

MEEN 2210.003 THERMODYNAMICS I
MEET 3990.002 APPLIED THERMODYNAMICS

Fall 2021

3 credit hours, Monday & Wednesday 12:30-1:50pm, NTDP F185

Instructor: Weihuan Zhao
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Instructor Office Hours: Half hour before and half hour after each lecture session
(other times by appointment)

TA: Ken Araki

TA Office Hours: Make appointments via email (kenaraki@my.unt.edu)

Required Textbook: (either one of the following textbooks is fine; the lectures will follow the chapters of the first textbook)

1. *Thermodynamics, An Engineering Approach, 9th edition*, Cengel, Y.A., Boles, M.A., Kanoglu, M., McGraw Hill, 2019. ISBN: 978-1-259-82267-4.
2. *Fundamentals of Engineering Thermodynamics, 8th edition*, Moran, M.J., Shapiro, H.N., Boettner, D.D., Bailey, M.B., Wiley, 2014. ISBN: 978-1-118-41293-0; ISBN: 978-1-118-82044-5.

Course Description:

Thermodynamics is a **fundamental mechanical engineering course** for lower-level undergraduate students. This course will provide basic skills and knowledge to solve various **classical macroscopic** thermodynamic engineering problems. Specifically, throughout this course students can:

- (1) Understand the basic concepts of thermodynamic properties including temperature, pressure, volume, enthalpy, entropy, internal energy, and specific heat
- (2) Understanding the concept of work and energy transfer by heat
- (3) Apply the first law of thermodynamics and understand the concept of energy
- (4) Apply the control volume concept to analyze engineering systems such as turbines, heat exchangers, pump, etc.
- (5) Apply the second law of thermodynamics to analyze the thermodynamic cycle performance

Pre-requisites: Math 1720 and Phys 1710.

Course Learning Outcomes (CLO):

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

- i. Demonstrate ability to formulate the first and second law of thermodynamics;

- ii. Demonstrate ability to identify, formulate, and solve engineering problems;
- iii. Understand concepts of the First Law of Thermodynamics;
- iv. Understand the concept of work and energy transfer by heat;
- v. Understand concepts of the Second Law of Thermodynamics;
- vi. Demonstrate ability to evaluate and work with thermodynamic properties;
- vii. Demonstrate ability to use control volume analysis for various engineering applications.

ABET EAC Student 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.

MEEN 2210 CLO	ABET EAC Student Outcomes						
	1	2	3	4	5	6	7
i	X						
ii	X			X			
iii	X						
iv	X						
v	X						
vi	X						
vii	X						

Grades:

Homework (10)	10%	$\geq 85\%$	A
Quizzes (4)	15%	70-84.9%	B
Midterm Exam I (Ch 1~4)	25%	55-69.9%	C
Midterm Exam II (Ch 3~6)	25%	40-54.9%	D
Final Exam (Ch 6, 7 and 10)	25%	< 40%	F
Total	100%		

Class Policy:

- (1) **Face Coverings:** UNT encourages everyone to wear a face covering when indoors, regardless of vaccination status, to protect yourself and others from COVID infection, as recommended by current CDC guidelines. Face covering guidelines could change based on community health conditions.
- (2) Come in time before the class starts.
- (3) Review the materials covered/taught in the previous class before coming to the class.
- (4) Bring the textbook either as a hard copy or as an e-book to every class. This will help in following the class worked-out examples as well as the materials covered that day and assigned for further reading.
- (5) Participate in Q&A.

Homework:

- (1) Please turn in your homework on the due date before 1:50pm. **NO late homework will be collected.**
- (2) Definition of “late”: when class is over and the instructor steps outside the classroom, homework turned in thereafter will be considered as “late” and will not be collected.
- (3) Having no textbook is not a valid excuse for not doing your homework. It is the student’s responsibility to acquire textbook for his/her study and bring to the classroom.
- (4) Homework can be turned in earlier than the due date.
- (5) Homework dropped in the instructor’s departmental mailbox will NOT be collected.
- (6) Homework slid into the instructor’s office will NOT be collected.
- (7) If you want to turn in your homework other than the due day or if you want to turn in your homework outside the classroom, you need to turn in your homework to the instructor either IN PERSON or a scanned copy through email.
- (8) You can ask your friend/classmate to turn in homework for you.
- (9) You can scan and email the homework before the class ends (1:50pm).
- (10) Homework must be stapled. Instructor or TA will not be responsible for lost loose homework.
- (11) Exceptions (late homework will be collected): medical emergency (student and important ones), transportation/traffic emergency, religious holidays/duty, jury duty and military duty. Evidences must be submitted.

Quizzes and Exams:

- (1) Quizzes are open book and open notes. **Exams are closed book closed notes with formula sheets.**
- (2) Formula sheets can be maximum 1 page (for Midterm) or 2 pages (for Final), A4 or letter size, **single** side.
- (3) Each student is responsible for preparing his/her own formula sheets.

- (4) Formula sheets could include anything BUT: solutions to homework or examples. Student who failed to follow this rule will score zero in the exam and this cheating matter will be reported to the department and university.
- (5) Formula sheets must be turned in (uploaded) with the exam papers. Student who failed to follow this rule will score zero in the exam and this cheating matter will be reported to the department and university.
- (6) **There will be NO make-up quiz.**
- (7) **There will be NO make-up exams. Exceptions:** medical emergency (student and important ones), religious holidays/duty, jury duty and military duty. Evidences must be submitted.

Calculator:

Graphing calculators will not be allowed during quizzes and exams. Only NCEES-approved calculators can be used (<http://ncees.org/exams/calculator/>).

Acceptable calculators are:

- 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.)

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. For more information, please refer the Office of Disability Accommodation website at <https://disability.unt.edu/>

Academic Dishonesty:

There is a zero-tolerance policy for academic dishonesty. 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.

IMPORTANT EXAM DATES

Quizzes: The date will be announced. A quiz will be given every other chapter.

Midterm Exam I (Temporary schedule and subject to change):

Oct. 4th, 2021, Monday, 12:30-1:50pm, NTDP F185

Midterm Exam II (Temporary schedule and subject to change):

Nov. 1st, 2021, Monday, 12:30-1:50pm, NTDP F185

Final Exam (UNT official final schedule):

Dec. 8th, 2021, Wednesday, 10:30am-12:30pm, NTDP F185

Lecture Contents

Schedule Overview (Subject to change)

<u>Week</u>	<u>Date</u>	<u>Topics</u>	<u>Homework Due</u>
#1	Aug.23 rd - Aug.25 th	Chapter 1	---
#2	Aug.30 th - Sep.1 st	Chapter 2	9/8
#3	Sep.6 th - Sep.8 th	No class, Labor Day; Chapter 2	9/15
#4	Sep.13 th - Sep.15 th	Chapter 3	9/22
#5	Sep.20 th - Sep.22 nd	Chapter 3	9/29
#6	Sep.27 th - Sep.29 th	Chapter 4	---
#7	Oct.4 th - Oct.6 th	Midterm I (Oct. 4 th): covers Ch 1, 2, 3 and 4; Chapter 4	10/13
#8	Oct.11 th - Oct.13 th	Chapter 5	10/20
#9	Oct.18 th - Oct.20 th	Chapter 5	10/27
#10	Oct.25 th - Oct.27 th	Chapter 6	---
#11	Nov.1 st - Nov.3 rd	Midterm II (Nov. 1 st): covers Ch 3, 4, 5 and 6; Chapter 6	11/10
#12	Nov.8 th - Nov.10 th	Chapter 7	11/17
#13	Nov.15 th - Nov.17 th	Chapter 7; Chapter 10	11/24
#14	Nov.22 nd - Nov.24 th	Chapter 10	12/1 (optional)
#15	Nov.29 th - Dec.1 st	Chapter 10; Pre-final Day (Last Class Day)	---
#16	Dec. 8 th , Wednesday (10:30am-12:30pm)	Final Exam: covers Ch 6, 7 and 10	---

Disclaimer:

The course schedule, content, and assignments are subject to modification when circumstances dictate and as the course progresses. If changes are made, you will be given due notice.

Link for **Fall 2021 Final Exams - Discovery Park**
<https://registrar.unt.edu/exams/final-exam-schedule/fall>