Fall 2025

Name of Instructor: Dr. Abul F. Ali (aali@njit.edu)

Textbook: Thermodynamics – An Engineering Approach, 10th ed.,
by Cengel and Boles, McGraw-Hill publisher

COURSE DESCRIPTION

This course is a continuation of the Introduction to Thermodynamics course (ME 311) and focuses on the application of the thermodynamic laws and principles. The course analyzes various power producing air and vapor cycles and related 2nd law analyses. Refrigeration and heat pump systems, including cascading, gas refrigeration and innovative refrigeration, are discussed. Air-conditioning processes including systematic calculations using Psychrometric chart are analyzed. Analysis of combustion processes are outlined, including enthalpy of formation, and heating values of fuels.

COURSE PRE-REQUISITE

Pre-requisite for this course is Thermodynamics I. This course requires strong conceptual understanding of the basics of thermodynamics. A good review of the materials of Thermodynamics I will be helpful.

Semester Schedule

Dates	Days	Topic	Chapter	Activity
09/02/2025 09/04/2025	Tue Thu	**Gas Power Cycles:** Basic considerations, Air Standard Cycles: Otto Cycle, Diesel Cycle	10	Lecture
09/09/2025 09/11/2025	Tue Thu	Diesel Cycle, Stirling and Ericsson Cycles, Brayton Cycle	10	**Quiz #1** Lecture
09/16/2025 09/18/2025	Tue Thu	Regenerative Brayton Cycle	10	Lecture
09/23/2025 09/25/2025	Tue Thu	Jet Propulsion Cycles. 2nd Law for Gas Power Cycles.	10	Lecture **Quiz #2**

Semester Schedule *contd…*

Dates	Days	Topic	Chapter	Activity
In Class Exam #1 on 09/30/2025 (covering materials of Chapter 10)				
09/30/2025 10/02/2025	Tue Thu	**Vapor Power Cycles:** Carnot Vapor Cycle, Rankine Cycle.	11	**Exam #1** Lecture
10/07/2025 10/09/2025	Tue Thu	Ideal Reheat Cycle, Regenerative Rankine Cycle: Regeneration, Feed-water Heaters.	11	Lecture
10/14/2025 10/16/2025	Tue Thu	Combined Gas-Vapor Cycle; 2nd Law Analysis of Vapor Cycle.	11	**Quiz #3** Lecture
In Class Exam #2 on 10/21/2025 (covering materials of Chapters 11)				
10/21/2025 10/23/2025	Tue Thu	**Refrigeration Cycles:** Refrigerators and Heat Pumps, Actual Vapor Compression Refrigeration Cycle.	12	**Exam #2** Lecture
10/28/2025 10/30/2025	Tue Thu	Cascading, Gas Refrigeration.	12	Lecture
11/04/2025 11/06/2025	Tue Thu	Innovative Refrigeration.	12	Lecture
11/11/2025 11/13/2025	Tue Thu	**Gas-Vapor Mixture:** Properties of Air, Psychrometric Chart.	15	**Quiz #4** Lecture
11/18/2025 11/20/2025	Tue Thu	**Air-conditioning Processes:** heating, cooling, humidification, dehumidification, mixing processes.	15	Lecture
11/25/2025 11/27/2025	Tue Thu	**Chemical Reactions:** Fuels and Combustions, Combustion Equations.	16	**Quiz #5** Lecture
12/02/2025 12/04/2025	Tue Thu	Combustion Equations, Enthalpy of Combustion.	16	Lecture
12/09/2025 12/11/2025	Tue Thu	Heating Value, Enthalpy of Formation.	16	Lecture
FINAL EXAM COVERING MATERIALS OF CHAPTERS 12, 15, & 16.				

COMMUNICATION PLATFORM

- Canvas will be used as our communication platform.
- Students are strongly advised to be highly proactive throughout the semester to stay current with the pace of the course.
- Make sure you have installed Canvas in your computer and that you are fluent in using this app.
- Contact NJIT First Service Desk if you need assistance. The instructor cannot resolve IT issues.

LECTURE SLIDES & DISCUSSIONS

Periodically some lecture slides will be posted in Canvas throughout the semester. This will be done through posting the slides using "Files" in Canvas. These slides are only an aid and must not be considered as a replacement of reading the textbook.

- Successful performance in the course requires that you thoroughly review lecture materials immediately after each lecture.
- This should be followed by any clarification/question that you may have.
- Such discussions will be carried out preferably by using the "Discussions" forum in Canvas (preferred) or through e-mails.
- Using the Discussion forum will give exposure to others as well who may have similar questions.

REVIEWING POSTED SLIDES

To review the slides:

- You must first *download* the files from Canvas.
- Open the Power Point file.
- Select "Slide Show".
- From selection menu, select "From Beginning", or "From Current Slide" as you need.
- The slides will now be presented with full animations and annotations.

PERFORMANCE EVALUATION

The course evaluation will be based on the following scheme.

- Multiple Quizzes
- 2 Mid-Term Exams
- Final Exam

TENTATIVE SCHEME

Class Participations	5%
Quizzes	20%
Exam 1	25%
Exam 2	25%
Final Exam	25%

NOTE: The above is a tentative grading scheme is subject to slight modification if felt necessary by the instructor.

QUIZZES

- ❖ A number of quizzes will be offered throughout the semester.
- ❖ Quizzes will be offered online (using Canvas). These days are marked on the given schedule.
- ❖ All quizzes will take place 10 minutes prior to the regular start of the lecture time.
- ❑ In such days you are required to bring your laptop to take the quizzes.

ATTENDANCE

- ❖ Regular class attendance is a requirement in doing well in the course.
- ❖ Experiences show a direct link between attendance and course performance.
- ❖ Attendance will be taken *randomly* throughout the semester. This attendance record will be utilized in your performance grading.
- ❖ A 5% grade has been allocated for attendance and class participation. This grade will be prorated based on your record.

Letter Grade	Total Weighted Mark
A :	90 – 100
B+ :	80 – 89
B :	75 – 79
C+ :	70 – 74
C :	60 – 69
D :	50 – 59
F :	0 – 49

GRADE ENHANCEMENT:

- ❖ Your overall letter grade will reflect the above grading scheme.
- ❖ No grade enhancement request will be entertained.
- ❖ Please do not send e-mails to the instructor asking for it.
- ❖ The instructor will not respond to such e-mail requests.

EXAM PREPARARTION

To be properly prepared for exams, you should:

- Read the textbook, review your lecture slides/notes on a regular basis.
- Do the exercises problems suggested by the instructor at the end of chapters.

MATERIAL REVIEW AND EXERCISE PROBLEMS

- This course heavily utilizes the concepts developed in Thermodynamics - I.
- Making a good review of Thermodynamics-I will be extremely helpful.
- Doing the exercise problems is the key in clearly understanding the methods and concepts.
- Students are strongly advised to discuss any conceptual issue with the instructor while doing the problems.
- Students are highly advised to discuss these issues during the office hours.

MAKE-UP EXAM/QUIZ:

Absolutely no make-up exams or quizzes will be given.

Do not ask for it.

If you miss an exam your marks for the exam will be zero.

OFFICE HOURS:

- There will be office hours on the following days every week, except for the holidays.
- Please make it a point to see me in the office hours to discuss issues you may have, particularly solving exercise problems.
- Remember, mastering the exercise problems is the key in doing well in the course.

Thursdays: 4:00 PM - 5:00 PM

The instructor is also available in Canvas/Discussions. Post your questions/queries in this panel. I will respond to you. Also, you may send me an e-mail asking any question.

One to one Zoom/WebEx session is impractical and will not be entertained at any anytime. Please do not ask for it. Resolve your issues using office hours/ e-mails / Canvas Discussions forum.

I wish you all the best in the semester.