

ECE461 Power System Schedule and Grading

Class Time: Tuesday and Thursday 12:30 – 1:45 PM in D102 (Physics wing).

Instructor: Prof. George Collins, Email: gcollins@engr.colostate.edu

Text Book: Electrical Machines, Drives and Power Systems, Theodore Wildi

Class website: <http://www.engr.colostate.edu/ECE461>

COURSE OBJECTIVES

This course will teach basic power with the perspective of INCREASED energy efficiency in both generation and consumption of electrical energy. As well we will cover as the increased role of emerging alternative sources of electrical energies and the challenges to grid stability and load cycle problems they bring. Here is a website dedicated to the “smart grid” a term of some ambiguity: <http://www.smartgridnews.com/artman/publish/index.html>. See another website: http://antwrp.gsfc.nasa.gov/apod/image/0011/earthlights_dmisp_big.jpg to grasp the energy use situation on earth any given evening. Just increasing lighting or transformer efficiency by 1% would save trillions of dollars per year in energy costs, reduce green house gas and CO₂ emissions, and reduce the need to build new power plants.

This course will discuss all these issues and more. For example, a move to all electric cars or even hybrid vehicles would save significant energy due to the inefficiency of internal combustion engines and the ability to return unused stored DC electricity to the grid from the cars during peak periods.

SEE http://www.teslamotors.com/display_data/twentyfirstcenturycar.pdf

Moreover surprising to some, inefficient energy use is becoming ILLEGAL, such as use of incandescent light bulbs in 2012. See for example:

http://www.energy.ca.gov/commissioners/rosenfeld_docs/index.html

and http://www.efficientpowersupplies.org/efficiency_news.asp

EPA, CEC (California energy commission) and DOE energy star programs are but several examples, as are the federal laws that require the government to get 3% of its electricity needs by (2005) and 7.5 % by 2013 on a sliding scale with renewable sources, peaking at 20% renewable sources.

GRADING

We will emphasize group efforts with teams of students handing in weekly HW sets and take home POP quizzes as well as two talks and two papers. PLEASE FORM a GROUP for HW, POP QUIZZES and for talks/ presentations/ papers, described below, ASAP in the first week of the semester.

The grading is scored roughly as follows:

1. Group Homework assignments will comprise **10%** of the grade as further explained below.
2. Talk #1/Paper #1 will count for **20%**, as further explained below and to be done as a group effort.
3. Talk #2/Paper #2 will count for **30%**, as further explained below and to be done as a group effort .
4. I count **30%** for weekly class pop quizzes to be done as a group which are ALL of take-home variety. Sit Down individual exams will count for **10-15 %**.
5. Up to **10%** of the grade will be for completing successively the PSSE Laboratories
6. Positive Class Participation **10 %**
7. 10 extra points on the final grade for an approved special project.

YES the total is **>110 %** and final grades will be curved as described below:

Our approach will be more traditional with both + and - letter grades to achieve a sliding curve and a distribution of grades. . In an ideal statistical world we would seek in a class grade distribution as follows:

Grading will be curved with students above the median receiving an "A", students below the median and above one standard deviation below the median receiving a "B". 1 to 2 standard deviations below the median will receive a "C", 2 to 3 standard deviations below will receive a "D", and anything lower will receive an "F".

Course Group Efforts

Power companies value communication skills (oral and written) HIGHLY so 461 will help prepare you for the real world. You will all have two talks and two papers during the semester done as group efforts. Your technical presentations will be GROUP efforts to simulate your next environment—industry. This group effort is purposeful to get students familiar with the team efforts that they will SOON encounter in industry. Notice that group/team efforts are required in this course. This to encourage team efforts and to better understand the dynamics of team work, as you will soon work in teams in industry. The team’s tasks include HW assignments, the two in class talks and two written papers as well as weekly POP quizzes. The goal is: to better appreciate how to act in teams, as will the case when you join industry. You will get a team grade for all of the above. Still each student will have their portion highlighted for extra credit when merited, as for example when giving class talks or in papers if properly documented.

I judge renewable/green energy claims beyond 20-30 % total energy generation are starting to be more “pixie dust” than reality. But you make your own determination in your TALK # 2. Again for talk #2 if you are interested in “Smart Grid”, sometimes referred to as “The Enernet”, I suggest you download the white paper “Top Design Considerations for Low Power Metering Applications” from www.silabs.com/meteringWP. Finally, if you want to see where I get my skeptical /realistic but cold air attitude on the LIMITATIONS of “Green Energy” see: <http://www.withouthotair.com/>.

For group efforts Microsoft has versions of Word and Power Point that reside on servers at [Microsoft OfficeLive](http://www.microsoft.com/office/online) —moreover this allows MULTIPLE users to log on and work on the SAME document together.

DETAILED SECOND GO THROUGH ON GRADING

The grading is in 7 parts as described above with opportunity for both group and individual efforts counting roughly equally as follows.

1. Homework assignments, 10 points

Ten HW assignments at 1 point each, for a total of 10 points. HW is due one week after assigned unless otherwise noted.

Work in teams of 3-6 students for x/10 grade for the entire HW team.

Please note that in total Chapter 21 is worth 30% of the final HW score. This schedule is loaded heavy in the beginning and lightly at the end of the semester as described below to leave more time for report preparation and paper writing at the end of the semester.

CHAPTER	PROBLEMS	DUE DATE
7	26-29	week 3
8	28,30, 34-35	week 4
9	7-10	week 5

REMINDER NEXT WEEK (week # 4) YOUR TALK/PAPER # 1 OUTLINE on Energy Conservation is also DUE for Prof. Collins to determine if your group is on schedule and on target—also sign up for date and time of your group presentations.

10	34-37	week 6
11	12-15	week 7
12	11-13,15	week 9
27	10,13,17,19	week 10
21 Part 1	13,17-19	week 11
21 Part 2	20,22-24	week 12
21 Part 3	28-30, 32	week 13

No further HW will be assigned after Chapter 21. Students please USE REMAINING SEMESTER TIME FOR YOUR Team PROJECTS on Energy generation TECHNOLOGIES and Comparisons Between Them as well as Synergies.

2. Class TALK # 1 (15 points)/Paper #1(5 points): 20 points total

Written (Word format) and PowerPoint Format presentation on energy conservation tools and processes is the first student group talk and is has a common theme for all groups—Energy conservation measured in “Nega Watts”. Only energy saving schemes that are practical and state of the art will be the topic for PAPER/TALK # 1 and ALL students must choose this same general topic choice, but can focus on generation, transmission or consumption energy savings. For example you could talk on “How Smart Grid Methodology Saves Energy”. You are to work in groups of 3-6 students for this effort. Details of each student group focus in energy conservation will be different and each group and individual will present to the class using PPT slides. Energy conservation hardware, smart grid systems and software are a growth industry so here is your chance to get educated.

Your group chooses its own focus but must include:

- Total energy savings(some times called Nega Watts) possible (in units of GW-hr) and the energy application present usage in Gw-hr, the technologies employed to achieve these savings, results to date and future plans
- Federal and state energy mandates as well as international standards such as the EU and Japan, Use of Solid State Devices in Power Systems for FACTS (flexible AC transmission)
- A first simple example would be PC and workstation energy use, Intel and others attempts to decrease energy usage by making all parts of the system more energy efficient. Give for example their successes and failures to date and future plans
- A second example is the use of low E coatings on glass used for building windows and the energy savings allowed by this technology in both heating and cooling of buildings

- A third example is the forced transition from incandescent lighting to fluorescent and LED lighting and the energy savings possible nationwide and even world wide—be quantitative on individual light bulbs and well as system savings

The Goal of talk/paper#1 is to spot problems early in both presentations and papers, so you do not repeat in talk # 2. Presentations from ALL groups will occur BEFORE mid-semester (mid October) -- exact dates TBA. Again you get a group grade with individual grades for extra credit, where merited.

3. Talk # 2/ Paper #2: 30 Points Total (25 for PPT talk and 5 for WORD paper).

This talk is to have each group discuss the relative merits and demerits of the following major magnificent seven ways to generate electricity:

- 1) Coal or natural gas hydrocarbon based power in this regard Shale based gas is a hot topic: See: <http://www.energy-facts.org/Portals/0/media/index.html>.
- 2) Nuclear based power
- 3) Wind based power
- 4) Solar based power
- 5) Hydro based power
- 6) Geothermal based power
- 7) Tidal or wave power

Minimum one power source per group but you must compare and contrast two power sources for those seeking “A” grades. If you do only one source you cannot score above 15/25. This will emphasize in class Power Point group talks two weeks before final exams, unless special permission request is given for a late talk in writing to me. Word paper on same material as the PPT talk is worth 5 points and is due last week of the semester. Unless you have sent me a written request this must be completed in the second week before finals to meet CSU requirements. In-class talks in the last week of the semester are by special permission only.

Each Student must give a portion of the group 40-minute talk using PowerPoint for an individual grade $x/20$. YOU WILL NOT BE ALLOWED MORE THAN 45 MINUTES for the entire group so plan accordingly. This presentation will tentatively be scheduled in weeks 12-14. Sign up early if you have conflicts.

Students detail his or her portion of a thirty-page paper in the header or footer of their pages or on the front cover. Still one grade will be assigned for all students assigned for the paper, so check your colleagues work for a group grade of $x/20$. They mess up you suffer. Extra credit will be given to outstanding portions of papers. Cite in IEEE format all references and figures employed. Give me a CD with both the PowerPoint presentation and the Word reports burned on it or lose 15 points on your final grade. This CD must be able to open—check it before handing it in.

4. Sit down individual Exams (10-15 points total to be determined).

Exact dates TO BE DETERMINED but the midterm exam will be in late Oct./ early Nov. and be worth 5-15 points (to be determined).

5. PSSE Laboratories: 10 points

See ECE461 website for details, further details of which will be fully explained in class will be worth 10 points—four required labs at 2.5 points each. The fifth lab is for extra credit. PSSE software is the “Spice” of the power geeks and familiarity with it opens doors for jobs in the power industry. These labs are just to give you familiarity not a high skill level. I will announce the start date for labs at the end of Sept.

PSST Lab #	Semester Week Due
1	#3
2	#5
3	#7
4	#9
5	#11

Labs will be assigned immediately and you are expected to work in groups—I have arranged for students to help with the labs, who will be introduced in class to all. For PSEE you are expected to know basic 1 phase circuits and basic three phase AC circuits but these will be reviewed in class. You need to understand one-line diagrams which are also introduced in class. The labs are meant to be tutorial in nature and will be done in groups not as individuals. Uploading of data to programs is minimized but unavoidable.

6. Positive Class Participation 10 %

Folks who interrupt or bring to lectures quality questions or important comments will earn these points. I love questions from the class. You are paying to be taught and I am being paid to teach so ask lots of questions. Do not act like a potted plant in class. There will be no final exam. Grading will be with both + and - letter grades.

7. In addition I will give up to 10 extra points on the final grade for an approved special project to improve the course in future years (See me and we will write a contract together).

Disclaimer Notice:

Use it to guide you through the semester but realize that up to date in class announcements always supersede this preliminary guide.

Thank you for reading though this missive. If you have further questions ask me in class so everybody benefits.