



**NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI
DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING**

COURSE PLAN – PART I			
Name of the programme and specialization	B.TECH. METALLURGICAL AND MATERIALS ENGINEERING		
Course Title	(Introduction to) Computational Techniques		
Course Code	MTOE12	No. of Credits	03
Course Code of Pre-requisite subject(s)	Nil		
Session	July 2019	Section (if, applicable)	NA
Name of Faculty	Dr. V. Karthik	Department	MME
Official Email	karthikv@nitt.edu	Telephone No.	9788444987
Name of Course Coordinator(s) (if, applicable)	NA		
E-mail	---	Telephone No.	---
Course Type	<input type="checkbox"/> Core course	<input checked="" type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
<p>Design of Experiments and Analysis: Factorial design, Taguchi Techniques, ANOVA</p> <p>Artificial Intelligence: Artificial Neural Networks, Fuzzy logic, Genetic Algorithm; Applications in Materials Engg.</p> <p>Numerical Fluid Flow and Heat Transfer: Classification of PDE, finite differences, Steady and unsteady conduction, explicit and implicit method</p> <p>Finite Element Methods: Introduction to I-D FEM. Problems in structural mechanics using two dimensional elements; Plane stress, plane strain, axisymmetric analysis; Three dimensional stress analysis</p> <p>Optimization Methods: Classical optimization methods, unconstrained minimization. Univariate, conjugate direction, gradient and variable metric methods, constrained minimization, feasible direction and projections. Integer and Geometric programming</p> <p>Molecular dynamics simulations: Introductions, important concepts, hands-on exercises with open source molecular dynamics simulation package</p> <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Douglas C. Montgomery Design and analysis of experiments, 5th ed., John Wiley and Sons, 2005 2. Tirupathi R. Chandrupatla and Ashok D. Belegundu, Introduction to Finite Elements in Engineering, 3rd Ed., Prentice-Hall, 2003 3. Singiresu S. Rao, Engineering Optimization: Theory and Practice, 4th Ed., John Wiley & Sons Inc, New Jersey, 2009 			
COURSE OBJECTIVES			
To become familiar with computational techniques including related mathematical background			



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COURSE OUTCOMES (CO)	
Course Outcomes	Aligned Programme Outcomes (PO)
At the end of the course student will be able to:	
Get an overview of certain specific tools in the domain of computational techniques	1,4
Solve simple engineering problems in application involving fluid flow, heat transfer and structures	5
Design optimum number of experiments for studying various metallurgical problems	2,5
To have familiarity with the emerging tools such as Neural networks, Genetic algorithm, Geometric programming and optimization methods	10,11
Get an overview of certain specific tools in the domain of computational techniques	1,4
Solve simple engineering problems in application involving fluid flow, heat transfer and structures	5

COURSE PLAN – PART II				
COURSE OVERVIEW				
The course covers various computational techniques including related mathematical background				
COURSE TEACHING AND LEARNING ACTIVITIES				
S.No.	Week/Contact Hours	Topic	Mode of Delivery	
1	I-III	Molecular dynamics	Lectures through online mode using PPTs, videos and hands-on demo	
2	IV-V	Design of Experiments and Finite Difference Method		
3	VI-VIII	Finite Element Method		
4	IX-X	Traditional and non-traditional optimization techniques		
5	XI-XII	Non-traditional optimization techniques: GA, ANN, Fuzzy		
COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Technical Presentation	V	--	10
2	Cycle Test	VI	60	20
3	Assignment	VII	--	10
4	Mini-project	IV-XI	--	30
CPA	Compensation Assessment	XII	60	20
5	End semester Examination	XIII	120	30



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

The exit survey will be assessed based on the 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/Whatsapp

COMPENSATION ASSESSMENT POLICY

It will be given during XII week for those who are absent on genuine grounds for Cycle Test.

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

- **Institute guidelines will be followed for attendance policy, since the classes are conducted through online video conferencing mode.**

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.

ADDITIONAL INFORMATION

The Course faculty is available for consultation at any time (Room No.: MME/NAB/102). Students can also contact at any time through whatsapp or phone call or by mail.

FOR APPROVAL

Course Faculty _____

V. Karthik

CC-Chairperson _____

B. Ravisankar

HOD _____