



North Central State College

MASTER SYLLABUS

2025-2026

A. Academic Division: Engineering Technology, Business & Criminal Justice Division

B. Discipline: Mechanical Engineering Technology

C. Course Number and Title: MECT3031 Technical Thermodynamics

D. Assistant Dean: Brooke Miller, M.B.A.

E. Credit Hours: 3

F. Prerequisites: MATH 1151, PHYS1130

G. Last Course/Curriculum Revision Date: Fall 2025 Origin date: 01/25/2021

H. Textbook(s) Title:

Thermodynamics: An Engineering Approach with Connect

- Authors: Cengel, Boles
- Copyright Year: 2024
- Edition: 10th Edition
- ISBN: 9781264925742 Print with Connect

I. Workbook(s) and/or Lab Manual: None

J. Course Description: This course covers the analysis of thermodynamic concepts as they apply to heating and power production, including conservation of energy, work and heat, engines and refrigeration.

K. College-Wide Learning Outcomes:

College-Wide Learning Outcome	Assessments - - How it is met & When it is met
Communication – Written	
Communication – Speech	
Intercultural Knowledge and Competence	
Critical Thinking	
Information Literacy	
Quantitative Literacy	

L. Course Outcomes and Assessment Methods:

Upon successful completion of this course, the student shall:

Outcomes	Assessments – How it is met & When it is met
1. Identify the relationship between pressure, volume / specific volume, and temperature for a gas.	Problem based quizzes and exams
2. Use gas tables to determine the properties of gases and gas-liquid combinations.	Problem based quizzes and exams

Outcomes	Assessments – How it is met & When it is met
3. Use graphs and charts to find the properties of gases and apply them to machine cycles.	Problem based quizzes and exams
4. Describe the design and function of air compressors.	Problem based quizzes and exams
5. Apply thermodynamics to manufacturing processes.	Problem based quizzes and exams
6. Generate an energy analysis of closed systems.	Problem based quizzes and exams
7. Calculate the thermodynamics efficiency of Carnot cycles.	Problem based quizzes and exams

ABET Program Criteria:

- *Outcome d.* Elements of differential and integral calculus;
- *Outcome g.* Mechanical system design;
- *Outcome l.* Technical communications typically used in preparation of engineering proposals, reports, and specifications.

M. Recommended Grading Scale:

NUMERIC	GRADE	POINTS	DEFINITION
93–100	A	4.00	Superior
90–92	A-	3.67	Superior
87–89	B+	3.33	Above Average
83–86	B	3.00	Above Average
80–82	B-	2.67	Above Average
77–79	C+	2.33	Average
73–76	C	2.00	Average
70–72	C-	1.67	Below Average
67–69	D+	1.33	Below Average
63–66	D	1.00	Below Average
60–62	D-	0.67	Poor
00--59	F	0.00	Failure

N. College Procedures/Policies:

North Central State College believes that every student is a valued and equal member of the community.* Every student brings different experiences to the College, and all are important in enriching academic life and developing greater understanding and appreciation of one another. Therefore, NC State College creates an inclusive culture in which students feel comfortable sharing their experiences.

Discrimination and prejudice have no place on the campus, and the College takes any complaint in this regard seriously. Students encountering aspects of the instruction that result in barriers to their sense of being included and respected should contact the instructor, assistant dean, or dean without fear of reprisal.

* *Inclusive of race, color, religion, gender, gender identity or expression, national origin (ancestry), military status (past, present or future), disability, age (40 years or older), status as a parent during pregnancy and immediately after the birth of a child, status as a parent of a young child, status as a foster parent, genetic information, or sexual orientation*

Important information regarding College Procedures and Policies can be found on the syllabus supplement located at

<https://ncstatecollege.edu/documents/President/PoliciesProcedures/PolicyManual/Final%20PDFs/14-081b.pdf>



North Central State College
SYLLABUS ADDENDUM

Academic Division: Business, Industry, and Technology Discipline: Mechanical Engineering Technology
Course Coordinator: _____
Course Number: MECT 3031 Course Title: Technical Thermodynamics
Semester / Session: Fall 2025 Start / End Date: 08/11/2025 – 12/12/2025

Instructor Information

Name: Md Saiful Islam Credentials: PhD, MSc, and BSc
Phone Number: 419-755-4717 E-Mail Address: sislam@ncstatecollege.edu
Office Location: Kehoe 234 Office Hours: Thursday: 12:00PM - 3:00PM and Friday 10:00AM - 12:00PM

I. Topical Timeline (Subject to Change):

- First Law of Thermodynamics
- Phases of a pure substance; P-v diagram,
- Ideal Gas Law
- Energy analysis of closed systems: moving boundary work: Constant Volume Processes, Constant Pressure Processes, Constant Temperature Processes, Polytropic Processes
- Conservation of mass
- Steady flow engineering devices: nozzles and diffusers, turbines and compressors, mixing chambers, heat exchangers, pipe and duct flow
- Second law of thermodynamics: heat engines, refrigerators and heat pumps
- Carnot cycle: principle, Carnot heat engine, Carnot refrigeration and heat pump

Weeks	Topic	Assignment	Due Date
1-2	Ch-1: Introduction and Basic Concepts	Quiz-1	08/21/2025
3-4	Ch-2: Energy, Energy Transfer, and General Energy Analysis	Quiz-2 Home Work	09/11/2025
5-6	Ch-3: Properties of Pure Substances		
7-8	Ch-4: Energy Analysis of Closed Systems	Quiz-3	09/18/2025
8	Contents covered in Weeks 1 to 7	Midterm Exam	10/02/2025
9	Fall Break - No Class		10/6/2025 – 10/10/2025
10-11	Ch-5: Mass and Energy Analysis of Control Volumes	Quiz-4	10/30/2025
12-14	Ch-6: The Second Law of Thermodynamics	Quiz-5 Home Work	11/20/2025
15-16	Ch-7: Entropy		
17	Review		
18	Final Exam		12/11/2025

NOTE: THIS IS A TENTATIVE SCHEDULE. ASSIGNMENTS AND DUE DATES MAY BE CHANGED AT THE DISCRETION OF THE INSTRUCTOR.

II. Course Assignments:

Homework: The homework problems will be posted on Canvas.

Quizzes will be in class. Missed quizzes will not be made up and will result in a “0” score for the quiz.

Exams: All the necessary formulas will be given. If you must miss an exam (for any legitimate reason, e.g.: illness), please notify me as early as possible. No makeup examination permitted if instructor is not notified before the day of the scheduled examination.

III. Grading and Testing Guidelines:

Final Grade Calculation

Activity	Qty	Points	Percentage
Quizzes/Home Works	5	500	30
Mid Term Exam	1	100	30
Final Exam	1	100	40

IV. Examination Policy:

1. The reasons for which a student will be excused from taking an examination:
 - a. Hospitalization (with documented verification)
 - b. Death in the immediate family (with documented verification)
 - c. Personal illness or illness in immediate family - (doctor's excuse required).
2. A student who misses an examination for any reason is responsible for:
 - a. Notifying the instructor before the day of the examination.
 - b. Set up a new date for the examination through email from instructor.
3. No makeup opportunity will be given for absences of quizzes.

V. Class Attendance and Homework Make-Up Policy:

Attendance is required per NCSC policy. Class Absentees: No merit or demerit derived from attendance, unless it prevents you from taking a quiz or examination. Homework value will lose 10% per day late.

VI. Classroom Expectations:

1. **Questions in class:** Any questions regarding the material are welcome during the class. If something is not clear to you, it probably is not clear to others. So, ask questions. Your question not only helps yourself, but it also helps others. If your question is too specific and its answer is too long, I may invite you to ask me later in my office.
2. **Office hours:** Take the full advantage of the office hours. Any questions regarding assignments, exam reviews, or general understanding of the material are welcome. If you cannot make the scheduled office hours, appointments can be made in class or by email.
3. **Diagrams:** The importance of diagrams in this course, and generally in Mechanical Engineering, cannot be possibly over- emphasized. Their benefit is two-fold; a) Diagrams help you imagine a problem's scenario, so you will not leave out any details and your solution will be accurate, b) Diagrams are a good tool to represent your solution more clearly to your audience (here, a grader for example, and later to your manager/colleagues). Both a) and b) will enhance your performance as a student and as a future engineer.
4. **Assignments:** Doing the assignments is extremely important. As you will see, the concepts of Dynamics are very simple. Applying them to different problems, however, is challenging at least. You can master the application techniques only by practicing. So, do not neglect the assignments. The assigned homework problems are the bare minimum number required for you to consider. You must solve as many extra problems on your own as possible for best results in this course.