DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the program and specialization	**M.TECH. MATERIALS SCIENCE & ENGINEERING**		
Course Title	**Thermodynamics and Kinetics**		
Course Code	MT653	**No. of Credits**	4
Course Code of Pre-requisite subject(s)	Nil		
Session	July 2023	**Section (if, applicable)**	NA
Name of Faculty	Dr. Anand S	**Department**	MME
Email	anands@nitt.edu	**Telephone No.**	7685933853
Name of Course Coordinator(s) (if, applicable)	NA		
E-mail		**Telephone No.**	
Course Type	✓ Core course	☐ Elective course	

Syllabus (approved in BoS)
- Introduction to thermodynamics and kinetics – different approaches – emphasis on metallurgical thermodynamics, transport phenomena and applications Laws of thermodynamics and related applications – concepts of free energy and entropy criteria for spontaneity   - Introduction to solutions – partial molar entities – Gibbs Duhem relations - thermodynamic aspects of metallic solutions and salt melts – Raoult's Law and Henry's Law - regular and quasi chemical models   - Thermodynamic aspects of phase diagrams – similarity in thermodynamic approach towards different classes of materials – thermodynamic aspects of defect formation in metals and ceramics – approaches used in chemical modeling   - Principles of metallurgical kinetics – reaction rates and reaction mechanisms – overview of mass transfer, heat transfer and fluid flow – related applications in metallurgical processes – role of transport phenomena in mathematical and physical modelling
COURSE OBJECTIVES
To introduce the principles of thermodynamics and kinetics and illustrate their applications in the design of alloy systems.

COURSE OUTCOMES		

At the end of the course, students will be able to

	Course Outcomes	Programme outcomes
CO1	Understand the terminology associated with engineering thermodynamics and have knowledge of contemporary issues related to metallurgical thermodynamics.	1, 2
CO2	Knowledge of phase equilibria in two-component and multi-component systems Estimate thermodynamic properties of an alloy in solid or liquid state of ideal and real mixture	1, 2
CO3	Predict the phase transformations in an alloy system with an understanding of phase diagrams.	1, 2, 4

COURSE PLAN – PART II

COURSE OVERVIEW

The course introduces the principles of thermodynamics and kinetics and illustrates their applications in the design of alloy systems.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
1	I	Introduction	Board + Power point+ animated/real videos
2	II-V	Enthalpy, entropy calculations for reactions	
3	VI-X	Free energy for reactions and solution thermodynamics	
4	XI-XIII	Thermodynamic aspects of phase diagrams	
5	XIV-XV	Metallurgical Kinetics	

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week*	Duration (in Mins)	% Weightage
1	Cycle Test 1	X	60	20
2	Cycle Test 2	XV	60	20
3	Assignment	--	--	20
CPA	Compensation Assessment*	XIX	60	20
4	End-sem Exam *	XXI	**180**	40
		* As per institute time table		

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

The exit survey will be assessed based on questionnaire prepared by the class teacher and expected attainment is 75% on 1-10 scale basis

COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)

MODE OF CORRESPONDENCE (email/ phone etc)
Email/Mobile: anands@nitt.edu, 7685933853

COMPENSATION ASSESSMENT POLICY
It will be given during XVI week for those who are absent on genuine grounds for any one of the Cycle Tests, for full syllabus

ATTENDANCE POLICY

> At least 75% attendance in each course is mandatory.

> Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

> The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

ADDITIONAL INFORMATION
The Course faculty is available for consultation at any time. Students can also contact him at any time through phone call or by mail.

FOR APPROVAL

| Course Faculty | CC-Chairperson | HOD |