

**DEPARTMENT OF PRODUCTION ENGINEERING  
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI-620015.**

COURSE OUTLINE				
Course Title	<b>METROLOGY (Theory &amp; Lab)</b>			
Course Code	PRPC18	No. of Credits	03	
Department	Production Engineering	Faculty	Dr. V. Anandkrishnan	
Pre-requisites Course Code	PHIR12			
Course Coordinator(s) (if, applicable)	Dr. V. Anandkrishnan			
Email Id	<a href="mailto:krishna@nitt.edu">krishna@nitt.edu</a>	Contact No.	9842167599	
Course Type	Core course	✓	Elective course	-
Course overview				
<p>The quality and reliability of any product in service highly relies on its dimensional control. Hence Metrology, the science of measurements both theoretically and practically needs ample attention to meet out the demand for precise measurements in different scales. Also in order to crater the uncertainty in measurements the necessity of statistical inferences about the measurements becomes vital. The course Metrology deals with fundamentals of measurements, methods, errors, instruments, and statistical tools to meet quality assurance both in theory and practice.</p>				
Course objectives				
<ul style="list-style-type: none"> <li>➤ To apply various measurement techniques to inspect and test products</li> <li>➤ To apply statistical tools for quality assurance purpose</li> <li>➤ To test and evaluate various components using various measuring instruments</li> </ul>				
Course Outcomes				
<ul style="list-style-type: none"> <li>➤ Describe the fundamental concepts in measurement methods, techniques.</li> <li>➤ Apply various instruments for measurements</li> <li>➤ Apply quality control tools to achieve defects free quality products</li> <li>➤ Take precise measurements using various instruments.</li> <li>➤ Develop data for engineering analysis.</li> </ul>				

Lecture	Week	Topic	Mode of Delivery	
1	Week 1	Introduction to Measurement	Lecture - C&T/ PPT, Video – 2 Hrs Practical – 2 Hrs	
2		Objectives of Measurement		
3		Classification of methods of measurements - Precision and Accuracy		
4		Standards and their evolution of errors in measurements		
5	Week 2	Types of errors in measurements		
6		Limit gauging		
7		Introduction of Comparators and applications		
8		Comparator types		
9	Week 3	Linear measurements		
10		Angular and form measurements		
11		Surface roughness methods of surface finish		
12		Direct instrument measurements		
<b>Cycle Test 1</b>				
13	Week 4	Screw Thread Measurement		
14		Standard thread profiles		
15		Effective diameter, Terminology of gear tooth		
16		Gear measurement – Parkinson gear tester		
17	Week 5	Alignment testing of machine tools		
18		Coordinate measuring machines		
19		Machine vision		
20		Nano measurements		
21	Week 6	Measurement of field quantities - temperature		
22		Measurement of field quantities - pressure		
23		Measurement of field quantities - velocity by intrusive		
24		Measurement of field quantities - velocity by non-intrusive techniques		
<b>Cycle Test 2</b>				
25	Week 7	Measurement of derived quantities - heat flux, volume in flowing fluids		
26		Measurement of derived quantities - mass flow rate, temperature in flowing fluids		
27		Measurement of thermo-physical properties		
28		Radiation properties of surfaces		
29	Week 8	Vibration and noise		
30		Measurement of length, measurement of angle		
31		Limits and fits		
32		Study and use of Electronic comparator		
33	Week 9	Profile projector		
34		Sine bar		
35		Precision measuring instruments		
36		Coordinate measuring machine Measurement of Gear tooth thickness		
37	Week	Adjacent base pitch error		
38	10	Surface roughness		

COURSE ASSESSMENT METHODS				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Cycle Test 1	Week 4	1 hour	20 marks
2.	Cycle Test 2	Week 7	1 hour	20 marks
3.	Assignments	Week 3&6	1 week	10 marks
4.	Final Examination - Theory	Week 11	3 hours	50 marks
5.	Final Examination – Practical	Week 11	2 hours	100 marks
Total (75% Theory+25% Practical)				100 marks

ESSENTIAL READINGS: Textbooks, Reference Books Website addresses, journals, etc.
<b>Text Books</b>
<i>Jain R. K., "Engineering Metrology", Khanna Publications, 2010</i> 2. <i>Douglas C. Montgomery, "Introduction to Statistical Quality Control", Wiley Publications, 2004.</i>
<b>Reference Books</b>
1. <i>Gupta. I.C., "Engineering Metrology", DhanpatRai and Sons, 1997.</i> 2. <i>Beckwith G. Thomas , Roy D. Marangoni, John H. Lienhard V, "Mechanical Measurements 6th Edition" Pearson publications, 2006.</i>

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)
1. Class committee meetings 2. Feedback through MIS

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)
As per NIT -T rules and regulations
<b>ADDITIONAL COURSE INFORMATION</b>
The Course Coordinator's Room No.: MTB304 Production department Timings: office time Email ID: <a href="mailto:krishna@nitt.edu">krishna@nitt.edu</a> Telephone No.: 0431-250-3521
<b>FOR SENATE'S CONSIDERATION</b>
Course Faculty _____ CC-Chairperson _____ HOD _____