

Instructor: Xiaohua Li **Office:** NTDP F101G; **Tel:** 940-369-8020; **Email:** xiaohua.li@unt.edu

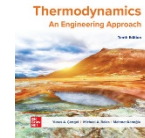
Lecture Time: MW 10:00-11:20 a.m. **Classroom:** B190

Office Hours: Open Office Policy; Email to make appointment

Required Textbook: Fundamentals of Engineering Thermodynamics, 8th
M. J. Moran, H. N. Shapiro, D. D. Boettner and M.B. Bailey
ISBN-13 978-1118412930

Or

Thermodynamics: An Engineering Approach, 10th Edition
Yunus Cengel, Michael Boles and Mehmet Kanoglu
ISBN13: 9781266664489



Course Description: This is a required course in MEEN program

Thermodynamics II is the applications of fundamental thermodynamics laws and concepts. Course will discuss exergy analysis (Ch7), vapor power cycle (Ch 8), gas power system (Ch 9; Otto cycle, Diesel cycle, Brayton cycle), refrigeration system/cycle (Ch 10), ideal gas mixture and psychrometric applications (Ch12 air conditioning system). Reacting Mixtures and Combustion (Ch13)

Pre-requisites: MEEN 2210 Thermodynamics I. **Credit Hours:** 3 credit hours

Course Learning Outcomes (CLO):

Upon successful completion of this course, students will able to:

1. Demonstrate an ability to correctly apply the 1st and 2nd laws of thermodynamics
2. Demonstrate an ability to analyze exergy and exergy destruction for different thermodynamics systems
3. Demonstrate an understanding on how to improve thermal efficiency for different thermodynamics systems based on 1st and 2nd law of thermodynamics
4. Demonstrate an ability to model and analyze various vapor power and gas power cycles/systems
5. Demonstrate an understanding of refrigeration system
6. Demonstrate an understanding of gas mixtures and psychrometrics, and be able to analyze A/C systems

ABET Student Learning Outcomes (SO)

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

CLO	ABET Student Outcomes (SO)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	X						
2	X						
3	X						
4	X						

5	X						
6	X						

Grades: Homework (6)	10%	≥ 85	A
Quizzes (highest 3/5)	10%	70-84.9	B
Exam #1 (Ch8)	20%	60-69.9	C
Exam #2 (Ch 10 & 12)	20%	50-59.9	D
Final (Exam #3) (Ch 7/9/13)	20%	< 50	F
<u>Attendance (20 times)</u>	<u>20%</u>		
Total	100%		

Calculator Policy:

The use of a calculator is required and allowed on all homework, exams and quizzes. Calculators with graphing capabilities will be allowed in the course for homework and quizzes. However, only calculators currently allowed in the Fundamentals of Engineering (FE) and Professional Engineering (PE) exams will be allowed in ALL EXAMS (Exam #1, Exam #2 and Exam #3/final exam). **NO other calculators will be approved for exams.** Please refer to the National Council of Examiners for Engineering and Surveying (NCEES) calculator policy for the list of acceptable calculators.

Casio: All fx-115 and fx-991 models (Any Casio calculator must have “fx-115” or “fx-991” in its model name.)

Hewlett Packard: The HP 33s and HP 35s models, but no others

Texas Instruments: All TI-30X and TI-36X models (Any Texas Instruments calculator must have “TI-30X” or “TI-36X” in its model name.)

Homework Policy:

1. “Homework Day”: **Wednesday**. The day new homework will be assigned (HW assignment will be posted in Canvas) and previous homework will be collected through Canvas;
2. Homework should be turned in before the deadline (11:20am) through canvas. **NO late homework will be collected, accepted, or graded.** (Canvas window will be automatically closed)

Exceptions: refer to UNT Policies 06.039.

An absence may be excused for the following reasons:

- ❖ religious holy day, including travel for that purpose;
- ❖ active military service, including travel for that purpose;
- ❖ participation in an official university function;
- ❖ illness or other extenuating circumstances;
- ❖ pregnancy and parenting under Title IX; and
- ❖ when the University is officially closed.

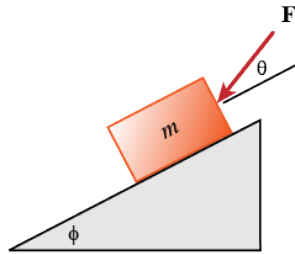
Procedure: Please request accommodations/exceptions through UNT “Dean of Students Office”

3. Solutions to Homework Assignments will be available in Canvas after HW has been collected.
4. Having no textbook is not a valid excuse for not doing homework. It is the student’s responsibility to acquire textbook for his/her study
5. All homework assignments should be turned in through Canvas. There will be a window/link in canvas open for submitting HW.

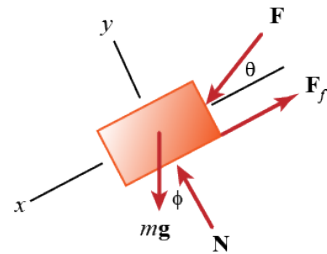
Format of Homework:

- (1) Use engineering paper only (**noncompliance: 10 points off; cumulative**)
- (2) Only solve one problem per page of engineering paper (**noncompliance: 10 points off; cumulative**). You may extend that problem into another page but then should begin the next problem on a new page if you require more room. If more than one page is needed for a solution you should number each page and the first page should be marked with a “continued on next page” note on the bottom.
- (3) Done in pencil, no ink. (**noncompliance: 10 points off; cumulative**)
- (4) No cross outs, use an eraser. (**noncompliance: 10 points off; cumulative**)
- (5) **Free-body diagrams (FBD) – WHEN NECESSARY/NEEDED**, Draw a neat FBD that includes arrows with arrowheads, necessary dimensions, and parameters needed to solve the problem (**noncompliance: problem/HW will NOT be graded; no points will be honored**)

Example:



Problem Statement

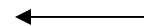


F.B.D

- (6) **Solution** – provide all the details so that anybody can easily follow your solutions and problem-solving approach. All intermediate values should be identified with the variable name and units (e.g., $F_1=50\text{ N}$; $X_c = 2.1\text{ m}$).(**noncompliance: 10 points off; cumulative**)
- (7) **Answer** – the **Final Answer** at the end of the problem should be identified with the **variable name, include units, and inside a box**. Include an arrow (from the far right side of the page) pointing to each final answer. (**noncompliance: 10 points off; cumulative**)

Example:

$$F_1 = 50\text{ N}$$



Exam and Quiz Policy:

- (1) Exams and quizzes will be announced in advance; **Exams are closed book and closed notes with approved formula sheets only**
- (2) Formula sheets: Use the formula sheets approved only, NOTHING ELSE.
- (3) Calculator: **ONLY** FE exam approved calculator models allowed
 - Casio: All fx-115 and fx-991 models;
 - Hewlett Packard: The HP 33s and HP 35s models;
 - Texas Instruments: All TI-30X and TI-36X models;
- (4) Using ANY unauthorized/unapproved materials during the exam is prohibited and considered as cheating.
- (5) Exchanging (either borrowing or giving) ANYTHING without the approval from the proctor, including but not limited to, calculators/scratch papers/formula sheets/ thermodynamics tables/writing tools during the exam between/among students is prohibited and considered as cheating.
- (6) Using cell PHONE for WHATEVER purpose during the exam is prohibited and considered as cheating.
- (7) Using Internet through any device during the exam is prohibited and considered as cheating.
- (8) Peeking, talking or discussing (either by oral/written/sign language) between/among students during the exam is prohibited and considered as cheating.

- (9) Using any type of earpiece/earbuds/earphone/Bluetooth/Stereo Headset (except with doctor's prescription/notes) during the exam is prohibited and considered as cheating.
- (10) Using any type of smart glasses (except with doctor's prescription/notes) during the exam is prohibited and considered as cheating.
- (11) Using any type of smart watches during the exam is prohibited and considered as cheating.
- (12) Cheating will result in SCORE ZERO in the exam
- (13) Cheating will be reported to the Department, College and University
- (14) There will be NO make-up exam.

Exceptions: refer to UNT Policies 06.039.

Procedure for Exceptions: Please request accommodations/exceptions through UNT "Dean of Students Office"

- (15) Makeup exam should be scheduled within one week after the regular exam date.

Disability Accommodations: If you need academic accommodations for disability, you must have document which verifies the disability and makes you eligible for accommodations, then you can schedule an appointment with the instructor to make appropriate arrangements.

Academic Dishonesty:

There is a zero-tolerance policy. Cheating of whatsoever will result in an automatic 'F' in this course and the matter will be turned over to the appropriate student disciplinary committee.

Professionalism:

One of the goals of this course is to teach students about professionalism, including the standards and expected behavior of your chosen profession. With this in mind, students are expected to demonstrate a behavior consistent with the conduct of an individual practicing in the engineering profession. Students are expected to: (1) come prepared for class; (2) respect faculty and peers; (3) demonstrate responsibility and accountability for your own actions; (4) sensitivity and appreciation for diverse cultures, backgrounds, and life experiences; (5) offer and accepts constructive criticism in a productive manner; (6) demonstrate an attitude that fosters professional behavior among peers and faculty; (7) be punctual to class meetings; (8) maintain a good work ethic and integrity; and (9) recognize the classroom as a professional workplace.

Classroom Inclusivity Statement

I consider this classroom to be a place where you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

MEE Program Educational Objectives

The educational objectives of the Mechanical & Energy Engineering program are to produce graduates who will:

- Graduates are prepared for successful employment in mechanical and/or energy engineering positions and other related fields.
- Graduates engage in lifelong learning demonstrated by advanced education, professional development activities and/or other career-appropriate options.
- Graduates are prepared to successfully demonstrate technical and leadership competence through ethical conduct, teaming, communication and/or problem-solving skills learned in our program.

ABET Student Outcomes

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- An ability to communicate effectively with a range of audiences.
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

IMPORTANT EXAM DATES

Exam #1 (tentative; depends on when chapter 8 is finished; Covers Ch 8 only):

Wednesday Jan. 31, 2024

Exam #2 (tentative; depends on when chapter 12 is finished; Covers Ch 10 & 12):

Wednesday March 20, 2024

Exam #3 (UNT official final exam schedule; Covers Ch 7/9/13)

UNT Official Academic Calendar: Spring 2024

January 16, 2024	First class day
March 11-17, 2024	Spring break (no classes)
May 1-2, 2024	Pre-finals days
May 2, 2024	Last regular class meeting
May 4, 2024	Reading day (no classes)
May 4-10, 2024	Final examinations

MEEN 3110 Thermo II Schedule Overview

Week	Date	Lecture Topics
#1	Jan.15 - Jan.19	Overview of syllabus; Chapter 8: 8.1-8.2 The Rankine Cycle
#2	Jan.22 - Jan.26	Chapter 8: 8.1-8.2 The Rankine Cycle Chapter 8: 8.1-8.2 The Rankine Cycle
#3	Jan.29 – Feb.2	Chapter 8: 8.3-8.4 Improving Rankine Cycle Performance Exam #1 (Covers Ch 8 only)
#4	Feb.5– Feb.9	Chapter 10: 10.1-10.3 Analyzing Vapor-Compression Refrigeration Systems Chapter 10: 10.1-10.3 Analyzing Vapor-Compression Refrigeration Systems
#5	Feb.12– Feb.16	Chapter 10: 10.1-10.3 Analyzing Vapor-Compression Refrigeration System Chapter 10: 10.1-10.3 Analyzing Vapor-Compression Refrigeration System
#6	Feb.19– Feb.23	Chapter 12: 12.1-12.3 Describing Mixture; Evaluating properties Chapter 12: 12.4-12.5 Psychrometric Principles
#7	Feb.26– Mar.1	Chapter 12: 12.4-12.5 Psychrometric Principles; Psychrometric Chart Chapter 12: 12.4-12.5 Psychrometric Principles; Psychrometric Chart
#8	Mar. 4– Mar.8	HW Session/Review Exam #2 (Covers Ch 10 & 12 only)
#9	Mar. 11– Mar.15	Spring break (no classes)
#10	Mar. 18– Mar.22	Chapter 9: 9.1-9.2 Engine Terminology; Otto Cycle; Chapter 9: 9.1-9.2 Engine Terminology; Otto Cycle
#11	Mar. 25– Mar. 29	Chapter 9: 9.3-9.4 Diesel Cycle; Chapter 9: 9.3-9.4 Diesel Cycle;
#12	Apr. 1– Apr. 5	Chapter 9: 9.5-9.6 Brayton Cycle Chapter 9: 9.5-9.6 Brayton Cycle
#13	Apr. 8 – Apr. 12	Chapter 7: 7.1-7.3 Introducing Exergy; Chapter 7: 7.1-7.3 Exergy of a System;
#14	Apr. 15 – Apr. 19	Chapter 13: 13.1-13.2 Introduction to Combustion Chapter 13: 13.2-13.3 Conservation of Energy-Reacting System
#15	Apr. 22– Apr. 26	Chapter 13: 13.2-13.3 Conservation of Energy-Reacting System Chapter 13: 13.4 Absolute Entropy, Gibbs Function
#16	Apr.29 – May 3	Chapter 13: 13.4 Absolute Entropy, Gibbs Function Review
#17	May 4– May 10	Final Exam/ Exam #3 (Covers Ch 7/9/13)

Spring 2024 Final Exams - Discovery Park

Pre-finals days are Wednesday, May 1 - Thursday May 2. Reading Day is May 3 and no classes will meet.

<https://registrar.unt.edu/exams/final-exam-schedule/spring>

Saturday, May 4	
This class...	Has a final exam at this time...
All Saturday classes & All INET Classes with On Campus Finals	Contact Department
MWF 10:30 a.m.	8:00 a.m. - 10:00 a.m.
MWF 1:30 p.m.	10:30 a.m. - 12:30 p.m.
MWF 4:30 p.m.	1:30 p.m. - 3:30 p.m.
R 5:30 p.m. or later	1:30 p.m. - 3:30 p.m.
F 2:30 p.m. - 5:20 p.m.	1:30 p.m. - 3:30 p.m.

What if my Class is not Listed? – Discovery Park

Classes that normally meet Mo/We/Fr before 5:00 P.M. and start on the hour and are NOT listed in the grid should “round up” to the half-hour.

For example, a class that normally meets Mo/We 9:00 A.M. would follow the Mo/We/Fr 9:30 A.M. schedule. The final exam would be Wednesday May 8 at 8:00 A.M.