

The University of Jordan
School of Engineering
Electrical Engineering Department
2nd Semester – A.Y. 2023/2024



Course: Advanced Electrical Power Lab – 0963588 (2 Cr. – Required Course)

Instructor: Dr. Mohammed Hajahmed

Office: E321, Telephone: 06/5355000 ext 22843, Email: m.hajahmed@ju.edu.jo

Office Hours: Will be posted soon

Platform: Moodle (<https://elearning.ju.edu.jo/>)

Catalog description: Power system protection. Relays. Using Supervisory Control And Data Acquisition (SCADA) systems to monitor and control various parts of a power system. High-voltage insulators and its testing. Special types of electric machines. Motor speed control. Variable-frequency motor drive.

Prerequisites EE 0943482 Power System Protection (pre-requisite)

by course: (pre-requisite)

Prerequisites Students are assumed to have a background in the following topics:

by topic: • Power Flow and Transmission System.

• Power system protection and relaying.

• Simulation and Programming on MATLAB or other softwares.

Textbook:

Instructor handouts and lab. Experiments

References: 1.

2.

4.

Schedule: On Campus [16 Weeks, 42 lectures (50 minutes each) including exams]

Course goals: Upon completion of this course, the student will be able to simulate different power system and machines models. The student will be able to design and implement different relaying schemes. The student will be able to design a variable frequency drive model for induction motor control. The student will be introduced to renewable energy systems' models and characteristics.

Course learning outcomes (CLO) and relation to ABET student outcomes (SO):

Upon successful completion of this course, a student will:

[SO]

1. Be able to design and verify a distance relaying system. [7]

2. Be able to design and verify a differential relaying system. [7]

3. Understand the variable frequency drive concept. [1, 2]

4. Be able to design a variable frequency drive system to control a motor. [7]

5. Be able to design a power system and identify its transient stability characteristics. [1, 7]
6. Be familiar with renewable energy systems and their modelling. [1, 7]

Course topics:

Hrs

1. Design of a distance relay: Zones definition, relay speed, and system loading. 3
2. Design of a differential relay: tripping characteristics, load PF, and inrush current. 3
3. Design of an overcurrent relay: grading and coordination times. 3
4. Design of electric photovoltaic system: radiation, temperature and IV curves. 3
5. Design of a wind turbine generator: generator types, and wind speed effect. 3
6. Study of the SCADA system: measurement and extraction of data. 3
7. Study of a numerical relay: SEL differential relay. 3
8. Introduction to variable frequency drives. 3
9. Design and implementation of variable frequency drives. 3
10. Study of the transient stability of an electric grid. 3
- 11.
- 12.
- 13.
- 14.
- 15.

Ground rules: Attendance is required and highly encouraged. To that end, attendance will be taken every lecture. Eating and drinking are not allowed during class, and cell phones must be set to silent mode. All exams (including the final exam) should be considered cumulative. Exams are closed book. No scratch paper is allowed. You will be held responsible for all reading material assigned, even if it is not explicitly covered in lecture notes. Academic integrity must be maintained.

Assessment & grading policy: First Exam 0% Assignments 0% Midterm Exam 30% Projects 30% Final Exam 40% Lab Reports 0%

Quizzes	0%	Presentation	0%
		Total	100%

Last Revised: Feb 2024