ECE 529
Utility Applications of Power Electronics

Session 1
ECE 529: Utility Applications of Power Electronics

Homework #0

Due: Session 3: [January 20]

BACKGROUND
Please spend a few minutes to tell me about your background relative to this course. Mainly courses taken or work experience that prepared you for this course. Discuss what power system simulation tools you have used (ATP, PSCAD/EMTDC, Powerworld, etc). Do you have a preference as far as using ATP, PSCAD/EMTDC or EMTP-RV in ECE 529?

RECITATIONS
I am planning to hold a weekly recitation session on Zoom for all students in ECE 529. Please provide some feedback on times (Pacific time) and days that would work. The best options for me are Monday after 4:30pm, Tuesdays 3:00-6:30, Wednesday 4:00-5:30, Thursday 4:00-5:00, Friday 4:30-6:30.

MICROSOFT TEAMS
I can also set up a team in Microsoft Teams as an option for communication between students in the class.

- If you want to opt out, let me know

OBJECTIVES
Now that you've had a chance to hear my objectives for this course, I would like to hear what you would like to get out of this course since there is more material to try to cover than available time I will need to cut out some material. Your responses here will help me decide what to emphasize. I will try to meet your objectives if possible.
GENERAL GUIDELINES:

On-Campus Students:
1. Assignments handed in after the due date will be worth a maximum of 50%. However, I will allow extensions if you consult with us in advance and if you have a major schedule conflict.
2. Feel free to contact me by phone or e-mail if you have questions and can't make it to our offices easily.

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. 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.
4. Please put your name and the course number on top of the first page of each exam and homework, especially if submitting e-mail or fax. 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.

   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 5.0. Limit to one or two attached files. I don't want many files with no documentation on what order to use them.

   Make sure to 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.
5. 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.

6. 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 IEEEExplore, 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 can visit the Off-Campus Access Information page on the library's website at: [http://www.lib.uidaho.edu/help/offcampus.html](http://www.lib.uidaho.edu/help/offcampus.html)

   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.

7. University of Idaho is committed to creating a safe learning environment for all students. Consistent with this, UI policy and Title IX prohibit sexual misconduct, which includes sex or gender-based harassment, sexual assault, intimate partner violence, stalking, and retaliation. If you have experienced any form of sexual misconduct, know that help and support are available. Please be aware that all University of Idaho employees are mandatory reporters and are required to report any information they receive about sexual misconduct to the university's Title IX Coordinator within 24 hours (Idaho State Board Policy, Section 1, I.T.). Visit http://www.uidaho.edu/ocr/title-nine/resources to learn more about which resources on campus and within our community are confidential. If you would like to report an incident, you may do so anonymously by visiting www.uidaho.edu/vandalcare or you can directly contact the Office of Civil Rights and Investigations at 208-885-4285 or ocri@uidaho.edu.
ECE 529: Lecture 1
Basic Power Electronics

I. Power Converters

A. Basic Purpose for Information Electronics

B. Basic Purpose for Power Electronics

C. Complete Power Converter versus Power Electronic Circuit

1. The power electronic circuit consists of the switching devices and passive elements (generally inductors and capacitors)
2. The power converter is a system that includes controls for:
   A. Gate pulse shaping
   B. Synchronization
   C. Inner control
   D. Outer control loop