

Course : **CEE 445- Properties of Air Pollutants**

Semester : Fall 2007

Course Format And Credit hours : 3 hr Lecture

Prerequisites : none

Instructor : Dr. Michael McCawley,
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Schedule : Tuesday/Thursday 1700 to 1815

Location : Room 501 Engineering Sciences Building

Office Hours: by appointment

Course Objectives : The objectives of this course are to present the properties of airborne contaminants; the sources of those contaminants; the means by which those contaminants are conveyed to receptors; the means of predicting where and at what concentration those contaminants will be conveyed; the effect of the contaminants upon people, animals, plants and property; the means of measuring the contaminants; the means of control of those contaminants and ways in which the risk presented by those contaminants may be presented to the public.

Expected Learning Outcomes: Upon completion of this course:

1. The student will be able to discuss the sources and types of air pollution as well as understanding the means of measuring those contaminants in ambient air.
2. The student will be able to read and understand meteorological maps and understand how meteorology affects air pollution.
3. The student will be able to predict the downwind concentration of pollution emissions by calculating the Gaussian Plume Dispersion Profile for both ground level and elevated sources.
4. The student will be able to calculate the approximate deposited dose of particulate pollution and be able to differentiate between measures of lung penetration and lung deposition.
5. The student will understand how to perform isokinetic stack sampling and calculate the degree to which a sample varies from isokinetic sampling based

upon temperature, pressure, moisture content and gas content of the gases in a stack.

6. The student will be able to select the appropriate form of engineering control technology to abate pollution emissions whether gaseous, liquid or solid and determine the approximate efficiency of the control upon selected operations.
7. The student will understand and be able to participate in the regulatory process involved in gaining an air emissions permit for a coal fired power generator.
8. The student will be able to communicate the risk of air contaminant exposure to the general public and the efficacy of engineering control in reducing that risk.
9. The student will understand the common sources of indoor air quality complaints, the means of assessing those complaints and the subsequent means of alleviating or preventing those complaints.

Required Text: R.D. Griffin, "Principles Air Quality Management 2nd Ed" from Taylor & Francis(2007).

GRADES (no extra work accepted, no late work accepted, all grades are final)

Homework -	10 points(optional)	A=90.0 + points
Quizzes - (unscheduled)	20 points	B=80.0 - 89.95
Tests -	40 points	C=70.0 - 79.95
Group Reports - oral -	15 <i>points</i> *	D=60.0 - 69.95
(Design Project) written -	<u>25 points</u>	
TOTAL -	110 points	

(An additional 5 points will be awarded to the group judged to have won the permit hearing Design Project)

*A GROUP MEMBER MUST BE PRESENT DURING THE ORAL REPORT TO ATTAIN ANY OF THESE POINTS.

Design Project: During this course, you are expected to work in small group of 2 to 4 students to solve a design problem covering material presented in this course. The problem statement will be given to you during the 4th week of the semester. A written group report will be due to the instructor on TUESDAY NOVEMBER 27TH . You and your group members will also be required to present the results of your work in a formal oral presentation, in front of faculty and students, ON SATURDAY DECEMBER 1ST FROM 9 AM TO 12 NOON.

Attendance Policy: Consistent with WVU guidelines, students absent from regularly scheduled examinations because of authorized University activities will have the opportunity to take them at an alternate time. Make-up exams for absences due to any other reason will be at the discretion of the instructor.

Social Justice Statement : “West Virginia University is committed to social justice. I concur with that commitment and expect to maintain a positive learning environment based upon open communication, mutual respect, and nondiscrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class. Please advise me and make appropriate arrangement with Disability Services (293-6700).”

Course Schedule

LECTURE(ppt)	TOPIC	READING ASSIGNMENT
1(1)	What is air pollution?	pp. 1-20
2 (2)	What are the sources of air pollution?	pp. 69-100
3 (3)	How does meteorology affect air pollution?	pp. 101-122
4	What are the effects of terrain and weather?	
5	How does air pollution affect the atmosphere?	pp. 209-242
6(4)	How is dispersion of pollution predicted?	pp. 123 - 138
7(5)	What are the different types of air models used for?	
8	GROUP SESSION	
9(6)	What are the health effects due to air pollution?	pp. 21-36
10	How are health effects determined?	
11(7)	How is epidemiology used to determine health effects?(handout 1)	
12(8)	How does deposition occur in the lung?	(handout 2)
13	REVIEW SESSION	
14	TEST 1 (Thursday 10/4)	
15(9)	How is air sampling done?	pp. 69-100
16	What is PM-10 and PM-2.5?	
17(10)	What is stack sampling?	(handout 3)
18	How is isokinetic sampling evaluated?	
19	GROUP SESSION	
20(11)	What are the air quality regulations	pp. 243-278
21	What are the air pollution standards?	
22(12)	What are the sources of IAQ problems?	pp. 291-306
23	GROUP SESSION	
24(13)	How should environmental risk be communicated?	pp. 54-60
25(14)	How does engineering control work ?	
26	What are the control strategies for stationary sources?	pp. 139-178