

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

COURSE PLAN – PART I			
Name of the programme and specialization	M.Tech – Welding Engineering		
Course Title	Design of Weldments		
Course Code	MT601	No. of Credits	4
Course Code of Pre-requisite subject(s)	NIL		
Session	July 2023	Section (if, applicable)	NA
Name of Faculty	Dr. S. Muthukumaran	Department	MME
Email	smuthu@nitt.edu	Telephone No.	(0431)2503468
Name of Course Coordinator(s) (if, applicable)	NA		
E-mail	smuthu@nitt.edu	Telephone No.	3468
Course Type	Core course		
<b>Syllabus (approved in BoS)</b>			
<p>Weld joints, weld symbols, and joint design principles.</p> <p>Weld design for static loading: Designing for strength and rigidity, Material – section properties, design under different loading.</p> <p>Weld design for dynamic loading: Design for fluctuating and impact loading - dynamic behavior of joints - stress concentrations - fatigue analysis - fatigue improvement techniques - permissible stress- life prediction. Principles and methods and practical approach for crack arresting</p> <p>Concept of stress intensity factor - LEFM and EPFM concepts - brittle fracture- transition temperature approach - fracture toughness testing, application of fracture mechanics to fatigue, weldments design for high temperature applications.</p> <p>Welding residual stresses - causes, occurrence, effects and measurements - thermal and mechanical relieving; types of distortion - factors affecting distortion - distortion control methods - prediction - correction, jigs, fixtures and petitioners</p>			
<b>COURSE OBJECTIVES</b>			
<ul style="list-style-type: none"> <li>• Design weld joints operating under static and dynamic loading conditions.</li> <li>• Analyze and predict the life of weld joints using the concepts of fracture mechanics</li> </ul>			

and identifying the effects of stress concentration build up.	
<ul style="list-style-type: none"> <li>Learn the various types of stresses and distortions induced in a component as a result of welding.</li> </ul>	
<b>COURSE OUTCOMES (CO)</b>	
<b>Course Outcomes</b>	<b>Aligned Programme Outcomes (PO)</b>
Design weld joints for strength and rigidity under static loading conditions.	1, 2 & 4
Design weld joints for dynamic loading and high-temperature applications.	1, 2 & 4
Analyze and predict the life of weld joints subjected to fatigue and evaluate the effect of stress concentration on the fatigue life of such joints.	2, 3, 4 & 5
Estimate the ductile to brittle transition temperatures based on fracture toughness testing and understand the LEFM and EPFM concepts in Fracture Mechanics to propose solutions for improvements to fatigue life.	4, 5 & 6
Identify the various types of stresses and distortions to a component during welding and takes measures to minimize or eliminate such effects.	7, 8 & 9

<b>COURSE PLAN – PART II</b>			
<b>COURSE OVERVIEW</b>			
<b>COURSE TEACHING AND LEARNING ACTIVITIES</b>			
<b>S.No.</b>	<b>Week/Contact Hours</b>	<b>Topic</b>	<b>Mode of Delivery</b>
1	1&2	Principle of Weld Joint Design & welding symbols	Chalk & Board
2	2-4	Weld design for static loading	Chalk & Board
3	5-7	Weld design for dynamic loading	Chalk & Board
4	8-10	Fracture mechanics and residual life estimation	Chalk & Board
5	11-14	Welding residual stresses and distortion	Chalk & Board

**COURSE ASSESSMENT METHODS (shall range from 4 to 6)**

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Midterm Test	4 <sup>th</sup> Week of November	90 minutes	20
2	Mini Project	First Week November	—	30
3	Seminar	Second Week of November	----	10
CPA	Compensation Assessment*	The second week of December	90 minutes	20
4	Final Assessment *	3 <sup>rd</sup> Week of December as per the institute guidelines	180 minutes <del>120 minutes</del>	40

\*mandatory; refer to guidelines on page 4

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

- Whether the prescribed syllabus is completed.
- Whether the faculty clarified the doubts of the students
- Whether the teacher is impartial to the students
- Whether the study materials are given to the student??
- Whether sufficient numbers of numerical problems being solved?

**COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)****MODE OF CORRESPONDENCE (email/ phone etc)**

Email ID: [smuthu@nitt.edu](mailto:smuthu@nitt.edu),  
Phone : (0431) 2503468

**COMPENSATION ASSESSMENT POLICY**

**Only one retest will be conducted and students may be permitted for valid reasons.**

**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**

NIL

**FOR APPROVAL**

Course Faculty S. Muthu CC-Chairperson Φ. R. S. HOD S. Muthu  
07/09/2023 07/09/2023 07/09/2023

**Dr. S. MUTHUKUMARAN**  
 Professor & Head  
 Dept. of Metallurgical & Materials Engg  
 National Institute of Technology  
 Tiruchirappalli - 620 015, Tamil Nadu, IN

**Guidelines:**

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