

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE OUTLINE TEMPLATE			
Course Title	INTRODUCTION TO MECHANICAL ENGINEERING		
Course Code	CLPC13	No. of Credits	3
Department	Chemical Engineering	Faculty	Dr.M. MATHESWARAN
Pre-requisites Course Code	NA		
Course Coordinator(s) (if, applicable)	NA		
Other Course Teacher(s)/Tutor(s) E-mail	Nil	Telephone No.	0431- 2503120
Course Type	<input checked="" type="checkbox"/>	Core course	<input type="checkbox"/> Elective course
COURSE OVERVIEW			
This course will introduce you to the field of mechanical engineering and the relationships between physics, mathematics, communications, and sciences which inform the study, design, and manufacture of mechanical products and systems.			
COURSE OBJECTIVES			
The course is aimed at giving a deeper understanding			
<ol style="list-style-type: none"> 1. To basic knowledge of thermodynamic laws and cycles. 2. To understand basic working principles of various boilers, steam turbines and vacuum pump. 3. To understand the energy conservation opportunities in steam systems 			
COURSE OUTCOMES (CO)			
Course Outcomes	Aligned Programme Outcomes (PO)		
<p>On completion of the course, the students will be understand</p> <ol style="list-style-type: none"> 1. The conceptual laws of thermodynamics for application in thermodynamic cycles. 2. The calculation of thermal efficiencies for different thermodynamic cycles 3. The basics of boilers and calculations of boiler efficiencies 4. The steam distribution and utilization systems to identify the energy conservation opportunities 5. The working of principles of steam turbines and vacuum pumps. 	PO1, PO2, PO3, PO5, PO6, PO7, PO8, PO9, PO10, PO11		

COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	Week	Topic	Mode of Delivery
1.	1 (3 contact hours)	Thermodynamic systems -closed, open and isolated. Property, state, path and process, quasi-static process, work, Energy.	Chalk & Talk
2.	2 (3 contact hours)	Zeroth, First and Second laws of Thermodynamics	
3.	3 (1 contact hours)	Internal energy, Specific heat capacity and Enthalpy.	
4.	3 (2 contact hours)	Air standard Cycles: Carnot, Otto, -determination of cycle efficiency	
5.	4 (3 contact hours)	Diesel and Combined cycle-determination of cycle efficiency	
6.	5 (2 contact hours)	Brayton and Rankine cycles -determination of cycle efficiency	
7.	5 (1 contact hour)	Written Test 1	-
8.	6 (3 contact hour)	Water tube, fire tube, coal, oil and gas fired boilers	PowerPoint, Chalk & Talk
9.	7 (3 contact hour)	Stoker fired, pulverized and fluidized bed boilers	
10.	8 (2 contact hour)	Mountings and accessories of boilers. Performance and efficiency calculation of boilers	
11.	8 (2 contact hour)	Properties of steam, Mollier chart, determination of dryness fraction of steam	
12.	9 (2 contact hour)	Different types of calorimeters, Concept of Steam distribution systems. steam traps- types and their characteristics	
13.	9 (1 contact hour)	Written Test 2	-
14.	10 (3 contact hour)	Energy conservation opportunities in steam systems	Chalk & Talk, PowerPoint
15.	11 (3 contact hour)	Steam turbines- types and principles: Reaction and impulse turbines	
16.	12 (3 contact hour)	Application of co-generation principles in process industries	
17.	13 (3 contact hour)	Gas turbines- principle and working. Production of Vacuum: Systems and Equipment - Vacuum Pumps, Steam Ejectors; Instrumental methods of	

		Vacuum measurement	
18.	End of semester	End semester examinations	

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week	Duration	% Weightage
1.	Written Test 1	5	1 hour	20
2.	Assignment	5	-	5
3.	Written Test 1	9	1 hour	20
4.	Assignment	10	-	5
5.	End semester exam	End of semester	3 hours	50

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

1. Rajput R.K., "Thermal Engineering", 9th Edition, Laxmi Publications, 2010.
2. Rudramoorthy R., "Thermal Engineering", 4th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2006.
3. Kothandaraman, C.P., "Course in Thermodynamics and Heat Engines: Thermal Engineering with Introduction to Solar Energy ", 3rd Edition, Dhanpat Rai Publisher, New Delhi, 1985.
4. Ballaney P.L., "Thermal Engineering", Khanna Publishers, New Delhi, 2005.

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 at the end semester on course outcome

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

ATTENDANCE

1. Attendance will be taken by the faculty during the contact hours.
2. Attendance is a "MUST" for all the contact hours.
3. Every student is required to maintain overall 75% attendance to appear for the end semester examinations.
4. Any student, who fails to maintain 75% and having above 50% attendance need to appear for the compensation assessment (CPA) and score minimum 30% marks in the CPA for attending the end semester examination, student who maintained less than 50% will redo the course.

ASSESSMENT

1. All the assessments are compulsory.
2. If a student fails to attend any of the assessment 1 and 3 on genuine reasons, he/she shall be permitted to appear only once for the retest with the prior permission of the concerned faculty member. The retest shall be conducted before the end semester exam.
3. Grading and passing minimum are as prescribed by the regulations of the institute.

ACADEMIC HONESTY AND PLAGIARISM

1. 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.

ADDITIONAL COURSE INFORMATION

The Course Coordinator is available for consultation at times that is displayed on the coordinator's office notice board.

Queries may also be emailed to the Course Coordinator directly at matheswaran@nitt.edu

FOR SENATE'S CONSIDERATION**Approved by:****Course Faculty : M.Matheswaran****CC-Chairperson : S.Saravanan****HOD : P.Sivashanmugam**