

EN 506 / ME 532 Air Pollution Principles and Control

- INSTRUCTOR:** Professor Richard B. Cole, Dept of Mechanical Engineering
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- TEXT:** *Air Pollution Control, a Design Approach* (3rd ed.), C. David Cooper, F. C. Alley, C. Otis, Waveland Press, Prospect Heights, IL 60070, 2002 (ISBN: 1577662180)
- COURSE PREREQUISITES:** Undergraduate engineering courses in physics, chemistry, mathematics (including differential equations), mechanics (statics & dynamics), thermodynamics, and fluid mechanics.
- COURSE DESCRIPTION:** This course is intended as a first course specific to air pollution, depending on prior background in engineering science, but not in any specifics of air pollution. It is a comprehensive course, dealing with legislation and regulation; sampling and measurement of pollutants; pollutant sources; atmospheric dispersion of pollutants; control of particulate pollutants, volatile organic compounds, carbon monoxide, oxides of nitrogen and sulfur, etc. by methods and devices such as filtration, scrubbers, condensers, electrostatic precipitators, incinerators, absorption and adsorption units, etc. Mobile sources and indoor air quality are also dealt with.
- GRADING:** Course grades will be determined based on:
 3 Quizzes: 30% 2 Design Projects: 50% Graded Home Work: 20%
- COURSE FORMAT:** Instruction will be over a **twelve-week duration** according to the following schedule. Any individual needs for varying from the course schedule must be approved (in advance, if at all possible) by the course instructor.
- WebCT** is the main vehicle for course materials (and is available as a communication aid as well; see below).
- Instructional material** will be in the form of Instructional Notes (provided via WebCT) and Study Assignments, largely in the course textbook.
- Home problems** will be assigned most weeks. These may be **submitted at any time before the beginning of the next class week** and will be **graded (if submitted on time)**. Submission can be by e-mail (e.g., scanned manuscript) or by fax or mail (first class)¹. Submission time must be documented either by e-mail or fax dating or by postmark.
- Graded homework** papers will be scanned and e-mailed in return or may be picked up in person at Stevens' Mechanical Engineering office during regular business hours. Other arrangements are possible, initiated by students if personal circumstances dictate.
- COMMUNICATIONS:** These may be by e-mail, telephone, WebCT mail/discussion, or by personal meeting (pre-scheduled). Questions related to the course (and answers) will be posted (at the instructor's discretion) in order that each student may benefit (and/or) follow up on the "discussion" of others.
- The instructor's **office hours** will be posted on WebCT and represent the **most effective timing for communication** by telephone, e-mail or fax.
- Communications at other times** will be responded to in a timely, but not urgent fashion during weekdays. Typically e-mail response can be expected within 24 hours or less.
- EXAMINATIONS:** Three 1-hour quizzes (Open-book, open-notes)
- DESIGN PROJECTS:** Two design projects will be assigned.. The project will involve formulating two or more alternative designs for satisfying a specific pollution control problem. The alternatives are to be evaluated economically and the preferred alternative specified. Students may confer with others in completing these projects. References (including Internet references) must be cited.
- Project reports will be reviewed in the week following submission and either accepted or not. If not accepted, project reports must undergo revision and resubmission in accordance with the instructor's review comments.

¹ Obviously, backup copies should be kept of all submissions.

COURSE SCHEDULE:

Wk. No.	Dates	Subjects	Study Assignment (Chapters in text, unless otherwise indicated)	Home Problems
1	2/3 - 2/9	Sources & effects of air pollution, Legislation & regulations	Ch. 1; Wk 1 Notes	A short essay on the sources and effects of one selected criterion pollutant
2	2/10 - 2/16	Regulations (cont'd.) & Permitting	Wk 2 Notes	Probl. Set 1
3	2/17 - 2/23	Atmospheric dispersion of pollutants	Ch. 19 & 20; Wk. 3 Notes	Probl. Set 2
4	2/24 - 3/2	Measurements & instrumentation; Process Design, flow sheets, economics	Ch. 2; Wk. 4 notes	Probl. Set 3
5	3/3 - 3/9	Particulates – sizing & distribu- tions, terminal velocity, impaction parameter, scrubbers	Ch. 3 & 7; Wk. 5 notes	Quiz 1 on Wks. 1 through 3; (Start Design Project 1)
3/10- 3/16		Spring Recess		
6	3/17 - 3/23	Particulate control – cyclones, filters, electrostatic precipitators	Ch. 4 & 6; Wk. 6 notes	Probl. Set 4
7	3/24 - 3/30	Particulate control – cyclones, filter, electrostatic precipitators (cont'd.); Control of Gases & Vapors – condensation	Ch. 5; Wk. 7 notes	Probl. Set 5
8	3/31 - 4/6	Control of Gases & Vapors (cont'd.) –incineration, ad- sorption	Ch.11 & 12; Wk. 8 notes	Submit Design Project 1 (Start Design Project 2); Probl. Set 6
9	4/7 - 4/13	Control of Gases & Vapors (cont'd.) – absorption	Ch. 13; Wk. 9 notes	Probl. Set 7
10	4/14 - 4/20	Control of Gases & Vapors – absorption(cont'd.); SO _x control	Ch. 15; Wk. 10 notes	Quiz 2 on Wks. 4 through 7
11	4/21 4/27	NO _x control	Ch. 16; Wk. 11 notes	Submit Design Project 2; Probl. Set 8
12	4/28 - 5/5	Mobile sources & indoor air quality	Ch. 18 & 21; Wk 12 notes	Probl. Set 9
Quiz 3 on Wks. 8 through 12				