



North Central State College
MASTER SYLLABUS
2019-2020

- A. Academic Division: Business, Industry and Technology
- B. Discipline: Mechanical Engineering Technology
- C. Course Number and Title: MECT 3030 Technical Thermodynamics
- D. Course Coordinator: Daniel Wagner
Assistant Dean: Toni Johnson, PhD

Instructor Information:

- Name: Click here to enter text.
- Office Location: Click here to enter text.
- Office Hours: Click here to enter text.
- Phone Number: Click here to enter text.
- E-Mail Address: Click here to enter text.

- E. Credit Hours: 4
- F. Prerequisites: MATH 1151, PHYS1130
- G. Syllabus Effective Date: Fall, 2019
- H. Textbook(s) Title:

Thermodynamics: An Engineering Approach

- Authors: Cengel, Boles & Kanoglu
- Copyright Year: 2019
- Edition: 9th
- ISBN: 9781259822674

- 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. It includes 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
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. 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

Week	Date	Topic	Chapter/section	Homework
1		Introduction to Thermodynamics, Units, Systems, Properties of a System, Properties, States, Processes, and Pressure	1.1-1.12	
2		Forms of Energy, Energy Transfer, Mechanical Work	2.1-5	
3		First Law of Thermodynamics, Efficiencies	2.6-7	
4		Review and Exam I	1 and 2	
5		Pure Substances, Phases and Phase-Change of Pure Substances, Property Diagrams	3.1-4	

6	Property Tables, Ideal-Gas Equation of State, Compressibility Factor, Equations of State	3.5-8	
7	Boundary Work, Closed Systems, Specific Heat	4.1-3	
8	Ideal Gas, Solid, and Liquid Properties	4.4-5	
9	Review and Exam II	3 and 4	
10	Conservation of Mass, Flow Work, Steady-Flow Energy Analysis	5.1-3	
11	Steady-Flow Engineering, Unsteady-Flow	5.4-5	
12	Second Law of Thermodynamics, Energy Reservoirs, Heat Engines, Refrigerators and Heat Pumps,	6.1-4	
13	Reversible and Irreversible Processes, Carnot Cycle, Carnot Devices	6.1-6.11	
14	Review and Exam III	5 and 6	
15	Course review and final exam review	1 through 6	
16	Final Exam	1 through 6	

N. Course Assignments:

- Quizzes
- Exams

O. 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

P. Grading and Testing Guidelines:

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Q. Examination Policy:

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R. Class Attendance and Homework Make-Up Policy:

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S. Classroom Expectations:

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T. College Procedures/Policies:

Important information regarding College Procedures and Policies can be found on the [syllabus supplement](#) located at <https://sharept.ncstatecollege.edu/committees/1/curriculum/SiteAssets/SitePages/Home/SYLLABUS%20SUPPLEMENT.pdf>