hours: **Thursday, 11 am to 12 noon** via WebEx (link will be provided)

(For other times, by email appointment and online meeting will be held via WebEx. **Always write in the Email subject line “EE XXXX Smart Grid: your query”** using your UTEP email ID only while **corresponding with Instructor**. Please do not use your personal email ID)

I. COURSE GOAL AND DESCRIPTION

This course serves as a senior/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, renewable energy sources, energy storage, demand response, microgrid, electric energy system, communication technology and decision support system, and tools for modeling Smart Grid performance.

Prerequisites: Engineering mathematics, calculus, electric circuits, energy conversion and power, and MATLAB or other programming skill. Other: Instructor’s approval.

II. COURSE LEARNING OUTCOMES

- Students will learn the basic concepts and principles of Smart Grid.
- Students will have sound knowledge about the design criteria and technology needed for building Smart Grid.

- Dr. Paras Mandal

- At the completion of the course, students would be able to learn various aspects of smart grid, such as importance and adoption of smart grid technologies, practices, and service options; 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 resource including cyber security; deployment and integrations of renewable energy resources including energy storage systems.
- Students would also be able to apply fundamental concepts to solve application problems.
- Students would be able to independently study advanced materials and present the findings to others.
- Presentations, homework, and project will prepare the students to have sound understanding of smart grid and associated technologies.

III. COURSE RESOURCE AND REFERENCE

Lecture Notes provided by the instructor.

References/Resource Material

- Smart Grid: Fundamentals of Design and Analysis, *IEEE Press Series on Power Engineering*, by James Momoh
- Research papers 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.

IV. ONLINE COURSE FORMAT

The course format includes lectures, quizzes, exercises, problems, video clip, etc.

- Lecture notes (.pptx, pdf, etc.) and/or pre-recorded audio/video of the lecture will be delivered in course blackboard in advance.
- Students are supposed to read the provided lecture notes and must go through the pre-recorded audio/video to keep oneself update with the course material. **Hence, read the course materials in regular basis.**
- **Real-Time Class Hours T, R 12-1:20:** Students will be informed in advance if the Instructor wants to meet (online) all students at the same time during real-time class hours. *Otherwise - majority of the times, instructor will provide course related information to students via email and blackboard.*

V. GRADING POLICY

Grades will be given based on following distribution:

Assignments and Presentations	40%
Quizzes	10%
Research Project/Presentation/Report	50%
Total	100%

As a general case, grades will be given as follows:

- 90-100 → A
- 80-89 → B
- 70-79 → C
- 60-69 → D
- 59 or below → F

VI. COURSE TOPICS

<ul style="list-style-type: none"> • Overview of Electric Power Grid • Smart Grid Architectural Designs • Smart Grid Communications and Measurement Technology • Performance Analysis Tools for Smart Grid Design • Pathway for Designing Smart Grid • Microgrid, Renewable Energy, Storage, and Demand Response • Computational Tools for Smart Grid Design • Interoperability, Standards, and Cyber Security 	<p><i>Presentations: There will be several presentations on related topics (students will prepare their respective recorded presentations and submit to Professor via email; details on which will be provided timely)</i></p>
<p>Disclaimer: Syllabus may subject to change within reasonable limits according to instructor's discretion. Any changes will be announced in the class.</p>	
<p>Policy for Make-up: There will be NO MAKE-UP quizzes, presentations, assignments, etc. Students are supposed to meet the given deadline.</p>	
<p>Please check the Blackboard frequently.</p>	

VII. ASSIGNMENTS/HOMEWORK

Assignments will be posted online (e.g., in blackboard) and/or informed via [email](#). Assignments could be theoretical, or simulation based, or numerical problems, or research paper (or related topic) presentation, etc. Students are expected to complete the assigned work in a timely manner demonstrating a professionally high standard. Late homework submission is not encouraged. ***If you submit an assignment late (after the due date and time), it will be graded out of 60% (i.e., you will instantly lose 40% points).*** If you fail to submit an assignment, you will receive zero (*no homework will be accepted after a week from the due date*).

VIII. QUIZZES

- Students should always be up to date with the lecture materials that are covered.
- Always be ready for the quizzes throughout the semester. **To give flexibility to students in this online course, details on quiz submission window will be provided including starting time and submission time.** *Quiz will NOT be conducted during the real-time class hours, i.e., T, R 12-1:20 PM.*
- You will receive quiz questions via email or blackboard with instructions on submission procedure.
- **How to submit your quiz? →** You can use AdobeScan app or OfficeLens (available for iphone and android), or CamScanner (good if you have iphone). The app allows to scan documents and e-mail or upload them in different format. Your handwriting should be clear and readable. If you take photo, make sure there is a clarity. If you have other means of scanning document, you are welcome.

IX. MAKE-UP POLICY

There will be NO MAKE-UP for quiz, presentation, assignments, or any assigned tasks, etc., **However, in case of pressing circumstances**, e.g., student having medical reason (evidence required from doctor) or military duties (with advanced notification) or compassionate reasons should inform the Instructor by sending email in advance or in emergency (i.e., in case a student is unable to inform the instructor in advance due to medical reason about his/her absence), the student must inform the instructor on the same week by Friday 5pm via email with evidence (from doctor) as attachment.

X. RESEARCH PROJECT

This part of the course is very important as it demonstrates the student's ability of performing research based on the theoretical knowledge delivered in the class. This will be an individual work. *Student will propose two research topics of their interest related to Smart Grid, and the instructor will choose one of them. If the instructor does not find the proposed topic interesting, he will assign the research project to that particular student – and note that the student should discuss about the assigned project (and associated expectations from the project) with the instructor as early as possible.* Student should be able to demonstrate a good understanding of Smart Grid through (1) the project using MATLAB software or power system tool or programming language, or (2) by conducting thorough literature review on the chosen topic. Your contribution could be in the form of developing algorithm, improvement, software deliverables or comparative analysis or suggested policy or detailed literature review on the selected topic. Discuss with the instructor in advance to avoid any confusion.

Each student will submit presentation (recorded) for the given project topic and submit a hard copy of the final report. Your *Research Project's* grade will depend on the technical content of the report, presentation, your understanding, your original contribution, and quality of the report. More information on the *Research Project* will be distributed later in the semester. The final report of the project (only the best chosen) might take the form of an IEEE conference paper or symposium.

XI. INSTITUTIONAL POLICIES

Academic Honesty:

Cheating is unethical and not acceptable. Plagiarism is using information or original wording in a paper without giving credit to the source of that information or wording: it is also not acceptable. Do not submit work under your name that you did not do yourself. You may not submit work for this class that you did for another class.

If you are found to be cheating or plagiarizing, for example, but not limited to, in quiz, assignment, report submission, any assigned task, etc., you will be subject to disciplinary action, per UTEP catalog policy.

- Plagiarism, Cheating, and Academic Dishonesty are unacceptable and will NOT be tolerated.
- Student who is caught cheating/plagiarizing will receive a **failing grade** as well as additional disciplinary measures by the University.

- Any case involving academic dishonesty will be referred to the Engineering Dean's Office and the Office of the Dean of Students. See the Office of the Dean of Students' home page at www.utep.edu/dos/acadintg.htm for more information.
- Please review the statements below and UTEP's Web page on Policy on Academic Integrity at <http://sa.utep.edu/osccr/academic-integrity/>

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.

XII. SOME OTHER IMPORTANT NOTES

- **Disclaimer:** Syllabus (that includes any content) may subject to change within reasonable limits according to instructor's discretion. Any changes will be announced in blackboard or in the class.
- **Students are expected to check the blackboard frequently (at least three times daily)** for course materials (e.g., Syllabus, Lecture Notes, announcements, etc.) and related information to see if any updates.
- **Students should also be checking emails frequently (at least three times daily)** as instructor can communicate via email.
- Usually the instructor sends email to all students keeping them in Bcc if it will be a group email.
- **Email Communication with a particular student:** (1) Instructor may send an email to a particular student to set up an online meeting or for any course related matter, and that student is supposed to answer the instructor's email as soon as possible (*which is Email-1*). (2) If the student does not reply to Email-1 within 24-hour period (*as students are expected to check email thrice a day*), the instructor will send a reminder email (*which is Email-2*). (3) If that student still does not reply to Email-2 within 2-business-day, there may be an impact on that student's grade.
- **Important note about Grade:** Grades are earned by students.
- Students are supposed to contact instructor in advance for any query.

Prepared by: **Paras Mandal, Ph.D.**
Associate Professor
Department of Electrical and Computer Engineering,
UTEP
Ph: (915) 747-8653
E-mail: pmandal@utep.edu

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