

**CHEM 294: Undergraduate Research Seminar
Fall 2011**

Instructor	Prof. Alexander V. Benderskii Office: SSC 602 (213) 740-3220 alex.benderskii@usc.edu
Office Hours	Thu 3 – 4 pm (Other times by appointment)
Lectures/Discussion	Thu 4:30 – 5:50 pm in SGM 226
Text	Reading materials including contemporary research papers, science news releases, and websites will be assigned and then discussed in class.
Course outline	<p>This seminar course will survey modern research topics in the field of Physical Chemistry, in particular focusing on Energy research, Spectroscopy, and Nanoscience.</p> <p>Tentative list of topics:</p> <ol style="list-style-type: none">1. Physics survey: forms of energy. Energy and matter.2. Mankind's energy needs and energy sources ('renewable' and 'non-renewable').3. We will discuss and practice <i>order-of-magnitude estimates</i> in physics and chemistry, using examples from the 3 fields mentioned above.4. Solar energy. Thermal vs. electrical energy conversion.5. Light-matter interactions and spectroscopy review.6. Photovoltaics (PV). Inorganic and organic PV.7. Hybrid PVs. A brief survey of nanotechnology8. Energy storage and distribution. Energy density. Chemical vs. electrical energy storage and delivery. Hydrogen and methanol economy.9. The role of theory and computer simulations in modern research.10. Science and Engineering. Approaches and strategies: fundamental vs. applied research. Examples of (fundamental) scientific problems and (practical) engineering challenges in energy research. Bringing the 'fruits' of science to people: economic and social factors.11. We will practice the use of scientific literature databases and search engines such as the Web of Science, to find publications to research the topics covered by this course
Course structure, assignments, and projects	<ul style="list-style-type: none">◆ Our weekly meetings will consist of lectures, discussions, and student presentations of the group projects (<i>vide infra</i>)◆ Reading materials, homework problems, and discussion topics will be assigned weekly◆ The class will be partitioned into teams of 4-5 students. Each team will

be assigned research projects. Upon completion, a team will make a presentation of their project for the rest of the class, followed by a question/answer session and discussion

- ◆ Each team will also prepare a brief report on their project to be distributed to the rest of the class before the presentation and discussion, as well as submitted to the instructor for evaluation
- ◆ Contest-style quizzes (individual and team competitions) will be held in-class.

Course Policies

- ◆ Full attendance and active participation in all lectures and discussions is expected and will be the base for the final course grade
- ◆ The reading assignments and preparation for discussions on the announced topics must be completed **before** each lecture.
- ◆ Individuals with excused absences will be given special consideration at the end of the semester. Absences will be excused on the basis of official university policy. To secure an excused absence, bring verification to Prof. Benderskii prior to the absence, or in case of illness, immediately upon your return. All excuses will be verified.
- ◆ Incomplete grade (IN) will be assigned when work is not completed because of documented illness or other emergency occurring after the twelfth week of the semester.

Academic Integrity

Rules regarding academic integrity and general student conducts will be strictly enforced. For details of the University Student Conduct Code and possible sanctions for academic integrity violations, see <http://www.usc.edu/dept/publications/SCAMPUS/gov>

Grading

There will be no curve grading. The final grade will be determined based on the cumulative contributions to the in-class activities, team projects and presentations, homework, and in-class quizzes.

Due to free-flowing discussion format of this course, there will be no points system to assign the final grade. *However*, here are some criteria that would **warrant a failing grade** in this course:

- if you miss more than 20% of the classes (that is, more than 3 out of 15) without the legitimate reason (see above)
- if there is no discernible contribution to the in-class discussions
- if I do not remember your name by the end of the semester (this is kind of like a joke, but not really...)
- failure to score above 50% in the in-class quizzes
- failure to score above 75% in the homework assignments
- if there is no evidence of contributing to your team's project (presenting the project in class automatically clears you of this criterion)