

The University of Jordan
School of Engineering
Electrical Engineering Department
2nd Semester – A.Y. 2020/2021



Course: Power System Protection – 0943483 (3 Cr. – Elective Course)

Instructor: Dr. Mohammed Haj-Ahmed
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Office Hours: Will be posted soon

Course website: <http://elearning.ju.edu.jo/>

Catalog description: Review of basic principles. Electromechanical/solid state/computer relays. Current and voltage transformers: steady state and transient performance. Transformer protection. Generator protection. Motor protection. Busbar protection. Fuses: mechanism of interruption of overcurrent and short circuit currents. Maintenance and testing of relays.

Prerequisites by course: EE 0933482 Power System Analysis (II) (pre-requisite)

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

- Per unit value calculations.
- Symmetrical and unsymmetrical fault analysis.
- Components of power systems.

Textbook: Protective Relaying: Principles and Applications by J. Lewis Blackburn and Thomas J. Domin, CRC Press, 4th edition, 2014.

References:

1. Power System Protection by Paul M. Anderson, Wiley-IEEE Press, 1st edition reprint, 1998.
2. Fundamentals of Power System Protection by Y.G. Paithankar and S.R. Bhide, PHI Learning, 2nd edition, 2013.
3. Power System Protection and Switchgear by Badri Ram, McGraw-Hill, 1st edition, 2011.
4. Protective Relay Principles by Anthony M. Sleva, CRC Press, 1st edition, 2009.
5. Protective Relays: Their Theory and Practice Volume One (Volume 1) by A. R. van. C. Warrington, Springer, reprint of 1st edition, 2013.
6. Protective Relays Application Guide by Gec Alsthom, Gec Alsthom Measurements Limited, 3rd edition, 1990.

7. Protection & Control for Power System by Mohamed A. Ibrahim, Independent Publishing, 1st edition reprint, 2016.

Schedule: 16 Weeks, 42 lectures (50 minutes each) plus exams.

Course goals: The overall objective is to provide the student with the knowledge and proficiency of protection relaying systems as applied to all components of power systems. In addition, students will be able to apply concepts of fault analysis on settings or relays.

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

Upon successful completion of this course, a student will:	[SO]
1. Understand the purpose of protection of power systems and identify some basic terms in the field.	[1]
2. Understand the primary and back-up zones of protection.	[1]
3. Understand the appropriate protective relays applied to different components of power systems.	[1, 4]
4. Understand the applications of fuses and circuit breakers.	[1]

Course topics:	Hrs
1. Main components of power systems.	2
2. Introduction to protection of power systems and basic definitions.	2
3. Primary and back-up protection.	3
4. Basic operating principles of relays.	3
5. Over-current and earth-fault protection.	3
6. Differential protection systems.	2
7. Distance protection systems.	3
8. Transformer protection.	5
9. Generator protection.	5
10. Motor protection.	5
11. Busbar protection.	4
12. Fuses and circuit breakers.	5

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.

Assessment & grading policy:	Assignments	0%	Quizzes	0%
	First Exam	30%	Projects	0%

Midterm			
Exam	30%	Lab Reports	0%
Final Exam	40%	Presentation	0%
<hr/>		Total	100%

**Last
Revised:**

March 2021