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. Jaskirat Sodhi / 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 138 or MATH 111, PHYS 103 or PHYS 121
COREQUISITE(S)	None.
REQUIRED, ELECTIVE OR SELECTED ELECTIVE	Required.
REQUIRED MATERIALS	**Text:** Thermodynamics, An Engineering Approach, 10th Ed., by Yunus A. Cengel and Michael A. Boles, McGraw-Hill, ISBN 9781266664489 Thermodynamics (property tables booklet) 9th Ed., by Yunus A. Cengel and Michael A. Boles, McGraw-Hill, ISBN 9781260048995 **Reference:** Schaum's Outlines – Thermodynamics for Engineers by Potter and Somerton, McGraw-Hill, ISBN 0-07-146306-2
COMPUTER USAGE	MS Office.
COURSE OUTCOMES (CO)	By the end of the course students should be able to: 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, 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.
Related 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.
Related CO – 5 and 6

GRADING POLICY

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

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

"Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: NJIT Academic Integrity Code.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the

university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu."

GENERATIVE AI

Student use of artificial intelligence (AI) is permitted in this course for certain assignments and activities. It is not permitted to be used in the assignments noted by the instructor, as doing so would undermine student learning and achievement of course learning outcomes. Additionally, if and when students use AI in this course, the AI must be cited as is shown within the NJIT Library AI citation page for AI. If you have any questions or concerns about AI technology use in this class, please reach out to your instructor prior to submitting any assignments.

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 / Dr. J. Sodhi

COURSE COORDINATED BY
Dr. J. Sodhi

CLASS HOURS

Monday 6:00 PM – 8:50 PM CKB 114

OFFICE HOURS:

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

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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

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

- Canvas: https://canvas.njit.edu/
- Zoom: https://njit-edu.zoom.us/
- Online Proctoring: https://ist.njit.edu/online-course-exam-proctoring

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COURSE OUTLINE

WEEK	DATE	TOPICS	SECTIONS	ASSIGNMENTS
1	Jan 27	Thermodynamics and Energy Systems and Control Volumes	1.1-1.6	Assignment 1
2	Feb 3	Process and Cycles Pressure and Measurement	1.7-1.11	Assignment 1
3	Feb 10	Forms of Energy First Law of Thermodynamics	2.1-2.4	Assignment 2
4	Feb 17	First Law of Thermodynamics	2.5-2.8	Assignment 3
5	Feb 24	**TEST # 1** Properties of Pure Substance	Chapters 1 & 2 3.1-3.4	Assignment 4
6	Mar 3	Property Tables	3.5-3.8	Assignment 5
7	Mar 10	**TEST#2**	Chapter 3	
8	Mar 24	Energy Analysis of Closed Systems	4.1-4.3	Assignment 6
9	Mar 31	Energy Analysis of Closed Systems	4.4-4.5	Assignment 7
10	Apr 7	Mass and Energy Analysis of Control Volumes	5.1-5.3	Assignment 8
11	Apr 14	Mass and Energy Analysis of Control Volumes	5.4-5.5	Assignment 9
12	Apr 21	**TEST#3** Second Law of Thermodynamics	Chapter 4 & 5 6.1-6.6	Assignment 10
13	Apr 28	Second Law of Thermodynamics	6.1--6.11	Assignment 11
14	May 5	Second Law of Thermodynamics **Review**	6.7-6.11 Chapters 1 thru 6	Assignment 12
	TBD	**FINAL EXAM**	Chapters 1 thru 6	