ECE 526: Protection of Power Systems II
Spring 2024 (pre-recorded)

DESCRIPTION Protection of electrical equipment as related to electric power systems with an emphasis on digital algorithms.

PREREQUISITES Power Systems Protection and Relaying (UI ECE525 or equivalent) or instructor's permission.

INSTRUCTOR Brian K. Johnson

CONTACT INFO Phone: 208-885-6902 (800-824-2889, ext. 6902)
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OFFICE HOURS Zoom and telephone office hours available upon request—please contact me to schedule

COURSE WEB SITE http://www.ece.uidaho.edu/ee/power/ECE526/

TEXT *Required:* J.L. Blackburn and T.J. Domin: *Protective Relaying: Principles and Applications, Fourth Edition.* CRC Press, 2014

Or: J.L. Blackburn and T.J. Domin: *Protective Relaying: Principles and Applications, Third Edition.* CRC Press, 2006

GE Grid Solutions Protection & Automation Application Guide (available for free on the web, see links on course web page for access instructions).

J.C. Das: *Power System Protective Relaying*. CRC Press, 2017)—optional if you have a copy

REFERENCES

1. H.J. Altuve, E. O Schweitzer, III*, Modern Solutions for Protection, Control and Monitoring of Electric Power Systems*. Schweitzer Engineering Laboratories, Inc., 2010. Order through the SEL web site: http://www.selinc.com
2. P.M. Anderson, *Analysis of Faulted Power Systems*, IEEE PRESS, 2000. **Note:** this book is available for free download for IEEE members from IEEEXplore (log in as yourself, go to Books, then select tab for Classics and search alphabetically.) It also available free to registered University of Idaho students through the library web page.
3. P.M. Anderson, *Power System Protection*. IEEE PRESS, 1998. **Note:** this book is available for free download for IEEE members from IEEEXplore (log in as yourself, go to Books, then select tab for Classics and search alphabetically.) It also available free to registered University of Idaho students through the library web page.
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SOFTWARE

- You will be required to use MathCAD for several projects during this course. I can provide you a link for ordering a student license at a reduced fee under a UI license, or you can get contact the University Of Idaho Department Of Civil Engineering (208-885-6782). Say you are in a UI Engineering Course.

You might want to use a commercial fault programs for performing short calculations at times. If you do not have access to a program, you can use the demo/educational version of Powerworld: http://www.powerworld.com

GRADING:

Item	Percent of Grade	A: 90-100
Homework/Labs	24%	B: 80-89
Exam 1	38%	C: 70-79
Final Exam	38%	D: 60-69
		F: < 60

COURSE OUTLINE

Topic	Chapter/Book
1 Introduction/Welcome	Notes
2. Finish Transformer Protection Superimposed quantities	9.19-24/B, 16/PAAG, Das 12.12, Notes
3. Line Protection A. Distance Protection Basics B. Polarization of Distance Elements C. Phase Distance Schemes D. Ground Distance Scheme E. Supervising element (lab 1) F. Fault Type Selection Logic	 Parts 12-13/B , 11-13/ PAAG, Das 13, and notes
G. Communication Aided Distance Protection H. Line Current Differential Protection (labs 2) G. Series Capacitor Protection I. Single Pole Tripping J. Mutual Impedance	12-13/B, 10/ PAAG, Das 14 12.26/B, 13.6/ PAAG, Das 13.8 12/B and notes
4. Out of Step Protection	14/B, 20/ PAAG, Das 15
5. Performing fault studies	Notes
6. Fault Location	Notes
7. Generator Protection (possible lab 3)	8/B, 17/ PAAG, Das 11
8. Motor Protection	11/B, 19/ PAAG, Das 10
9. Distributed Generation. Wind and PV Collectors	8/B and Notes
10. Wrap up	

1. Exams may given as “take homes”
2. Note: homework assignments and projects will require software tools, especially MathCAD.

APPROXIMATE LECTURE SCHEDULE

Monday Date	Tuesday	Thursday
January 8	X	1
15	2	3
22	4	5
29	6	7
February 5	8	9
12	10	11
19	12	13
26	14	15
March 4	16	17
11	H	H
18	18	19
25	20	21
April 1	22	23
8	24	25
15	26	27
22	28	29
29	30	31

Final Exam: Saturday May 11, (will probably replace with a take home exam/project).

GENERAL GUIDELINES:

Outreach Students:

1. This is not a self-paced class. Engineering Outreach students are expected to finish the course at the same time as the on campus students.
2. Due dates for homework and projects will generally be specified the same as the due date for on-campus students. This is the date when your assignment reaches Moscow. Assignments will be worth a maximum of 50% after the due date. However, I will allow extensions if you consult with us in advance and if you have a major schedule conflict.
3. Please include "ECE 526" in the subject line of e-mail correspondence related to this course.
4. Returned homework and projects may not reach you prior to exams. Please make copies of any assignments that you believe may be useful before you submit them.

   Please put your name and the course number on top of the first page of each exam and homework, especially if submitting by e-mail. It would be best if your name was in the header of each page. E-mail submission of assignments is ok, as long as compatible file formats are used.
5. When submitting homework assignments, please send copies to Brian Johnson (bjohnson@uidaho.edu) and Derrick Agbenya (e-mail address will be sent to class).

   Allowable formats for electronic submission are Adobe Portable Document Format (PDF), Microsoft Word (*.doc or *.docx), Rich Text Format (*.rtf) or MathCAD 15 (or earlier) or Prime 9 (or earlier). Limit to one or two attached files. I don't want a large number of files with no documentation on what order to use them.
6. Make sure you number your pages as: 1/4, 2/4, etc., so I know whether or not I have a complete set. Also make sure writing is dark and clear on the scan.
7. Phone calls or the use of e-mail for asking questions is encouraged. You are welcome to call outside of office hours. The Engineering Outreach 800 line is available 24 hours a day so you can reach us outside of their hours. I have a link to my Google calendar posted on the course web page. Please refer to that to check my availability, especially if you want to schedule a meeting.
8. Library Resources: As a UI student, you not only have access to valuable print and electronic resources from the university's library, such as access to IEEEXplore, but you also have the access to personalized assistance from the librarians. If you have assignments or research questions and aren't sure how to make the most of library resources from off campus, you do one of the following:

   As a UI student you can also download a VPN client from the ITS Help Desk: https://support.uidaho.edu/TDClient/KB/ArticleDet?ID=231

   You will need to log in using your UI student account.

   You can visit the Off-Campus Access information page on the library's website at:

   https://libanswers.uidaho.edu/faq/227988

   For IEEEXplore papers, it appears that you may now need to go to the UI library web page (https://www.lib.uidaho.edu/), put the paper title in the search box.