

Course Information, Textbook and Supplementary Materials

**Capstone Course**

**Course Description:** Air pollution effects on man, vegetation, materials; pollutant sampling and analysis; air quality standards and criteria; meteorological factors and dispersion modeling. Prerequisite: Senior standing.

**Required for:** BSCE Environmental, and BSENE

**Prerequisites:** ENE 400 Environmental Engineering Principles

**Co-Requisite:** None

**Required Textbook:** Seinfeld and Pandis, *Atmospheric Chemistry and Physics*, 2nd Ed., John Wiley, 2006

**Reference:** None

Topics Covered	Learning Outcomes
The basic principles of air quality science and regulations	Students will understand the basic principles of air quality science and regulations
	<b>1. Temperature and Winds</b> Temperature structure of the atmosphere Definition of troposphere, stratosphere Hydrostatic equation for pressure change with altitude Global wind circulation Geostrophic wind Sea-land breeze, mountain valley flows
	<b>2. Global Radiation Balance</b> Zero layer model of equilibrium temperature of the earth atmosphere system One and two layer atmospheric temperature models Zero layer model of equilibrium temperature of the earth atmosphere system Global climate change basics
	<b>3. Atmospheric Stability and Vertical Movement of Air Parcels</b> Stability and Vertical Movement of Air Parcels Dry adiabatic lapse rate formula Equations of temperature change of a rising or falling air parcel. Definition of stable, neutral, unstable layers Inversion height or the depth of the well-mixed layer
The basic principles of atmospheric chemistry	<b>4. Air Pollution Regulation</b> Roles of local, state, and federal government in the air quality regulatory process Meaning of NAAQS, SIP
	Students will understand the basic principles of atmospheric chemistry: <b>5. Atmospheric Chemistry of the Stratosphere</b> Chapman Mechanism for ozone formation Role of CFC's in ozone depletion Importance of polar stratospheric clouds

**6. Atmospheric**

Chemistry of the Troposphere  
 Hagen-Schmidt Mechanism for ozone formation  
 Lifetimes of chemicals in the atmosphere  
 Systems of rate equations and the pseudo-steady state assumption  
 Role of hydroxyl radical in atmospheric chemistry  
 Importance of organic gases in forming ozone

**ENE 428****Air Pollution Fundamentals****3 Units**

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**Lecture and Lab Schedule**

Lecture		Lab	
Sessions per Week	Duration per Session	Sessions per Week	Duration per Session
	2 hours	n/a	

**Relation of Course  
Objectives to Program Outcomes**

The Civil Engineering program is designed to teach beyond the technical content of the curriculum and prepare the students to utilize what they learn in a professional setting.

This course contributes to the program outcomes as outlined in the adjacent table.

Course Contribution to Program Outcomes (a-k)	✓ Key
k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	

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