EAS 6795 Atmospheric Aerosols Syllabus

Instructor: Rodney Weber

Course Objective: This is an introductory course that presents the fundamental concepts of aerosol physics with applications to atmospheric aerosols. The student, upon completion of this class, should have a basic knowledge of how individual aerosol particles behave in gases when exposed to various forces, including, aerodynamic drag, gravitation, electrical and others, how particles interact with light, mathematical concepts associated with describing aerosol particle populations, and processes that alter particle populations, including particle interaction with gases and particle-particle interactions. This class does not cover particle chemistry.

Text Book: ***Hinds, Aerosol Technology: Properties, behavior and measurement of airborne particles, 2nd Edition***
Reference Books: Seinfeld and Pandis, Atmospheric Chemistry and Physics (2nd Edition)
Friedlander, Smoke, Dust, and Haze.

Syllabus

Introduction
Topic 1: Dynamics of Single Particles (Hinds Chapters)
- Continuum vs Non-Continuum Dynamics (1 & 2)
- Drag - Stokes Law, Slip correction (3)
- Gravitational Settling (3 & 5)
- Motion In External Fields (Electrical)/Aerosol Charging, Charge Distribution (5&15)
- Brownian Motion and Particle Diffusion (sampling losses) (7)
- Phoretic Effects (8)
- Aerosols & Fluid Motion (filtration, impaction, sampling inlets, inhalation) (5,9,10)
- Non-Spherical Particles (3)
- Optical Properties *(16)*

Midterm
Topic 2: Describing Aerosol Populations (Hinds Chapter 4 and S&P Chapter 8)
- Size Distributions and Moments (N, A, V…)
- Discrete/Continuous
- Lognormal Distributions
- Particle Statistics
- Atmospheric Aerosols, size distributions/modes (S&P Section 8.2)

Topic 3: Processes (Hinds and Seinfeld & Pandis)
- Homogeneous Nucleation (13 and S&P Chapter 11 for great details)
- Growth: Condensation/Evaporation (CPCs) (13 and S&P Chapter 13)
- Coagulation (12 S&P Chapter 13)

Final Test