



# Smart Grids

## Syllabus

**Six Semester/ Power Engineering  
Electrical Engineering Department  
College of Engineering  
Salahaddin University - Erbil**

*January 2024*

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- **Course Name** : **The Smart Grids**
  - **Course Number** :
  - **Discipline** : **Power Engineering**
  - **Type of Study** : **Spring Semester 3 hrs/week**
  - **Schedule** : **Tuesday 12:00 – 13:00**  
**Wednesday 12:00 – 14:00**
  - **Academic Year** : **2023 - 2024**
  - **Instructor** : **Assist. Prof. Dr. Fadhil T. Aula**

# *Course Description*

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- **The use of information technologies, advanced digital devices and communications is likely to cause major shifts in the way energy transferred to consumers.**
- **The smart grid will use these modern tools to deliver electricity reliably and efficiency.**
- **This course will examine not just the smart grid technologies, but also the transformational impacts of the smart grid on the industry.**
- **Students in this course will learn the fundamental of the smart grid: its purpose and objectives, its technologies, its architectures, and its management.**
- **Students will also learn many if the challenges facing the smart grid as part of its evolution.**

# *Course Objectives*

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**After successfully completing this course, a student will have gained an understanding of:**

**1. The various aspects of the smart grid, including**

- **Technologies**
- **Components**
- **Architectures**
- **Applications**

**2. How smart grid can be designed to meet the needs of a utility, including**

- **Meeting a utility's objectives**
- **Helping to adopt new technologies into grid**
- **Creating a framework for knowledgeable power engineers to operate the grid more effectively**

**3. The major issues and challenges that remain to be solved.**

# *Course Requirements*

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## **Reference Text:**

- 1. S. Borlase, Smart Grids: Infrastructure, Technology, and Solutions, CRC Press, 2013**
- 2. J. Momoh, Smart Grid Fundamentals of Design and Analysis, Wiley, 2012**
- 3. International Renewable Energy Agency, Smart Grid and Renewables: A Guide for Effective Deployment, IRENA 2013**
- 4. N. Hadjsaid and JC. Sabonnadiere, Smart Grids, Wiley, 2012**

## **Prerequisites:**

**None.**

# *Tentative Course Outline*

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- **Introduction to Smart Grid: general consideration for a smart grid, characteristics of smart grid, difference between conventional and smart grid, Present development and international policies in smart grid.**
- **Smart Energy Resources: renewable generation. energy storages, electric vehicles, energy consumptions.**
- **Smart Power Grid: power grid operation and systems, load demand, LFC, reactive power control, AGC, load factor, microgrids.**
- **SCADA: RTU, MTU, protocols.**
- **Synchronized Phasor Measurements.**
- **Smart Meters**

# *Assignments*

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- **Homework assignments are part of this course.**
- **In addition to performance in the tests, students can demonstrate their abilities through the way of the presentation of solutions to homework assignments and/or projects.**

# *Attendance*

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- **Will be taken occasionally.**
- **Positive attitude is a key to success.**



# *Grading Policy*

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➤	<b>1<sup>st</sup> Midterm Exam</b>	<b>15 %</b>
➤	<b>2<sup>nd</sup> Midterm Exam</b>	<b>15 %</b>
➤	<b>Assignments + Quizzes, Report</b>	<b>10 %</b>
➤	<b>Annual</b>	<b>40 %</b>
➤	<b>Final Exam</b>	<b>60%</b>
➤	<b>Total</b>	<b>100%</b>

# *Academic Honesty and Plagiarism*

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- **Plagiarism is using the words or ideas of others and presenting them as your own. Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement.**
- **You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Student should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.**
- **If plagiarism is found in your work when you are in first year, your lecturers will offer you assistance to improve your academic skills. They may ask you to look at some online resources or resubmit your work with the problem fixed. However, more serious instances in first year, such as stealing another student's work or paying someone to do your work, may be investigated under the Student Misconduct Procedures.**
- **Repeating plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matter (like plagiarism in an honors thesis) even suspension from the university.**

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***End of Smart Grids Syllabus!***