Course Syllabus

Office Hours: Saturday 7~8pm, zoom link: To Be Announcement

Class Meeting Times/Locations: Online

Course Description: ME385M addresses the design and analysis of systems in which thermal and fluid processes are central to function and performance. New fundamental topics, such as thermodynamics of non-reacting and reacting gas mixtures, gas powered systems, vapor powered systems, psychrometrics, and combustion, will be covered in the context of specific applications. Students are expected to have had some exposure to undergraduate-level thermodynamics and heat transfer.

Class Web Site on Canvas: All class videos, supplemental readings and resources will be posted on the Canvas. Please check Canvas regularly for important announcements, homework assignments, quizzes and exams.

Homework: Homework will be posted on Canvas and will be due by 11: 59pm according to the schedule on **page 3 of this document**. No paper copies will be distributed in class. **Late homework may be accepted if the TA is informed ahead of time.**

Exams: Two quizzes, one midterm exam and one final exam.

Grading:

Homework:	40%
Quizzes:	10%
Midterm Exam:	20%
Final Exam	30%
Total:	100%

Texts: Textbooks are not required. Class materials should be sufficient for homework and exams. If you want to read extra materials, the following textbooks would be helpful:

1. Thermodynamics: An Integrated Learning System, by Schmidt, Ezekoye, Howell and Baker
2. Fundamentals of Engineering Thermodynamics, by Moran and Shapiro
3. Thermodynamics: An Engineering Approach, by Boles and Cengel

Observance of University policies: Standard University policies relating to accommodation for students with disabilities and to scholastic dishonesty will be followed in this course. Information regarding these policies may be found in the General Information Bulletin.

Expected incoming knowledge, skills and abilities: Students having passed the course prerequisites listed above should have a sound base of theoretical knowledge in the fundamentals of thermodynamics and heat transfer and moderate skill in Excel.

Expected outgoing knowledge, skills and abilities: Students successfully completing the course will have an enhanced level of theoretical and conceptual understanding of thermodynamics and heat transfer and a thorough understanding of how these disciplines apply to the design and analysis of complex thermal-fluid systems.

Laboratory assignments: No laboratory assignments are assigned for the course.

Computer assignments: No laboratory assignments are assigned for the course.

Special Notes: The University of Texas at Austin provides upon request appropriate academic adjustments for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-4641 TDD or the College of Engineering Director of Students with Disabilities at 471-4321 to request an official letter outlining authorized accommodations. The letter should be handed over to Dr. Yaguo Wang no later than Sep. 24th, 2018.

ABET EC2000 PROGRAM OUTCOMES ACHIEVED:

This course contributes to the following ME Program Outcomes**.** Priorities **(P)** assigned to each outcome are: 1=high priority (significant work devoted to this outcome), 2-moderate priority (some work devoted to this outcome), 3=low priority (little or no work devoted to this outcome)

Outcome	P
1. Knowledge of and ability to apply engineering and science fundamentals to real problems.	1
2. Ability to formulate and solve open-ended problems.	1
3. Ability to design mechanical components, systems, and processes.	1
4. Ability to set up and conduct experiments, and to present the results in a professional manner.	3
5. Ability to use modern computer tools in mechanical engineering.	1

Outcome	P
6. Ability to communicate in written, oral and graphical forms.	1
7. Ability to work in teams and apply interpersonal skills in engineering contexts.	1
8. Ability and desire to lay a foundation for continued learning beyond the baccalaureate degree.	2
9. Awareness of professional issues in engineering practice, including ethical responsibility, safety, the creative enterprise, and loyalty and commitment to the profession.	2
10. Awareness of contemporary issues in engineering practice, including economic, social, political, and environmental issues and global impact.	2

ASME PROGRAM CRITERIA OUTCOMES ACHIEVED:

a. Knowledge of chemistry and calculus-based physics with in-depth knowledge of at least one.
b. The ability to apply advanced mathematics through multivariate calculus and differential equations.
d. Ability to work professionally in both the thermal and mechanical systems areas including the design and realization of such systems.

TOPICS:	# of classes	Outcomes
Teamwork and project planning	2	7
Technical reporting standards and practices	2	6
Review of thermodynamic principles and properties	4	1,2,3,5,a,b,d
Modeling and parametric analysis of thermodynamic cycles	11	1,2,3,5,a,b,d
Gas mixtures and psychrometrics, with applications	7	1,2,3,5,6,7,a,b,d
Chemically reacting mixtures and combustion	5	1,2,3,5,6,7,a,b,d

Course Schedule

Week	Date	Topic	Assignment Due*
1	Aug. 26	Lesson 1.1: Introduction, Basic Thermo. Concepts Lesson 1.2: First Law	
2	Aug. 31	Lesson 1.3: Second Law Lesson 2.1:Ideal Gas Law	
3	Sep. 7	Lesson 2.2: Ideal Gas Mixture Lesson 2.3: Ideal Gas Mixing in Closed system	HW 1 due 9/6
4	Sep. 14	Lesson 2.4: Ideal Gas Mixing in Open System Lesson 3.1: Otto Cycle Analysis	
5	Sep. 21	Lesson 3.2: Diesel Cycle Analysis **Quiz1 (For Lessons 1 & 2)**	HW 2 due 9/20
6	Sep. 28	Lesson 3.3: Simple Brayton Cycle Lesson 4.1: Review of Properties of Phase Change Substances	
7	Oct. 5	Lesson 4.2: Ideal Rankine Cycle Lesson 4.3: Rankine Cycle with Reheat and Regeneration	HW 3 due 10/4
8	Oct. 12	Lesson 4.4: Rankine Cycle with Cogeneration and Combined Cycles	
9	Oct. 19	**Midterm Exam (For Lessons 1~4)** Lesson 5.1: UT Power Plant Tour	HW 4 due 10/18 No Homework
10	Oct. 26	Lesson 6.1: Saturation Pressure, Dew Point, Humidity Lesson 6.2: Psychrometric Chart	
11	Nov. 2	Lesson 6.3: HVAC Process _ Heating, Cooling Lesson 6.4: HVAC Process _ Humidification	
12	Nov. 9	Lesson 6.5: HVAC Process _ Dehumidification Lesson 6.6: HVAC Process _ Mixing	
13	Nov. 16	Lesson 7.1: Chemical Reaction of Combustion **Quiz2 (For Lesson 6)**	HW 6 due 11/15
14	Nov. 23 Thanksgiving	Lesson 7.2: Enthalpy of Formation and Standardized Enthalpy Lesson 7.3: Enthalpy of Combustion	
15	Nov. 30	Lesson 7.4: Adiabatic Flame Temperature	
16	Dec. 7	**Final Exam (To be announced)** Last Class Day: Dec. 7th	HW 7 due 12/6

*Instructions of Quizzes and Exams will be posted on Canvas. Schedule indicted in the table is only accurate to the specific week.