

CE 5390 AEROSOL SCIENCE AND TECHNOLOGY

Fall 2020 (Version 08242020)

Class Reference Number: 17693 (co-listed as 18011: Adv. Topics in Civil Eng.)
Class Meeting: 4:30 PM - 5:50 p.m., TR
Class Room: Online (via Blackboard)

Textbook: **Aerosol Science and Technology, 2nd edition**
by William C. Hinds

References: **Aerosol Measurement, 2nd edition**
Edited by P.A. Baron and K. Willeke

Instructor: Wen-Whai Li, Ph.D., P.E., Q.E.P.
Professor of Civil Engineering
Office: Online via Blackboard Meeting Room
Phone: 747-8755 (message)
Office Hours: 1:00 p.m. - 2:00 p.m., TR

Course Description

The primary objective of this course is to provide the students an overview of the science and measurements of aerosols. Fundamental knowledge relevant to the properties, behavior, and transport of aerosols will be discussed. Measurements techniques for aerosols will be reviewed and evaluated with a focus on atmospheric aerosols. The operating principles of different types of aerosol measurement instruments available at UTEP will be discussed.

Instructor's notes and excerpts from several reference books will be distributed in the class to supplement the topics discussed in the textbooks. Students are required to read the assigned chapters, classnotes, and excerpts prior to the class meeting. Two reference books are listed in this syllabus and additional references will be given in the class during the semester. Final grade will be determined based on the student's performance in homework, quizzes, exams, and the class project.

Grades

Your grade for this course will be assessed based on your performance in the quizzes (15 %), three mid-term exams (40 %), homework (25 %), and a final project (20 %). Several quizzes will be given throughout the semester. The content of a quiz could be the materials covered in previous sessions or to be covered that day. Your lowest quiz will not be counted toward your final grade. There will be no make-up quizzes.

Your final grade will be calculated based on the points you have accumulated as follows:

A	≥85
B	≥75 but <85
C	≥65 but <75
D	≥50 but <65
F	<50

Attendance of the class is mandatory. **Your final grade will be downgraded one notch (i.e., from “A” to “B” or from “B” to “C”) for every two absences from the class without the instructor’s consent.**

The instructor reserves the right to revise this grading plan. However, students will be informed of any

changes during the semester.

Homework

Regular homework assignments will be used to reinforce the concepts and problem-solving techniques covered in the textbooks and class. Homework is assigned in this syllabus. All homework will be graded by the instructor. Homework should be neatly presented on engineering paper or equivalent. You may be asked to present your homework solutions in class. Late homework will only be accepted in the event of illness or an emergency and must be approved by the instructor.

Class Project

- Select at least one article of interest (by Sep. 30, 2020)
 - Only articles from recognized, published journals are accepted (A list of journals will be provided later)
 - Select an article based on key words of interest and search through Google Scholar and Science Direct
 - Determine the title of your literature review
 - Expand your research into other papers
 - E-mail the instructor the subject and primary paper(s) of your review by October 31, 2020.
- Review the article, prepare a 5-10 pages summary of your review, and make a presentation to the class including the following:
 - Purpose of the study
 - Background Knowledge
 - Methodologies
 - Results
 - Summary of the study
 - Contribution of the research to the Science
- Review and include other papers to supplement your understanding of the subject
- Discuss what you have learned from this review including ideas that can be further explored. (***Do not copy any sentence from any journal article!***)
- Paper due date: Dec. 10, 2018
- Power point presentation: Dec. 8, 2020

Technology Requirements

Course content is delivered via the Internet through the Blackboard learning management system (LMS). Ensure your UTEP e-mail account is working and that you have access to the Web and a stable web browser. Mozilla Firefox and Google Chrome are the most supported browsers for Blackboard; other browsers may cause complications with the LMS. When having technical difficulties, update your browser, clear your cache, or try switching to another browser.

You will need to have or have access to a computer/laptop, scanner, a webcam, and a microphone. You will need to download or update the following software: Microsoft Office, Adobe, Flashplayer, Windows Media Player, QuickTime, and Java. Check that your computer hardware and software are up-to-date and able to access all parts of the course.

If you encounter technical difficulties beyond your scope of troubleshooting, please contact the [Help Desk as](#)

they are trained specifically in assisting with technological needs of students.

Accommodations Policy

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University.

If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass.

Scholastic Integrity

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. Academic dishonesty harms the individual, all students, and the integrity of the university; policies on scholastic dishonesty will be strictly enforced. All suspected violations of academic integrity at The University of Texas at El Paso will be reported to the [Office of Student Conduct and Conflict Resolution \(OSCCR\)](#) for possible disciplinary action. To learn more [HOOP: Student Conduct and Discipline](#).

Instructor's Office Hour

During the specified office hours, you can drop in my virtual office for any questions regarding the subjects discussed in the class without making an appointment. Of course, you are always welcomed to visit me at any other times, but I may not be available for discussion because of other commitments. Leave me a note, call for an appointment, or send me an email will be the most effective way to catch me for your questions. Remember, do not pile up questions and expect me to answer all your questions the day before an exam.

Tentative Class Schedule

CE 5390 Fall 2020 Weekly Calendar (Subject to Change, Version Aug. 18, 2020)

Textbook: Aerosol Science and Technology, 2nd ed by W.C. Hinds (Textbook)

Homework needs to be typed and submitted in **one pdf file**. Handwriting is allowed for calculations and equations.

MODUL E/ WEEK	Topic	Readings Due	Assignment	Remarks
Week 1 8/25 8/27	Class introduction, syllabus, Class Project <u>Introduction to Aerosols.</u> Fundamental, history, measurements, and general properties of aerosols	<ul style="list-style-type: none"> • Review syllabus • Familiarize Blackboard • Homework • Class Project 	Chap. 1, Chap. 14 HW #1: 1.1; 1.3; 1.5; 1.7; 1.8; 1.9 Due: 11:59 pm, 8/30 (Sunday) Homework is always due on Sunday the following week or as discussed in class	<ul style="list-style-type: none"> - Email - Blackboard Collaborate - Discussion Board - Help Board - Homework Format - Project Schedule
Week 2 9/1 9/3	<u>Introduction to Aerosols.</u> <u>Properties of Gases</u>	<ul style="list-style-type: none"> • review Chapter 2 	Chap. 2 HW #2: 2.3; 2.5; 2.7; 2.9; 2.11; 2.13 Due: 11:59 pm, 9/6 (Sunday)	Course Calendar will be updated periodically.
Week 3 9/8 9/10	<u>Available Tools for</u> <u>Aerosol Sciences</u> <u>(Aerosol Calculator)</u> <u>Theory of Particle</u> <u>Movements</u>	<ul style="list-style-type: none"> • review Chapter 3 	Chap. 2, 3 HW #3: 3.8; 3.10; 3.16; 3.18; 3.20; 3.22 Due: 11:59 pm, 9/13 (Sunday)	All solutions to homework will be uploaded on Blackboard
Week 4 9/15 9/17	<u>Theory of Particle</u> <u>Movements</u> <u>Particle Size Statistics</u>	<ul style="list-style-type: none"> • review Chapter 4 	Chap. 4 HW #4: 4: 4:2, 4:4, 4:6, 4:8, 4:10	Homework due date may change.
Week 5 9/22 9/24	<u>Particle Size Statistics</u>	<ul style="list-style-type: none"> • review Chapter 4 	Chap. 4 problems are due: 11:59 pm, 9/27 (Sunday)	
Week 6 9/29 10/1	EXAM #1 <u>Curvilinear Particle</u> <u>Motion and Applications</u>	<p style="text-align: center;">Exam #1</p> <ul style="list-style-type: none"> • review Chapter 5 	Chap. 5 HW #5: 5.1; 5.3; 5.5; 5.7; 5.9 due: 11:59 pm, 10/11 (Sunday)	- Discuss topics for course project
Week 7 10/6 10/8	<u>Principles of Particle</u> <u>Collection: Adhesion</u>	<ul style="list-style-type: none"> •continued with Chapter 5 •review Chapter 6 	Chap. 6 HW #6: 6.1; 6.2;	Subject for quiz will be announced

			6.3; 6.4 due: 11:59 pm, 10/11 (Sunday)	
Week 8 10/13 10/15	<u>Principles of Particle Collection: Diffusion, Thermal and Radiometric Forces</u>	• review Chapter 7	HW #7: 7.1; 7.3; 7.5; 7.7; 7.8 due: 11:59 pm, 10/18 (Sunday)	Mid-term Course schedule adjustment.
Week 9 10/20 10/22	<u>Principles of Particle Collection: Diffusion, Thermal and Radiometric Forces, Filtration</u>	• review Chapter 8	HW #8: 8.1; 8.2; 8.3; 8.4 due: 11:59 pm, 10/22 (Sunday)	- Discuss project progress
Week 10 10/27 10/29	<u>Principles of Particle Collection: Diffusion, Thermal and Radiometric Forces, Filtration</u>	• review Chapter 9	HW #9: 9.1; 9.3; 9.4; 9.5 due: 11:59 pm, 11/1 (Sunday)	
Week 11 11/3 11/5	EXAM #2 <u>Principles of Particle Collection: Diffusion, Thermal and Radiometric Forces, Filtration</u>	Exam #2 • review Chapter 10		
Week 12 11/10 11/12	Aerosol Measurement	• review Chapter 10	Chap. 10 HW #10: 10.2; 10.4; 10.6; 10.8 due: 11:59 pm, 11/15 (Sunday)	- Discuss project progress
Week 13 11/17 11/19	<u>Atmospheric Aerosol Measurement and Instrumentation</u>	• review Chapter 11	Chap. 11 HW #11: 11.2; 11.4; 11.5; 11.6 due: 11:59 pm, 11/22 (Sunday)	
Week 14 11/24 11/26	<u>Atmospheric Aerosol Measurement and Instrumentation</u> <u>Thanksgiving Holiday (No Class)</u>	• review Chapter 14 (No Class on Nov. 26)	Chap. 14 HW #12: 14.1; 14.2 due: 11:59 pm, 11/29 (Sunday)	
Week 15 12/1 12/3	<u>Respiratory Deposition of Aerosols</u> EXAM #3	Exam #3		
Week 16 12/8	Final Presentation (4:00 – 6:45 pm)	Final Exam (Mandatory)	Turn in your power point file before presentation Paper due Monday	Format and details will be discussed before the final exam