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 3170 Applied 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
Lecture: 3 hours
Lab: 2 hours

F. Prerequisites: MECT 3030, MATH 1151

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:

J. Course Description: This course explores the basic principles and laws of classical thermodynamics, equations of state, reversibility and entropy applied to processes and cycles for ideal and non-ideal substances. Special attention will be given to gas power cycles, vapor and combined power cycles, refrigeration cycle. Air conditioning processes and mechanics of heat transfer will also be studied.

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	

College-Wide Learning Outcome	Assessments - - How it is met & When it is met
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. Use appropriate tables and diagrams to determine the state of the working fluid.	Problem based quizzes, and exams
2. Calculate thermal efficiencies, heat transfer in & out, work in & out, etc. for ideal thermodynamic cycles, as Otto, Diesel, Brayton, Rankine, and refrigeration cycles.	Problem based quizzes, and exams
3. Calculate / investigate actual engine cycles and compare them with the idealized ones as well as identifying viable ways to improve the thermal efficiencies of the engine cycles as Otto and Diesel and power cycles as Brayton and Rankine.	Problem based quizzes, and exams
4. Conduct laboratory experiments, analyze and interpret experimental data.	Laboratory reports
5. Produce written technical and laboratory reports.	Laboratory reports

ABET Outcomes:

- *Outcome c*. Perform selection, set-up, and calibration of measurement tools/instrumentation;
- *Outcome i*. Thermal sciences (such as thermodynamics, fluid mechanics, heat transfer, etc.);
- *Outcome k.* Application of industry codes, specification and standards;
- *Outcome l.* Technical communications typically used in preparation of engineering proposals, reports, and specifications.

M. Topical Timeline (Subject to Change):

- Gas power cycles: ideal, actual and improved
- Vapor and combined power cycles
- Isentropic efficiencies of steady-flow devices
- Refrigeration cycles and heat pumps
- Gas-vapor cycles and air-conditioning
- Heat transfer in thermodynamic systems

Week	Date	Topic	Chapter/section	Homework
1		Carnot Cycle Analysis, Air-Standard Assumptions, Otto Cycle	9.1-5	
2		Diesel Cycle, Stirling & Ericsson Cycles, Brayton Cycle, Jet-Propulsion	9.6-11	
3		Carnot Vapor Cycle, Rankine Cycle, Regeneration	10.1-6	
4		**Review and Exam I**	**9 and 10**	
5		Refrigerators and Heat Pumps	11.1-7	
6		Gas Mixtures	13.1-3	

7		Specific and Relative Humidity, Dew-Point, Wet-Bulb Temperatures	14.1-4	
8		Air-Conditioning	14.5-7	
9		**Review and Exam II**	**11, 13, and 14**	
10		Fuels and Combustion, First-Law Analysis of Reacting Systems	15.1-4	
11		Adiabatic Flame Temperature, Second-Law Analysis of Reacting Systems, Chemical and Phase Equilibrium	15.5-6, 16.1-3	
12		Chemical Equilibrium for Simultaneous Reactions, Stagnation Properties	16.4, 17.1	
13		Speed of Sound and Mach Number, One-Dimensional Isentropic Flow, Isentropic Nozzle Flow, Shock and Expansion Waves	17.2-5	
14		**Review and Exam III**	**15, 16, and 17**	
15		Course review and final exam review	**9 through 17**	
16		**Final Exam**	**9 through 17**	

N. Course Assignments:

- Quizzes
- Exams
- Laboratory Reports

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:

Click here to enter text.

Q. Examination Policy:

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R. Class Attendance and Homework Make-Up Policy:

Click here to enter text.

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

The information can also be found Choose an item.