

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE OUTLINE TEMPLATE			
Course Title	CHEMICAL ENGINEERING THERMODYNAMICS		
Course Code	CLPC17	No. of Credits	3
Department	Chemical Engineering	Faculty	Dr.K.N.Sheeba
Pre-requisites Course Code	CLPC15		
Course Coordinator(s) (if, applicable)	NA		
Other Course Teacher(s)/Tutor(s) E-mail	Nil	Telephone No.	0431 2503113
Course Type	<input checked="" type="checkbox"/> Core course		<input type="checkbox"/> Elective course
COURSE OVERVIEW			
This course is intended to understand the principles of thermodynamics as applied to the chemical engineering applications.			
COURSE OBJECTIVES			
1. To understand and appreciate thermodynamics as applied to various Chemical Engineering Processes.			
COURSE OUTCOMES (CO)			
Course Outcomes	Aligned Programme Outcomes (PO)		
On completion of the course, the students will be familiar with 1. Fundamentals of thermodynamics as applied to various processes 2. Properties as applied to ideal and real gases 3. Determination of equilibrium states for mixture of gases, phases and chemical reaction	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12		

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
1.	1 (3 contact hours)	First law and second law of thermodynamics, P-V-T Behaviour of Pure fluids , Heat effects accompanying chemical Reactions	Chalk & Talk
2.	2 (3 contact hours)	Statements of second law- Clausius Inequality, Mathematical Statement of Second law-Third Law of Thermodynamics.	Chalk & Talk
3.	3 (3 contact hours)	Flow processes: Flow in pipes, Flow through nozzles, Compression- Refrigeration	Power point
4.	4 (1 contact hour)	<i>Written test 1</i>	
5.	5 (3 contact hours)	Thermodynamic Properties of Pure Fluids Classification of Thermodynamic properties Work function and Gibb's Free energy, Fundamental Property relations	Chalk & Talk
6.	6	<i>Assignment</i>	
7.	6 (3 contact hours)	Maxwell's equations- Clapyeron equation Entropy Heat capacity relationship, Differential equations of Entropy	Chalk & Talk
8.	7 (3 contact hours)	Relationship between Cp and Cv, Effect of pressure and volume on Cp and Cv, Gibb's Helmholtz Equation-Properties of Jacobians, Thermodynamic Relations through method of jacobians	Chalk & Talk
9.	8 (1 contact hour)	<i>Written test 2</i>	
10.	8& 9 (5 contact hours)	Introduction to fugacity and activity, Activity coefficients-Partial molar properties, Chemical potential as a partial molar property. Lewis randall rule-Roults and henry's law-Gibbs Duhem Equation	Chalk & Talk

11.	9	<i>Spot test</i>	Chalk & Talk
12.	10 & 11 (6 contact hours)	Criteria for phase equilibrium, Criterion of stability, Phase equilibria in single and multiple component systems Duhem's theorem, VLE for Ideal solutions, Calculation of activity coefficients	
13.	12	<i>Compensation test</i>	
14.	12, 13, 14 (9 contact hours)	Reaction stoichiometry, Equilibrium constant Feasibility of reaction- Effect of temperature, pressure, volume and other factors- Simultaneous Reactions	Chalk & Talk
15.	End of semester	End semester examinations	

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Written Test 1	4	1 hour	20
2	Assignment	6	Group task	5
3	Written Test 2	8	1 hour	20
4	Spot Test	9	10 minutes	5
5	Compensation Test	12	1 hour	20
6	End semester exam	End of semester	3 hours	10

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. J.M. Smith, Hendrick Van Ness, Michael M. Abbott, *Introduction to Engineering Thermodynamics*, McGraw Hill, New York, 2005.
2. S. Sundaram, *Chemical Engineering Thermodynamics*, Ahuja Publishers, New Delhi, 2001.
3. K.V.Narayanan, *A Textbook of Chemical Engineering Thermodynamics*, PHI Learning, 2004.
4. B.F. Dodge, *Chemical Engineering Thermodynamics*, McGraw Hill, New York, 1971.

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

Feedback from students during class committee meetings
Feedback during end semester examinations

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)

Academic honesty and plagiarism

Students are expected to follow academic ethics and refrain themselves from activities such as plagiarism, copying assignments, copying in exams etc.

Such activities if found will result in loss of marks for the student.

Attendance

Attendance will be taken by the faculty during the contact hours.

Attendance is a "MUST" for all the contact hours. Every student is required to maintain atleast 75% attendance to appear for the end semester examinations.

Any student who maintains attendance in the range of 50-75%, needs to appear for a compensation assessment test (CPA) and score minimum 30% of the total marks of CPA to appear for the end semester examinations failing which the student has to redo the course.

Students who maintain attendance less than 50% in the subject should redo the course.

Assessment

All the assessments are compulsory.

If a student fails to attend any one assessment due to genuine reasons, he/she will be permitted to appear for CPA.

Grading and passing minimum are as prescribed by the regulations of the institute.

ADDITIONAL COURSE INFORMATION

The Course Coordinator is available for consultation at times that are displayed on the coordinator's office notice board. Queries may also be emailed to the Course Coordinator directly at sheeba@nitt.edu

FOR SENATE'S CONSIDERATION

Course Faculty

(Dr. K. N. Sheeba)

CC-Chairperson

(Dr. Saravanan)

HOD

(Signature)