FYS 100 – Power and the U.S. Electrical Grid
Section VV (TR 9:30-10:45am), Fall 2013

Course Website: log in to Sakai (https://sakai.wfu.edu/)

Instructor: Dr. Jack Dostal (dostalja@wfu.edu)
Office: Olin 303B
Phone: (336) 758-4948
Office Hours: MTWR 2-3pm, WF 11am-noon, and by appointment.

Books/materials: All materials for this class will be in the form of class handouts, electronic documents, web resources, or other information. In addition, some general references such as physics textbooks will be placed on reserve in the ZSR Library.

Homework: Readings – check Sakai for the most up-to-date schedule
Reading questions - Each set of readings will come with a set of questions that each student should answer and submit via Sakai

Midterm papers: Students will write several papers in the 2 to 5 page range on topics relevant to current discussion. Dates for those papers will be given throughout the semester. These will due approximately every 3 to 4 weeks, with intermediate deadlines for review of paper drafts. In addition, when a pair of students leads the discussion in a given week, they will write a paper related to the subject of their discussion.

Written questions: Periodically I will ask you to submit questions that you would consider to be a thoughtful, good quality exam question. I think you will find in writing these that you begin to see the material in a more synthesized way when you do this.

Exams: Final exam date: (**Fri. Dec 13, at 2PM**).

Etiquette: ***Students are expected to follow the university's honor code at all times.*** To see how this relates to writing for your classes (FYS, WRT 111, etc.), please read the English Department'sguide for writing: http://college.wfu.edu/english/course-information/academic-writing/

Class participation: This comes in a variety of forms. While the most obvious is speaking in class discussion, you will also be asked to do things such as review what your classmates write, work in groups in class, and possibly contribute to online discussions. The goal is for you to stay actively engaged throughout the course.

Absences: Students are always expected to attend class and are responsible for material covered in case of an absence. Missing class robs you – and your fellow students – of the opportunity to discuss and learn. Your class participation score will be reduced by ¼ (5% of the total 20%) for each unexcused absence. More than four unexcused absences will result in a failing grade.

Grade	
A	93% or above
A-	90
B+	87
B	83
B-	80
C+	77
C	73
C-	70
D+	67
D	63
D-	60
F	below 60

Grading:

Midterm papers	40%
Homework/reading questions	10%
Written questions and formal activities	10%
Final exam	20%
Class participation/contributions	20%

Important dates:

Last day to add class: **Tue. Sept. 10**
Last day to drop class: **Tue. Oct. 1**
Library instruction dates: TBA

Course goals: Students should expect to:

- Become familiar with the physics and engineering concepts relevant to power transmission.
- Develop an understanding of the current state of the US/North America power grid, including how/why things go wrong (e.g. blackouts).
- Learn about alternatives, particularly systems present in other countries.
- Discuss and debate related public policy, societal, and social issues involved in developing a new grid and/or staying with the status quo.
- Understand how issues of power generation, consumption, and distribution relate to creating a sustainable way of life.

Course schedule:

Introduction – Describing the nature of science and issues of power through recent history
Sources: Historical news articles (e.g. New York Times)

Unit 1: (Weeks 1-3) The physics and history of power generation and transmission – Understanding basic physical principles of electricity, electric circuits, generators, transformers, AC and DC current types. Beginnings of power transmission in the U.S. – Edison, Tesla, and the war of the currents.
Sources (including but not limited to):

- *Conceptual Physics* - Paul Hewitt
- *Guesstimation* - L. Weinstein / J.A. Adams
- *Edison: A Biography* – M. Josephson
- *Tesla: Man Out of Time* – M. Cheney

Unit 2: (Weeks 4-9) Current-day issues with power transmission – scientific, social, and political. Begins with an introduction to the U.S. power grid infrastructure and corresponding issues. Further topics of study are selected by students and may include but are not limited to:

- Fossil-fuel power generation (coal, oil, natural gas, etc.)
- Renewable resource power generation (wind, solar, etc.)
- Smart grid technology
- Existing power grid infrastructure
- Resource shortages (oil, etc.)
- Energy independence / Living off the grid
- Country-comparison of power transmission/generation
- Oil politics
- Local politics / Not In My Back Yard issues
- Blackouts and grid failures
- Nuclear power and disasters (Chernobyl, Fukushima, etc.)
- Energy conservation/use and impacts on sustainability
- Energy distribution and terrorism

Introductory sources:
Before the Lights Go Out: Conquering the Energy Crisis Before it Conquers Us – M. Koerth-Baker
Visualizing the Grid (web resource) – National Public Radio

Unit 3: (Weeks 10-12) Integrating resource management, research and development, and distribution. The balance of resource management, research and development, and distribution infrastructure is a difficult issue for all electrical companies at some level. Students will be introduced to the roleplay/strategy game Power Grid where these issues are inherently intertwined. Students will then create and implement strategies for the playing the game based on roles or goals of their choosing. Students will prepare a report on the effectiveness, consequences, and benefits of those strategies.

Resource: *Power Grid* - Friedmann Friese / Rio Grande Games

Unit 4: (Weeks 13-14) Governments and regulations and their impacts on power generation, distribution, and consumption. Students will put their knowledge of power production and distribution in context with state and federal laws regarding power transmission.