

TEXAS A&M UNIVERSITY
Department of Mechanical Engineering

MEEN 633-600 Combustion Science and Engineering
Fall 2011

- Instructor:** Dr. Eric L. Petersen
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Office hours: W 09:00-11:00; TH 14:00-16:00 or by appointment
- Description:** This course covers the fundamental concepts of combustion science and engineering. Modern-day combustion science combines thermodynamics, chemistry, fluid mechanics, and heat transfer concepts, and it is used for the design of many energy and propulsive applications. Topics include equilibrium thermochemistry; chemical kinetics; mass transfer; laminar premixed and diffusion flames; deflagration and detonation; flame stability; pollutants; and canonical 1st-Law applications.
- Units:** 3
- Prerequisites:** MEEN 344 – Fluid Mechanics
MEEN 421 – Thermal-Fluids Analysis and Design
MEEN 461 – Heat Transfer
(or their equivalent)
- Lecture Times:** T TH 08:00-09:15 **Room:** ENPH 204
- Website:** Vista
- Required Text:** *Combustion Science and Engineering*
by Kalyan Annamalai and Ishwar K. Puri
CRC Press, 2007 ISBN-13 978-0-8493-2071-2
- Supplemental Text:** *An Introduction to Combustion: Concepts and Applications*, 2nd Edition
by Stephen R. Turns
McGraw-Hill, 2000 ISBN-13 978-0072350449
- Grading:**
- | | |
|---------------|-----|
| Mid-Term Exam | 20% |
| Final Exam | 30% |
| Homework | 50% |

The grade is based on one mid-term exam, a comprehensive final exam. Problem sets will be assigned and graded, worth 50% of the overall grade. The grading will be relative but, in general, the minimum scale will be based on A = 90-100%, B = 80-89%, C = 70-79%, etc. In other words, if you have an 82 average but the class average is 85, you will still get a B.

Homework and Quizzes:

Working homework problems is a necessity for learning and practicing the material, and at the graduate level it should be a tool toward developing deeper understanding beyond the course lecture content. The student is responsible for keeping up with the homework assignments; the due dates will be posted on each assignment. The solutions will be given some time prior to the exam that uses the material on which the problems are based.

Academic Honesty:

Ethical behavior and academic honesty are expected and required of students and even more so of engineers and scientists. Evidence of cheating during an exam or other assignment for credit may result in failure of the entire course for the student(s) in question. The same goes for homework that is not your own work.

Aggie Honor Code: "An Aggie does not lie, cheat, or steal, or tolerate those who do."

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the Texas A&M University community from the requirements or the processes of the Honor System. For additional information please visit: www.tamu.edu/aggiehonor/

On all course work, assignments, and examinations at Texas A&M University, the following Honor Pledge shall be preprinted and signed by the student:

"On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work."

Americans with Disabilities Act (ADA) Policy Statement:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118 or call 845-1637. For additional information visit <http://disability.tamu.edu>

Course Outline

Table 1 presents the overall course schedule. The planned exam dates are subject to change upon prior notice of the instructor at least one week in advance of the exam date. The final exam will be during the university-designated time slot.

The following topics will be covered. The suggested sections for reading and content will be provided on Vista as we progress through the course.

Introduction and Review of Thermodynamics (Chp. 1)
Stoichiometry and Thermochemistry of Reacting Systems (Chp. 2)
Reaction Direction and Equilibrium (Chp. 3)
Fuels (Chp. 4)
Chemical Kinetics (Chp. 5)
Pollutants Formation and Destruction (Chp. 17)
Deflagration and Detonation (Chp. 14)
Flame Propagation and Flammability Limits (Chp. 15)
First Law Applications (Chp. 7)
Introduction to Laminar and Turbulent Flames

Table 1 Schedule for MEEN 633, Fall 2011

Week	T	Th	Notes
1	8/30	-	no class, 9/1
2	9/6	9/8	
3	9/13	9/15	
4	9/20	9/22	
5	9/27	9/29	
6	10/4	10/6	
7	10/11	10/13	
8	10/18	10/20	Mid-Term Exam: 10/18
9	10/25	10/27	
10	11/1	11/3	
11	11/8	11/10	
12	11/15	11/17	
13	11/22	-	Holiday: 11/24
14	11/29	12/1	
15	12/6*	-	* Redefined Th
16	12/13	-	Final Exam: 12/13, 13:00 - 15:00