



## COURSE OUTLINE: MAC203 - METROLOGY II

Prepared: Peter Corbett

Approved: Corey Meunier, Chair, Technology and Skilled Trades

<b>Course Code: Title</b>	MAC203: METROLOGY II
<b>Program Number: Name</b>	6346: GENERAL MACHINIST L2
<b>Department:</b>	MECHANICAL TECHNIQUES PS
<b>Semesters/Terms:</b>	21W, 21F, 22W
<b>Course Description:</b>	This course is designed to provide Level II General Machinist Apprentices the ability to demonstrate measuring techniques using inspection and checking gauges, direct/indirect reading linear and measuring equipment, and check surface roughness.
<b>Total Credits:</b>	1
<b>Hours/Week:</b>	1
<b>Total Hours:</b>	6
<b>Prerequisites:</b>	There are no pre-requisites for this course.
<b>Corequisites:</b>	There are no co-requisites for this course.
<b>Course Evaluation:</b>	Passing Grade: 50%, D  A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.
<b>Other Course Evaluation &amp; Assessment Requirements:</b>	Other Course Evaluation Requirements: Smart watches, smart phones and similar devices are not allowed during tests or quizzes and must be removed.  Grade Definition Grade Point Equivalent A+ 90 - 100% 4.00 A 80 - 89% B 70 - 79% 3.00 C 60 - 69% 2.00 D 50 - 59% 1.00 F (Fail) 49% and below 0.00 CR (Credit) Credit for diploma requirements has been awarded. S Satisfactory achievement in field /clinical placement or non-graded subject area. U Unsatisfactory achievement in field/clinical placement or non-graded subject area. X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course. NR Grade not reported to Registrar's office. W Student has withdrawn from the course without academic penalty.
<b>Books and Required Resources:</b>	Technology Of Machine Tools by Steve F. Krar, Arthur R. Gill, Peter Smid, Robert J. Gerritsen Publisher: McGraw - Hill Edition: 8 ISBN: 9781260565782

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2020-2021 academic year.



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**Course Outcomes and Learning Objectives:**

<b>Course Outcome 1</b>	<b>Learning Objectives for Course Outcome 1</b>
1. Identify the fundamentals of dimensional metrology.(1 hr)	1.1 Describe the fundamentals of dimensional metrology: <ul style="list-style-type: none"><li>- accuracy</li><li>- precision</li><li>- tolerances</li><li>- reliability</li><li>- limits</li><li>- fits</li><li>- datums</li><li>- discrimination</li><li>- lengths/widths</li><li>- angular</li><li>- straight</li><li>- flat</li><li>- square</li><li>- round</li><li>- surface texture</li><li>- perpendicularity</li><li>- parallel</li></ul>
<b>Course Outcome 2</b>	<b>Learning Objectives for Course Outcome 2</b>
2. Describe the fundamentals of measuring, checking, and gauging equipment.(1 hr)	2.1 Describe direct reading linear measuring equipment: <ul style="list-style-type: none"><li>- depth micrometer</li><li>- interchangeable anvil micrometer</li><li>- bench micrometer</li><li>- thread micrometer</li><li>- indicating micrometer</li><li>- deep throat micrometer</li><li>- V-anvil micrometer</li><li>- disc micrometer</li><li>- blade micrometer</li><li>- tube micrometer</li><li>- wire micrometer</li><li>- gear tooth vernier caliper</li></ul> 2.2 Describe indirect reading angular equipment: <ul style="list-style-type: none"><li>- sine plate</li><li>- toolmakers square</li><li>- precision level</li><li>- Describe inspection and checking gauges:<ul style="list-style-type: none"><li>- plug gauges</li><li>- ring gauges</li><li>- snap gauges</li><li>- profilometer</li><li>- precision rollers</li><li>- precision balls</li><li>- thread wires</li><li>- gear tooth rollers</li><li>- angular gauge blocks</li></ul></li></ul>

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<b>Course Outcome 3</b>	<b>Learning Objectives for Course Outcome 3</b>
3. Demonstrate measuring techniques using direct/indirect reading linear measuring equipment.(1 hr)	3.1 Demonstrate measuring techniques using: <ul style="list-style-type: none"> <li>- direct/indirect reading linear measuring equipment.</li> <li>- direct reading linear measuring equipment.</li> <li>- indirect reading angular equipment.</li> <li>- inspection and checking gauges.</li> <li>- indicating gauges.</li> </ul>
<b>Course Outcome 4</b>	<b>Learning Objectives for Course Outcome 4</b>
4. Describe measuring and checking procedures using inspection and checking gauges.(4 hrs)	4.1 Describe cleaning techniques of calibrated test specimen surfaces. Select inspection and checking gauges: <ul style="list-style-type: none"> <li>- gear forms (profiles)</li> <li>- pitch diameters</li> <li>- gear parts</li> <li>- gear teeth</li> </ul> 4.2 Demonstrate inspection and recording techniques. Identify error sources in measurement techniques: <ul style="list-style-type: none"> <li>- inherent instrument error</li> <li>- observational error</li> <li>- manipulative error</li> <li>- bias error</li> <li>- parallelism error</li> </ul>
<b>Course Outcome 5</b>	<b>Learning Objectives for Course Outcome 5</b>
5. Describe measuring and checking procedures using indicating gauges and comparators.(3 hrs)	5.1 Describe measuring and checking procedures using indicating gauges and comparators. Describe cleaning techniques of calibrated test specimen surfaces. Describe features of a work piece to be checked. Describe indicating gauges and comparators: <ul style="list-style-type: none"> <li>- optical comparators</li> <li>- mechanical comparator</li> <li>- air gauges</li> <li>- optical flats</li> </ul> Describe procedures for inspection and recording techniques.
<b>Course Outcome 6</b>	<b>Learning Objectives for Course Outcome 6</b>
6. Describe surface roughness measurement procedures.(2 hrs)	6.1 Describe surface roughness measurement. Describe cleaning techniques of calibrated test specimen surface. Describe surface roughness range. Describe surface roughness measurement equipment: <ul style="list-style-type: none"> <li>- profilometer</li> <li>- surface texture gauge</li> </ul>

**Evaluation Process and Grading System:**

<b>Evaluation Type</b>	<b>Evaluation Weight</b>
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Attendance, Participation and Attitude	5%
Final Test	50%
Mid term	25%
Quiz 1	10%
Quiz 2	10%

**Date:** January 3, 2021

**Addendum:** Please refer to the course outline addendum on the Learning Management System for further information.

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