



COURSE OUTLINE: MAC305 - CMPLX MILLING TECH

Prepared: Peter Corbett

Approved: Corey Meunier, Chair, Technology and Skilled Trades

Course Code: Title	MAC305: COMPLEX MILLING TECHNOLOGY
Program Number: Name	6347: GENERAL MACHINIST L3
Department:	MECHANICAL TECHNIQUES PS
Semesters/Terms:	20F, 21F, 22F
Course Description:	This course is designed to provide Level III General Machinist Apprentices the ability to demonstrate milling of complex geometric shapes.
Total Credits:	6
Hours/Week:	3
Total Hours:	42
Prerequisites:	There are no pre-requisites for this course.
Corequisites:	There are no co-requisites for this course.
Course Evaluation:	Passing Grade: 50%, D A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.
Other Course Evaluation & Assessment Requirements:	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 W Student has withdrawn from the course without academic penalty.
Books and Required Resources:	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:

Course Outcome 1	Learning Objectives for Course Outcome 1
1. Describe safe working procedures when setting up and operating milling machines.	1.1 Identify potential safety hazards which may occur during milling set-up and operating procedures. Demonstrate safe working habits including: <ul style="list-style-type: none">- protective clothing- protective equipment and gear- good housekeeping- start up and shut off procedures- securing and stabilizing of workpiece- lock out procedures- use of lifting devices
Course Outcome 2	Learning Objectives for Course Outcome 2
2. Identify milling attachments used for complex milling operations. (3 hrs)	2.1 Identify attachments used for complex milling operations: <ul style="list-style-type: none">- slotting head- right angle attachment- vertical/horizontal attachment- high speed attachment- boring/facing heads- swivel attachments- dividing heads
Course Outcome 3	Learning Objectives for Course Outcome 3
3. Develop a plan for complex milling operations. (2 hrs)	3.1 Interpret engineering drawings, CAD data, or process sheets to determine: <ul style="list-style-type: none">- workpiece material- number of workpieces- form and shape of workpiece- machining operations- tolerances- surface finish- machining sequences Identify complex milling techniques: <ul style="list-style-type: none">- gear cutting- helical milling- line boring- back boring- cam milling (CNC application) Identify workholding devices by determining: <ul style="list-style-type: none">- application- operating principles- graduation values- angular and rotation settings- workpiece characteristics- positioning, mounting and securing procedures- discrimination Identify required cutting tools, tool holding devices, and accessories by determining:

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	<ul style="list-style-type: none"> - type and application - clearances - tolerances - surface finish - machining operations and sequences - cutting fluid requirements - operating principles - toolholding and support requirements - speed and feed values - workpiece characteristics - handling, storing, and maintenance procedures <p>Describe measuring and checking procedures.</p>
Course Outcome 4	Learning Objectives for Course Outcome 4
4. Describe procedures for using mill workholding devices and accessories. (3 hrs)	<p>4.1 Identify mill workholding devices:</p> <ul style="list-style-type: none"> - dividing head - mandrels - rotary table <p>Describe workholding device set-up procedures by determining:</p> <ul style="list-style-type: none"> - application - operating principles - type - size - function - tool selection - type of tool - workpiece features - holding characteristics - mounting characteristics - location accessibility - workpiece characteristics - handling procedures - storing procedures - maintenance procedures <p>Describe contact surface cleaning procedures.</p> <p>Demonstrate mounting, positioning, aligning, and securing procedures.</p>
Course Outcome 5	Learning Objectives for Course Outcome 5
5. Describe the assembly of cutting tools and holders for complex milling operations. (2 hrs)	<p>5.1 Identify cutting tool geometry (nomenclature).</p> <p>Describe milling cutting tools and tool holders:</p> <ul style="list-style-type: none"> - gear cutters - solid carbide - boring tools - boring and facing heads <p>Describe required cutting tools and tool holders by determining:</p>

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	<ul style="list-style-type: none"> - type and size - cutting tool material - shape - application - holding/mounting characteristics - cutting and shaping characteristics - tolerances - surface finish <p>Demonstrate the assembly of cutting tools and holders.</p>
Course Outcome 6	Learning Objectives for Course Outcome 6
6. Demonstrate complex milling operations. (31 hrs)	<p>6.1 Describe helical milling techniques.</p> <p>Describe cam milling techniques.</p> <p>Demonstrate the milling of complex geometric shapes.</p>
Course Outcome 7	Learning Objectives for Course Outcome 7
7. Perform routine maintenance. (1 hr)	<p>7.1 Describe routine maintenance and cleaning procedures.</p> <p>Describe lubrication procedures.</p> <p>Describe dismantling, handling, and storage of tools, tooling, workholding devices, and measuring equipment.</p>

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
Attendance, Participation and Attitude	5%
Final Test and Practical Project	50%
Mid term	25%
Quiz 1	10%
Quiz 2	10%

Date: September 3, 2020

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

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