



**NATIONAL INSTITUTE OF TECHNOLOGY,
TIRUCHIRAPPALLI**

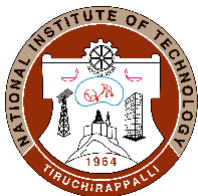
DEPARTMENT OF METALLURGICAL AND MATERIALS ENGG

COURSE PLAN – PART I			
Name of the programme and specialization	BTech Metallurgical and Materials Engg.		
Course Title	Alloy Development		
Course Code	MTPE19	No. of Credits	03
Course Code of Pre-requisite subject(s)	Nil		
Session	July 2022	Section (if, applicable)	Nil
Name of Faculty	Dr S KUMARAN	Department	MME
Official Email	kumara@nitt.edu	Telephone No.	9944434705
Name of Course Coordinator(s) (if, applicable)	Nil		
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	Core course	√ Elective course	
Syllabus (approved in BoS)			
<p>Metals vs Alloys; superiority of alloys over pure elemental metals; strategies for alloying; concepts such as strengthening mechanisms. Thermodynamics aspects of alloying; relation between alloy composition, structure and properties. ICME approach to alloy design and development.</p> <p>Ferrous systems – Effect of specific alloying elements; alloy grades of cast irons, carbon steels; role of heat treatment</p> <p>Ferrous systems – Highly alloyed steels; specific examples; Effect of alloying elements on phase transformations; development of novel grades of steels such as maraging steels, IF steels, AHS steels, PH steels, DP steels and Duplex stainless steels, role of heat treatment</p> <p>Non-Ferrous systems based on Aluminium, Titanium and Copper; Typical alloying elements and their effects; relevant phase diagrams; Input on heat treatment</p> <p>Use of alloying elements for grain refinement; Inclusion engineering; concept of ODS alloys; special cases such as High Entropy Alloys and Bulk metallic glasses</p>			
COURSE OBJECTIVES			
To study the fundamentals, classification, properties of applications of various ferrous and nonferrous systems			



MAPPING OF COs with POs	
Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. Understand the strategies of alloying, effects of alloying and thermodynamics of alloying	[1]
2. Describe the carbon steels, cast iron and their grading, role of alloying elements and heat treatment	[1,2]
3. Choose a suitable alloying element to develop a highly alloyed steels with specific properties	[1,2]
4. Develop a non-ferrous alloy system with specific properties by adjusting the alloying elements.	[1,2]
5. Understand the principle of formation of high entropy alloys and bulk metallic glasses.	[1]

COURSE PLAN – PART II
COURSE OVERVIEW
<ul style="list-style-type: none"> • Metals vs Alloys; superiority of alloys over pure elemental metals; strategies for alloying; concepts such as strengthening mechanisms. • Ferrous systems – Effect of specific alloying elements; alloy grades of cast irons, carbon steels; role of heat treatment • Ferrous systems – Highly alloyed steels; specific examples; Effect of alloying elements on phase transformations; development of novel grades of steels such as maraging steels, IF steels, AHS steels, PH steels, DP steels and Duplex stainless steels, role of heat treatment • Non-Ferrous systems based on Aluminium, Titanium and Copper; Typical alloying elements and their effects; relevant phase diagrams; Input on heat treatment • Use of alloying elements for grain refinement; Inclusion engineering; concept of ODS alloys; special cases such as High Entropy Alloys and Bulk metallic glasses



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COURSE TEACHING AND LEARNING ACTIVITIES				
S.No.	Week/Contact Hours	Topic	Mode of Delivery	
1	4 th week, August	Alloy development concepts, strengthening mechanism, Ferrous systems (Carbon steels) Alloy Steels Non-Ferrous Alloys Advanced Metallic Materials	Chalk & Board	
2	1 st to 3 rd week September			
3	4 th week September., to 3 rd week October			
4	4 th week October to 2 nd week November			
COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assignment - I	4 th week August	1 hr	10
2	Mid-Term Assessment	2 nd week October	1 hr 30 min	25
3	Quiz / Viva /Presentation	3 rd /4 th week October	1 hr	5
4	Assignment -II	4 th week October	1hr	10
CPA	Compensation Assessment	2 nd week November	1hr 30 min	25
5	Final Assessment	Novemeber /December	3hrs	50
COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)				
Student's Feedback				
COURSE POLICY (including compensation assessment to be specified)				
If any students miss the test in genuine ground (production of certificate or letter from the authorized personnel), She / he will be permitted for compensation assessment				



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ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- 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.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

Nil


FOR APPROVAL



Course Faculty



CC- Chairperson
V. Karthik



HOD
B.Ravisankar

08 August 2022



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Guidelines

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.