COURSE OUTLINE: MAC306 - CMPLX GRINDING TECH

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Approved: Corey Meunier, Chair, Technology and Skilled Trades

Course Code: Title	MAC306: COMPLEX GRINDING 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:	2
Hours/Week:	1
Total Hours:	18
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 W Student has withdrawn from the course without academic penalty.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.

Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
1. Describe safe working procedures when setting up and operating grinders.	1.1 Identify potential safety hazards which may occur during grinder set-up and operating procedures. Demonstrate safe working habits including: - protective clothing and equipment - good housekeeping - start up and shut off procedures - securing and stabilizing of workpiece - guards and dust extraction system - dressing and inspection of grinding wheel - lock out procedure - maximum wheel RPM - ring test of wheel
Course Outcome 2	**Learning Objectives for Course Outcome 2**
2. Describe internal grinding techniques and processes. (1.5 hrs)	2.1 Identify machining processes and components of plain or universal cylindrical grinders: - universal cylindrical grinding - tool post grinding - tool and cutter grinder - I/D grinder - jig grinder Describe cutting fluid applications.
Course Outcome 3	**Learning Objectives for Course Outcome 3**
3. Identify workholding devices and/or attachments used for internal grinding. (1.5 hrs)	3.1 Describe workholding devices, accessories, and attachments used in internal grinding techniques: - wheel dressing attachment - radius and tangent wheel dresser - angular wheel dresser - radius dresser - three-jaw chuck - four-jaw chuck - magnetic chuck - collets chuck - crush roll forming - steady rest - arbors - universal work-head - internal grinding attachment
Course Outcome 4	**Learning Objectives for Course Outcome 4**
4. Describe grinding wheels used for internal grinding and sharpening of end mills. (2 hrs)	4.1 Identify grinding wheels: - straight - recessed - cup - dished

	- flared - cut-off - mounted Describe mounting, truing, and dressing of grinding wheels. Identify cutting tool geometry on an end mill by determining: - land - heel - flutes - helix angle - rake angle - tooth face - peripheral cutting edge - relief angles (clearance) - peripheral and end face clearance angles
Course Outcome 5	**Learning Objectives for Course Outcome 5**
5. Develop a plan for internal grinding and sharpening of end mills. (2 hrs)	5.1 Interpret drawings, CAD data or process sheets to determine: - workpiece material characteristics - form and shape of workpiece - surface finish - tolerance - machining operations and sequences Identify grinding techniques: - plunge grinding - I/D grinding - profile grinding - parallel grinding - internal taper grinding - centre gashing - form grinding - cut off grinding - grinding primary and secondary angles Identify workholding devices and/or attachments: - tooth rest and support - centre height gauge - wheel dressing attachment - collets chuck
Course Outcome 6	**Learning Objectives for Course Outcome 6**
6. Demonstrate internal grinding and end mill sharpening. (10 hrs)	6.1 Demonstrate end mill sharpening. Demonstrate internal grinding.
Course Outcome 7	**Learning Objectives for Course Outcome 7**
7. Perform routine maintenance. (1 hr)	7.1 Demonstrate routine maintenance and cleaning procedures. Demonstrate lubrication procedures.

	Demonstrate dismantling, handling, and storage of tools, tooling and workholding devices, and measuring equipment.

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.