Syllabus - ENE 429 – Principles of Air Pollution Control

Spring 2012, Tuesday and Thursday 2:00 – 3:15, KAP 165
Professor: Ronald C. Henry, KAP 224E, x-00596, rhenry@usc.edu
Office Hours: Tuesday and Thursday 11:00 – 12:30 and by appointment
Teaching Assistant:
Office Hours:

Course Description: This course is intended senior environmental engineering students and other advanced engineering students with an interest in air pollution control. It provides a basic knowledge of the types of equipment used to remove particulate matter and toxic gases from industrial waste gas streams.
Learning Objectives: The student will learn the fundamental operating and design principles of air pollution control equipment. Emphasis is given to the basic design parameters and the strengths and weaknesses of each class of control equipment. Specifically, the student will be able to design:

- Cyclone separators
- Electrostatic precipitators
- Baghouse filters.
- Scrubbers
- Incinerators,
- Absorbers
- Adsorbers.

Special attention is given to control of nitrogen oxides and sulfur oxides as these are ubiquitous, have many harmful effects on the environment and are thus highly regulated.

Textbook: C. D. Cooper and F. C. Alley, Air Pollution Control, Fourth Ed.

Week Topics
1. Introduction – Chapter 1
2. Particulate Matter – Chapter 3
3. Cyclones – Chapter 4
4. Electrostatic Precipitators – Chapter 5
5. Fabric Filters – Chapter 6
6. Particulate Scrubbers – Chapter 7
   Midterm I – Feb. 25
8. VOC Incinerators – Chapter 11
9. Gas Adsorption – Chapter 12
10. Gas Absorption – Chapter 13
    Midterm II – April 1
11. Control of Sulfur Oxides
12. Control of Nitrogen Oxides
14. Fans, ducts and auxiliary equipment
15. Review

Topics will not necessarily be covered in the order above, and are subject to change.

Examinations
There will be one midterm examination and a comprehensive final examination. The final examination will be given at the time assigned in the Catalog. Signing up for the class is taken as
a commitment to take the final at this time. Do not request to take the final examination at any other time. Failure to take the final exam because of an emergency requires written proof of the emergency, e.g., doctor's note, emergency room admission form. Examinations have a mix of questions with quantitative and non-quantitative answers. The final examination will cover the entire course, but will concentrate on subjects covered after the midterm.

**Extra Credit**

Students may improve their grades by doing extra credit work. This could be a 5 page written review of a research paper, a 10 minute oral report to the class on a recent news story plus a 2 – 3 page written report, or solutions to some of the more challenging problems in the textbook. Students are encouraged to suggest creative extra credit projects of their own design. To receive extra credit, the student must get prior approval from the instructor at least four weeks before the end of the term. This includes approval of the project, topic, article, or problems. The extra credit work must be completed and in the hands of the Professor by two weeks before the end of the term. The amount of extra credit is determined solely by the Professor and is limited to no more than 10 points on the final grade.

**Guidelines for Reports**

*General Principles*

The main purpose is to communicate what you have learned from reading the paper. Use your own words; *plagiarism will not be tolerated.*

References to the paper under review should be in the form “one purpose of the paper is to find the rate of the reaction (page 259); another is to discuss the effect on the chemical mechanism (page 266).” You are encouraged to read related papers and to include these papers in your report. References to other papers must follow the same form as used in *Atmospheric Environment*. For example, “Henry and Chang (2000) shows that …” or “Other studies have shown the importance of human perception in visibility (Henry et al., 1999; Henry, 1995).” References must be given in alphabetical order by last name of the first author at the end of the paper using the format of *Atmospheric Environment*.

The report must be at least 1200 words, space and a half with the main body using Times Roman font or equivalent. Sans serif fonts (such as Arial) are not allowed, except as headings. Margins should be approximately one inch. Submit the reports as Word doc files to rhenry@usc.edu. Include a copy of the paper being reviewed.

Reports will be graded as follows:

- Content – 50 points
- Form (language, readability, and style) – 25 points
- Scholarship (Proper use of references, use of other sources) 25 points.

*Research Papers*

Your report should include but not necessarily be limited to the answers to the following questions:

- What was done?
- In light of previous work, why it is important?
- What were the results?
- What are the implications of the results?

*Review Papers*

Your report should include but not necessarily be limited to the answers to the following questions:

- Why is the subject of the review important?
How is the review organized? What period of time does it cover?
If you are limiting yourself to part of the review, which part? In what way is the
subject of this part important?
What significant insights into the subject does the reviewer present?

Final Grades
At the end of the course, a grade between 0 and 100 will be assigned for attendance, homework,
the midterm, and the final. The homework grade will be the average of the grades for
the individual homework assignments, after dropping the lowest homework grade. The grade for
attendance will be the percentage of classes attended. The final grade will be the weighted sum
of class participation, homework, midterm, and the final. Extra credit will be treated as extra
points on the lowest midterm grade, a maximum of 20 extra credit points is allowed.

Statement for Students with Disabilities
Any student requesting academic accommodations based on a disability is required to
register with Disability Services and Programs (DSP) each semester. A letter of verification
for approved accommodations can be obtained from DSP. Please be sure the letter is
delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301
and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is
(213) 740-0776.

Statement on Academic Integrity
USC seeks to maintain an optimal learning environment. General principles of academic
honesty include the concept of respect for the intellectual property of others, the expectation
that individual work will be submitted unless otherwise allowed by an instructor, and the
obligations both to protect one’s own academic work from misuse by others as well as to
avoid using another’s work as one’s own. All students are expected to understand and abide
by these principles. Scampus, the Student Guidebook, contains the Student Conduct Code in
Section 11.00, while the recommended sanctions are located in Appendix A:
http://www.usc.edu/dept/publications/SCAMPUS/gov/. Students will be referred to the
Office of Student Judicial Affairs and Community Standards for further review, should there
be any suspicion of academic dishonesty. The Review process can be found at:
http://www.usc.edu/student-affairs/SJACS/.