



## COURSE OUTLINE: AMF104 - C.N.C. MACHINING I

Prepared: Peter Corbett

Approved: Corey Meunier, Chair, Technology and Skilled Trades

|   |   |   |
|---|---|---|
| <b>Course Code: Title</b>   | AMF104: COMPUTER NUMERICAL CONTROL MACHINING I  |   |
| <b>Program Number: Name</b>   | 4069: AUTOMATED MANUFACT.   |   |
| <b>Department:</b>  | ROBOTICS GRADUATE CERTIFICATE   |   |
| <b>Semesters/Terms:</b>   | 21F   |   |
| <b>Course Description:</b>  | This course is designed to provide students with the importance of Computer numerical control machines in a manufacturing environment. Students will combine classroom knowledge and apply what has been learned on actual CNC Lathes. Students will work in both conversational and normal G code programming to write programs and perform edits as required. Safety in the Shop and the equipment will be strictly followed. |   |
| <b>Total Credits:</b>   | 5   |   |
| <b>Hours/Week:</b>  | 5   |   |
| <b>Total Hours:</b>   | 75  |   |
| <b>Prerequisites:</b>   | There are no pre-requisites for this course.  |   |
| <b>Corequisites:</b>  | There are no co-requisites for this course.   |   |
| <b>This course is a pre-requisite for:</b>  | AMF204, AMF205  |   |
| <b>Vocational Learning Outcomes (VLO's) addressed in this course:</b>                         | <b>4069 - AUTOMATED MANUFACT.</b>   |   |
| Please refer to program web page for a complete listing of program outcomes where applicable. | VLO 1 Solve automated manufacturing problems found in a typical industrial environment by applying engineering principles and decision-making strategies.   |   |
|   | VLO 3 Select and manage appropriate hardware and software for the creation of engineering designs.  |   |
|   | VLO 4 Identify and utilize manufacturing processes, rapid prototyping methods, and automation technologies to optimize product development.   |   |
|   | VLO 5 Incorporate sustainable, economic, safe and ethical approaches in the design and implementation of projects.  |   |
|   | VLO 7 Exercise professionalism, leadership, and effective communication in an industrial work setting to increase overall productivity and support a positive work environment.   |   |
|   | VLO 8 Ensure automation equipment is in compliance with established operating procedures, and occupational health and safety regulations.   |   |
|   | <b>Essential Employability Skills (EES) addressed in this course:</b>   | EES 1 Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience. |
|   | EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication.  |   |
| EES 3 Execute mathematical operations accurately.   |   |   |
| EES 4 Apply a systematic approach to solve problems.  |   |   |

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 2021-2022 academic year.



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- EES 5 Use a variety of thinking skills to anticipate and solve problems.
- EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others.
- EES 10 Manage the use of time and other resources to complete projects.
- EES 11 Take responsibility for ones own actions, decisions, and consequences.

**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:**

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:**

CNC Manufacturing Technology by Rick Calverly  
 Publisher: The Goodheart-Wilcox Company Inc. Edition: First  
 ISBN: 978-1-63563-883-7

**Course Outcomes and Learning Objectives:**

| Course Outcome 1  | Learning Objectives for Course Outcome 1   |
|---|--|
| 1. Demonstrate safe working practices in a shop atmosphere in regards to personal and machine safety including work setups. | 1.1 Identify all safety items required in a shop environment.<br>1.2 Identify various lathe operations and setups required and how to perform safely.  |
| Course Outcome 2  | Learning Objectives for Course Outcome 2   |
| 2. Explain the evolution of Computer Numerical Controlled machines.   | 2.1 List the various types of CNC Machines and their origins.<br>2.2 Identify the components of a CNC lathe.<br>2.3 Understand and explain the Cartesian coordinate system and the right-hand rule for axis identification |

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|--|--|--|
|  | <b>Course Outcome 3</b>  | <b>Learning Objectives for Course Outcome 3</b>  |
|  | 3. Explain the limitations of a CNC lathe in regards to manufacturing.   | 3.1 Identify the various operations that can be performed on a CNC lathe.<br>3.2 Identify work holding methods<br>3.3 Identify specific tools used to perform specific operations.<br>3.4 Identify order of operations needed to manufacture a part. |
|  | <b>Course Outcome 4</b>  | <b>Learning Objectives for Course Outcome 4</b>  |
|  | 4. Identify the materials being used.  | 4.1 Determine the best material selection to perform part manufacture.<br>4.2 Describe the characteristics of the material<br>4.3 Identify alternate materials that could be used and why.   |
|  | <b>Course Outcome 5</b>  | <b>Learning Objectives for Course Outcome 5</b>  |
|  | 5. Perform selection of cutting tools to perform various operations.   | 5.1 Identify the various tooling and how they are designed to cut.<br>5.2 Describe the purpose of the insert on the tool.<br>5.3 Identify the correct setup of the tool to perform the required operation.   |
| <b>Course Outcome 6</b>                                    | <b>Learning Objectives for Course Outcome 6</b>  |  |
| 6. Perform operation of the Tormach Path Pilot controller. | 6.1 Perform initial startup and orientation of lathe.<br>6.2 Perform basic programming functions in conversational.<br>6.3 Select proper tooling and orientation in the controller.<br>6.4 Understand tool setup in relation to axis and start points.<br>6.5 Perform manual movements to set tool locations.<br>6.6 Understand offsets and how they relate to the tool. |  |

**Evaluation Process and Grading System:**

| <b>Evaluation Type</b>                 | <b>Evaluation Weight</b> |
|--|--------------------------|
| Assignments & Labs                     | 25%                      |
| Attendance, Attitude and Participation | 10%                      |
| Lab Practical Test                     | 20%                      |
| Written Test #1                        | 15%                      |
| Written Test #2                        | 15%                      |
| Written Test #3                        | 15%                      |

**Date:** July 30, 2021

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

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