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MET 303-102: Applied Thermodynamics

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New Jersey Institute of Technology
Department of Engineering Technology
MET 303 Applied Thermodynamics

COURSE NUMBER	MET 303
COURSE NAME	Applied Thermodynamics
COURSE STRUCTURE	(3-0-3) (lecture hr/wk - lab hr/wk – course credits)
COURSE COORDINATOR/ INSTRUCTOR	Dr. Arijit Sengupta / A.Rohafza
COURSE DESCRIPTION	This course provides students with a clear understanding and a firm grasp of the basic principles of Thermodynamics that deals with energy. Topics are the first and the second laws of thermodynamics, physical properties of pure substances, energy analysis of closed system, and mass and energy analysis of control volumes.
PREREQUISITE(S)	MATH 238 or MATH 112, PHYS 103 or PHYS 121, CS 106
COREQUISITE(S)	None.
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Required.
REQUIRED MATERIALS	Text: Thermodynamics, An Engineering Approach, 9 th Ed., by Yunus A. Cengel and Michael A. Boles, McGraw-Hill 2015, ISBN 9780073398174 Thermodynamics (property tables booklet) 9 th Ed., by Yunus A. Cengel and Michael A. Boles, McGraw-Hill 2015, ISBN 9781260048995 Reference: Schaum's Outlines – Thermodynamics for Engineers by Potter and Somerton, McGraw-Hill, 2008, ISBN 0-07-146306-2
COMPUTER USAGE	MS Office.
COURSE LEARNING OUTCOMES	By the end of the course students should be able to: <ol style="list-style-type: none">1. Determine pressure within a tank or pressure drop across a flow section or a flow device by using a manometer.2. Apply Pascal's law to lift large weight by a small force.3. Apply the first law of thermodynamics to derive Energy Balance for various systems.4. Use Property Table to evaluate properties of different pure substances at different phases.5. Evaluate Internal Energy, Enthalpy, and Specific Heats of Ideal Gases, solids and liquids and then calculate work done and amount of heat transfer during a process in a closed system.6. use conservation of energy and mass principles for different steady flow devices: Nozzles and Diffusers, Turbine and Compressors,

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Throttling Valves, Mixing Chambers, Heat Exchangers etc and analyze the thermodynamic aspects of the flow through them.

7. Determine coefficient of performance of Heat Pumps and Refrigerators, thermal efficiency of Carnot Heat Engine and understand that energy has quantity as well as quality.

CLASS TOPICS

Thermodynamics and Energy Systems and Control Volumes, Process and Cycles, Pressure and Measurement, Forms of Energy, First Law of Thermodynamics, Properties of Pure Substance, Property Tables, Energy Analysis of Closed Systems, Mass and Energy Analysis of Control Volumes, Second Law of Thermodynamics

STUDENT OUTCOMES

The Course Learning Outcomes support the achievement of the following MET Student Outcomes and TAC of ABET Criterion 9 requirements.

Student Outcome a - an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities

Related CLO – 4

Student Outcome b - an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;

Related CLO – 1

Student Outcome f - an ability to identify, analyze, and solve broadly-defined engineering technology problems

Related CLO – 3

Student outcome l - technical expertise in dynamics, fluid mechanics, and thermodynamics;

Related CLO – 5

GRADING POLICY

Homework	10 %
Tests (3x20%)	60 %
Final Exam	30 %

Note: Grading Policy may be modified by Instructor for each Section in the Course)

Note: Cannot pass course if you having failing grades (< 60%) on tests and final exam

There are three tests and a final exam during the semester.

ACADEMIC INTEGRITY

NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. In the

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cases the Honor Code violations are detected, the punishments range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on students' permanent record. Avoid situations where honorable behavior could be misinterpreted. For more information on the honor code, go to <http://www.njit.edu/academics/honorcode.php>

STUDENT BEHAVIOR

- No eating or drinking is allowed at the lectures, recitations, workshops, and laboratories.
- Cellular phones must be turned off during the class hours – if you are expecting an emergency call, leave it on vibrate.
- No headphones can be worn in class.
- Unless the professor allows the use during lecture, laptops should be closed during lecture.
- During laboratory, if you are finished earlier, you must show the professor your work before you leave class
- Class time should be participative. You should try to be part of a discussion

MODIFICATION TO COURSE

The Course Outline may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in class of any changes to the Course outline.

**PREPARED BY
COURSE COORDINATED
BY**

Ali Rohafza
Dr. A. Sengupta

CLASS HOURS

Friday 6:00 PM – 8:50 PM CKB 310

OFFICE HOURS:

After class or by appointment E-mail: ar234@njit.edu.

GRADING LEGEND

GRADE	NUMERIC RANGE
A	90 to 100
B+	85 to 89
B	80 to 84
C+	75 to 79
C	70 to 74
D	60 to 69
F	0 to 59

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COURSE OUTLINE

WEEK	DATE	TOPICS	SECTIONS	ASSIGNMENTS
1	1/24	Thermodynamics and Energy Systems and Control Volumes	1.1-1.6	Assignment 1
2	1/31	Process and Cycles Pressure and Measurement	1.7-1.11	Assignment 1
3	2/7	Forms of Energy First Law of Thermodynamics	2.1-2.4	Assignment 2
4	2/14	First Law of Thermodynamics	2.5-2.8	Assignment 3
5	2/21	test # 1 Properties of Pure Substance	Chapters 1 & 2 3.1-3.4	Assignment 4
6	2/28	Property Tables	3.5-3.8	Assignment 5
7	3/6	TEST#2	Chapter 3	
8	3/13	Energy Analysis of Closed Systems	4.1-4.3	Assignment 6
SPRING BREAK 3/15-3/22				
9	3/27	Energy Analysis of Closed Systems	4.4-4.5	Assignment 7
10	4/4	Mass and Energy Analysis of Control Volumes	5.1-5.3	Assignment 8
NO CLASS ON GOOD FRIDAY 4/10				
11	4/17	Mass and Energy Analysis of Control Volumes	5.4-5.5	Assignment 9
12	4/24	TEST#3 Second Law of Thermodynamics	Chapter 4 & 5 6.1-6.6	Assignment 10
13	5/1	Second Law of Thermodynamics	6.1--6.11	Assignment 11
14	5/5 (Tuesday)	Second Law of Thermodynamics Review	6.7-6.11 Chapters 1 thru 6	Assignment 12
15	TBD	FINAL EXAM	Chapters 1 thru 6	