

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

<b>COURSE NUMBER</b>	MET 303
<b>COURSE NAME</b>	Applied Thermodynamics
<b>COURSE STRUCTURE</b>	(3-0-3) (lecture hr/wk - lab hr/wk – course credits)
<b>COURSE COORDINATOR/ INSTRUCTOR</b>	Dr. Arijit Sengupta / A.Rohafza
<b>COURSE DESCRIPTION</b>	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.
<b>PREREQUISITE(S)</b>	MATH 138 or MATH 111, PHYS 103 or PHYS 121
<b>COREQUISITE(S)</b>	None.
<b>REQUIRED, ELECTIVE OR SELECTED ELECTIVE</b>	Required.
<b>REQUIRED MATERIALS</b>	<b>Text:</b> Thermodynamics, An Engineering Approach, 9 <sup>th</sup> Ed., by Yunus A. Cengel and Michael A. Boles, McGraw-Hill, ISBN 9781259822674 Thermodynamics (property tables booklet) 9 <sup>th</sup> Ed., by Yunus A. Cengel and Michael A. Boles, McGraw-Hill, ISBN 9781260048995  <b>Reference:</b> Schaum's Outlines – Thermodynamics for Engineers by Potter and Somerton, McGraw-Hill, ISBN 0-07-146306-2
<b>COMPUTER USAGE</b>	MS Office.
<b>COURSE OUTCOMES (CO)</b>	By the end of the course students should be able to: <ol style="list-style-type: none"><li>1. Determine pressure within a tank or pressure drop across a flow section or a flow device by using a manometer.</li><li>2. Apply Pascal's law to lift large weight by a small force.</li><li>3. Apply the first law of thermodynamics to derive Energy Balance for various systems.</li><li>4. Use Property Table to evaluate properties of different pure substances at different phases.</li><li>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.</li><li>6. use conservation of energy and mass principles for different steady flow devices: Nozzles and Diffusers, Turbine and</li></ol>

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Compressors, 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:

**Student Outcome (1)** an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline.

**Relate d CO – 1, 3, and 4**

**Student Outcome (2)** an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline.

**Relate d CO – 5 and 6**

**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 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>

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**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**

Ali Rohafza

**COURSE COORDINATED BY**

Dr. A. Sengupta

**CLASS HOURS**

Friday            6:00 PM – 8:50 PM            CKB 320

**OFFICE HOURS:**

After class or by appointment E-mail: [ar234@njit.edu](mailto:ar234@njit.edu).

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**GRADING LEGEND**

<b>GRADE</b>	<b>NUMERIC RANGE</b>
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

**NJIT ONLINE INFORMATION**

The instructor will discuss these requirements on the first day of the course and/or post on their Learning Management System (LMS). Please become familiar

- Webex: <http://ist.njit.edu/webex>
- Online Proctoring: <https://ist.njit.edu/online-course-exam-proctoring>

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**COURSE OUTLINE**

<b>WEEK</b>	<b>DATE</b>	<b>TOPICS</b>	<b>SECTIONS</b>	<b>ASSIGNMENTS</b>
1	1/20	Thermodynamics and Energy Systems and Control Volumes	1.1-1.6	Assignment 1
2	1/27	Process and Cycles Pressure and Measurement	1.7-1.11	Assignment 1
3	2/3	Forms of Energy First Law of Thermodynamics	2.1-2.4	Assignment 2
4	2/10	First Law of Thermodynamics	2.5-2.8	Assignment 3
5	2/17	<b>TEST # 1</b> Properties of Pure Substance	Chapters 1 & 2 3.1-3.4	Assignment 4
6	2/24	Property Tables	3.5-3.8	Assignment 5
7	3/3	<b>TEST#2</b>	Chapter 3	
8	3/10	Energy Analysis of Closed Systems	4.1-4.3	Assignment 6
<b>NO CLASS 3/17 SPRING BREAK</b>				
9	3/24	Energy Analysis of Closed Systems	4.4-4.5	Assignment 7
10	3/31	Mass and Energy Analysis of Control Volumes	5.1-5.3	Assignment 8
<b>NO CLASS 4/7 GOOD FRIDAY UNIVERSITY CLOSED</b>				
11	4/14	Mass and Energy Analysis of Control Volumes	5.4-5.5	Assignment 9
12	4/21	<b>TEST#3</b> Second Law of Thermodynamics	Chapter 4 & 5 6.1-6.6	Assignment 10
13	4/28	Second Law of Thermodynamics	6.1--6.11	Assignment 11
14	5/2 (Tues)	Second Law of Thermodynamics <b>Review</b>	6.7-6.11 Chapters 1 thru 6	Assignment 12
	TBD	<b>FINAL EXAM</b>	Chapters 1 thru 6	

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