

COURSE NUMBER: ME 5133, 4 credits	COURSE TITLE: Aerosol Measurement Laboratory
TERMS OFFERED: Spring Semester	PREREQUISITES: ME 5113 Aerosol/Particle Engineering, IT upper division or Grad student.
TEXTBOOKS/REQUIRED MATERIAL: “Aerosol Technology”2 nd Edition, By W.C. Hinds, John Wiley & Sons, NY Reference: ACGIH “Air Sampling Instruments” 8 th Ed. Selected papers on special topics	PREPARED BY: David Y.H. Pui DATE OF PREPARATION: May 2007
COURSE LEADER(S): David Y. H. Pui	CLASS/LABORATORY SCHEDULE: Three 100 minute lectures every two weeks, plus one 3-hr Lab Experiment every two weeks. CONTRIBUTION OF COURSE TO MEETING PROFESSIONAL OBJECTIVES: 100 % Engineering Topics
CATALOG DESCRIPTION: Principles of aerosol measurement. Single particle analysis by optical and electron microscopy. Aerosol samplers and inertial collectors. Integral mass concentration and number concentration detectors. Size distribution by laser particle counter and differential mobility particle sizer. Particle chemical composition measurement using the aerosol time-of-flight mass spectrometer. Aerosol generation and instrument calibration.	COURSE TOPICS: 1. Introduction; manual & automatic measurement 2. Air movers and flow calibration; uncertainty analysis 3. Aerosol generation and instrument calibration. 4. Automatic mass monitors 5. Standard test methods 6. Number Concentration Detectors 7. Aerosol sampling and transport 8. Inertial impactors and diffusion samplers 9. Single particle analysis by SEM and TEM 10. Optical measurement techniques 11. Electrical aerosol measurement techniques. 12. Special measurement topics

<p>COURSE OBJECTIVES</p>	<p>This course is designed to introduce the seniors and graduate students to the principles and techniques of aerosol measurement. Students will learn the basic skills of aerosol measurement in a variety of application areas, including air pollution and industrial hygiene measurements:</p> <ol style="list-style-type: none"> 1. To teach principles of air movers and flow calibration. 2. To compare respirable and total mass concentration measurements. 3. To study aerosol sampling and transport loss and efficiency of air sampling filters. 4. To teach principles of inertial impactors and electrostatic low pressure impactor. 5. To teach the principles of differential mobility particle sizer. 6. To teach the principles of optical and laser particle counters.
<p>COURSE OUTCOMES</p>	<p>(Letters shown in brackets are linked to program outcomes a-k)</p> <ol style="list-style-type: none"> 1. Apply air movers to collect particle samples and transport aerosols. [b,c] 2. Understand standard test methods for sampling respirable mass used in industrial hygiene as well as EPA's PM2.5 and PM10 air quality standards. [g, h, i, j, k] 3. Apply inertial impactors for supermicron particle size distribution measurement. [b] 4. Apply differential mobility particle sizer for submicron particle size distribution measurement. [b] 5. Apply optical and laser particle counters for particle size distribution measurement larger than 0.1 μm particle diameter. [b] 6. Assess air quality in atmospheric and workplace environments. [e, f] 7. Learn instrument calibration and measurement uncertainties. [a, e, f]
<p>ASSESSMENT TOOLS:</p>	<ol style="list-style-type: none"> 1. Five laboratory reports 2. A two-part final exam.

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Nature of Changes:

The catalog description now includes particle chemical composition measurement using the aerosol time-of-flight mass spectrometer. No other changes were made.