




**Ahmedabad
University**



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University

Course	ENR205 Thermodynamics-1	Semester	Monsoon Semester 2024													
Faculty Name(s)	Sunil Kale	Contact	sunil.kale@ahduni.edu.in													
School	SEAS	Credits	2													
GER Category:		Teaching Pedagogy Enable:NO	P/NP Course: Can not be taken as P/NP													
Schedule	<table> <tr> <td rowspan="4">Section 1</td> <td>12:00 pm to 01:00 pm</td> <td>Wed</td> <td>30-09-24 to 26-11-24</td> </tr> <tr> <td>01:00 pm to 02:00 pm</td> <td>Mon</td> <td>30-09-24 to 26-11-24</td> </tr> <tr> <td>01:00 pm to 02:00 pm</td> <td>Fri</td> <td>30-09-24 to 26-11-24</td> </tr> <tr> <td>01:00 pm to 02:00 pm</td> <td>Sat</td> <td>30-09-24 to 26-11-24</td> </tr> </table>			Section 1	12:00 pm to 01:00 pm	Wed	30-09-24 to 26-11-24	01:00 pm to 02:00 pm	Mon	30-09-24 to 26-11-24	01:00 pm to 02:00 pm	Fri	30-09-24 to 26-11-24	01:00 pm to 02:00 pm	Sat	30-09-24 to 26-11-24
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Prerequisite	Not Applicable															
Antirequisite	Not Applicable															
Corequisite	Not Applicable															
Course Description	<p>This course covers the fundamental principles of thermodynamics and physical chemistry as applied to energy systems. This course provides a foundation in fundamental thermodynamic phenomena, including the first and second laws of thermodynamics, thermodynamic properties and equations of state.</p>															

Course Objectives	<ul style="list-style-type: none"> - To learn basic laws of thermodynamics - To understand the properties of pure fluids conceptually - To understand and analyze the performance, efficiency, and limits of systems
Learning Outcomes	<p>At the end of the course, the student will have acquired the knowledge about:</p> <ul style="list-style-type: none"> • Thermodynamics laws • Fluid and its properties • Steam utility and refrigeration
Pedagogy	Lectures
Expectation From Students	<p>Should solve the given home assignments regularly. They have to complete 10 assignments out of 15. Each assignment will have a weightage of 3%.</p> <p>The students will also appear for one quiz of 10 marks.</p>
Assessment/Evaluation	<ul style="list-style-type: none"> • Mid-Semester Examination: <ul style="list-style-type: none"> ◦ Written - 30% • End Semester Examination: <ul style="list-style-type: none"> ◦ Written - 40% • Other Components: <ul style="list-style-type: none"> ◦ Assignment - 30%
Attendance Policy	As per Ahmedabad University Policy.
Project / Assignment Details	

Course Material	<p>Reference Book</p> <ul style="list-style-type: none"> • Principles of Engineering Thermodynamics, 1. M J Moran, H N Shapiro, D D Boettner and M B Bailey, 8th Edition, Wiley Publications, ISBN: 8126556722, Year: 2015, • Principles of Engineering Thermodynamics, 1. M J Moran, H N Shapiro, D D Boettner and M B Bailey, 8th Edition, Wiley Publications, ISBN: 8126556722, Year: 2015, • Principles of Engineering Thermodynamics, 1. M J Moran, H N Shapiro, D D Boettner and M B Bailey, 8th Edition, Wiley Publications, ISBN: 8126556722, Year: 2015, • Principles of Engineering Thermodynamics, 1. M J Moran, H N Shapiro, D D Boettner and M B Bailey, 8th Edition, Wiley Publications, ISBN: 8126556722, Year: 2015, • Principles of Engineering Thermodynamics, 1. M J Moran, H N Shapiro, D D Boettner and M B Bailey, 8th Edition, Wiley Publications, ISBN: 8126556722, Year: 2015, • Principles of Engineering Thermodynamics, 1. M J Moran, H N Shapiro, D D Boettner and M B Bailey, 8th Edition, Wiley Publications, ISBN: 8126556722, Year: 2015, • Principles of Engineering Thermodynamics, 1. M J Moran, H N Shapiro, D D Boettner and M B Bailey, 8th Edition, Wiley Publications, ISBN: 8126556722, Year: 2015, • Principles of Engineering Thermodynamics, 1. M J Moran, H N Shapiro, D D Boettner and M B Bailey, 8th Edition, Wiley Publications, ISBN: 8126556722, Year: 2015,
Additional Information	

Session Plan

NO.	TOPIC TITLE	TOPIC & SUBTOPIC DETAILS	READINGS,CASES,ETC.	ACTIVITIES	IMPORTANT DATES
1	Introduction	The scope of Thermodynamics, Dimensions and Units, Energy Conversion	Textbook by Smith and Vanness, Chapter 1	Interaction about energy	
2	The first law of thermodynamics	Internal Energy, First law for closed system,	Textbook by Smith and Vanness, Chapter 2, Topic 2.2	Lecture	
3	The first law of thermodynamics	Thermodynamic state and state functions	Textbook by Smith and Vanness, Chapter 2, Topic 2.5	Lecture	
4	The first law of thermodynamics	Equilibrium, The Phase rule, The reversible Process	Textbook by Smith and Vanness, Chapter 2, Topic 2.6, 2.8	Lecture	
5	The first law of thermodynamics	Constant Volume and Constant Pressure Process	Textbook by Smith and Vanness, Chapter 2, Topic 2.9	Lecture	
6	The first law of thermodynamics	Enthalpy, Heat Capacity, Mass and Energy Balance for Open systems	Textbook by Smith and Vanness, Chapter 2, Topic 2.11	Group Discussion	
7	The first law of thermodynamics	First law for steady-state flow process, Problems	Textbook by Smith and Vanness, Chapter 2, Topic 2.12	Problem Solution	
8	The first law of thermodynamics	Pipe flow, Nozzle, Throttling Process	Textbook by Smith and Vanness, Chapter 7, Topic 7.1, 7.2	Lecture	
9	The first law of thermodynamics	Turbines, Compression processes	Textbook by Smith and Vanness, Chapter 7, Topic 7.2, 7.3	Lecture	

10	Volumetric Properties of Fluids	PVT behavior of pure substances, PV diagram, Critical behavior	Textbook by Smith and Vanness, Chapter 3, Topic 3.1	Lecture	
11	Volumetric Properties of Fluids	Virial equations of state, Ideal gas temperature, The idea gas	Textbook by Smith and Vanness, Chapter 3, Topic 3.2	Lecture	
12	Volumetric Properties of Fluids	Isothermal, Isobaric, Isochoric, Adiabatic process, Polytropic process,	Textbook by Smith and Vanness, Chapter 3, Topic 3.3	Problem Solution	
13	Mid-Term Examination				
14	Volumetric Properties of Fluids	Problems based on various processes		Problem Solution	
15	Volumetric Properties of Fluids	Applications of the virial equations, Cubic equation of state, The vander waals equation of state	Textbook by Smith and Vanness, Chapter 3, Topic 3.4	Lecture	
16	Volumetric Properties of Fluids	Theorem of corresponding states, Pitzer correlations for the compressibility factor, Pitzer correations for the second virial coefficient, Generalized correlations for liquids	Textbook by Smith and Vanness, Chapter 3, Topic 3.5, 3.6	Lecture	
17	Heat Effects	Sensible heat effects, Temperature dependence of the heat capacity	Textbook by Smith and Vanness, Chapter 4, Topic 4.1, 4.2	Lecture	
18	Heat Effects	Evaluation of the sensible-heat integral, Latent heats of pure substances, Standard heat of reaction, Standard heat of formation, Standard heat of combustion	Textbook by Smith and Vanness, Chapter 4, Topic 4.3, 4.4,4.5	Lecture	
19	The second law of thermodynamics	Statements of the second law, Heat engines	Textbook by Smith and Vanness, Chapter 5, Topic 5.1,5.2	Lecture	

20	The second law of thermodynamics	Carnot's theorem, Thermodynamic Temperature Scales, Ideal gas Temperature scale	Textbook by Smith and Vanness, Chapter 5, Topic 5.3,5.4	Lecture	
21	The second law of thermodynamics	Entropy, Entropy changes of an ideal gas	Textbook by Smith and Vanness, Chapter 5, Topic 5.4,5.5	Lecture	
22	The second law of thermodynamics	Mathematical statement of the second law, Calculation of ideal work, Lost work	Textbook by Smith and Vanness, Chapter 5, Topic 5.6	Problem Solution	
23	The second law of thermodynamics	Rankine Cycle, Otto Cycle	Textbook by Smith and Vanness, Chapter 8	Lecture	
24	Refrigeration and Liquefaction	The carnot refrigerator, The vapor-compression cycle	Textbook by Smith and Vanness, Chapter 9, Topic 9.1,9.2	Lecture	
25	Refrigeration and Liquefaction	The choice of refrigerant	Textbook by Smith and Vanness, Chapter 9, Topic 9.3	Lecture	
26	Refrigeration and Liquefaction	Absorption refrigeration, The heat pump	Textbook by Smith and Vanness, Chapter 9, Topic 9.4	Problem Solution	
27	Refrigeration and Liquefaction	Problems		Problem Solution	
28	Reflection and Review				
29	Reflection and Review				
30	End-Term Examination				

