

# Part I



**North Central**  
**MICHIGAN COLLEGE**  
*Your growth. Our mission.*

## *Master Course* *Syllabus*

Course Name: Introduction to G-Code and CAM-1 for CNC (Computer-Numerically Controlled) Operations

Course Number: CNC 120

Credit Hrs. 3      Lecture Hrs. 2      Lab Hrs. 2      Clinical Hrs. \_\_\_\_\_      Variable Hrs. \_\_\_\_\_

Total Hours of Instruction: 64      Total Contact Hours: 70.4  
*(Total Contact Hours Formula: (lecture hrs. + lab hrs. + clinical hrs.) x 17.6)*

### Course Description:

Provides the opportunity for students to develop the knowledge, skills processes and understanding of CNC (Computer-Numerically Controlled) basics, Cartesian Coordinate System, writing G-Code programs and using CAD/CAM systems to create geometry and CNC programs for CNC milling machines.

**PREREQUISITE:** CNC 100

### Course Objectives and Outcomes:

- Explore CNC basics (review history of CNC, identify advantages/disadvantages of CNC, describe CNC milling machine axis);
- Use Cartesian Coordinate System (identify axis designations and origin, associate absolute and incremental locations);
- Write G-Code programs (recognize programming protocol, associate G- and M-codes, recognize modal codes);
- Use the personal computer (identify computer components, recognize boot-up, associate software activating procedure, input and storage media, recognize print commands);
- Create geometry using CAD/CAM system (associate software start-up and the use of create, edit, and analyze functions);
- Create programs using CAM system for CNC milling machines (recognize tool selection and tool path verification, associate tool path and post functions, associate need for editing).

Satisfies Lumina Degree Qualification Profile #'s (*DQP*) (as approved on 04/11/12): 1,2,4,6,7,10,13,15

Reasonable accommodations can be provided for students with documented disabilities. Please contact Learning Support Services to arrange for these — (231) 348-6687 or (231) 348-6817, [kflewelling@ncmich.edu](mailto:kflewelling@ncmich.edu), Room 533 SCRC.



Suggested Methods of Instruction: lecture, small-group discussion, powerpoint presentations, video demonstrations, hands-on lab sessions.

Suggested Methods of Evaluation: quizzes, exams, successful production of prototypes using CNC software.

Adopted Text at Time of Course Adoption/Revision: Smid, Peter. CNC Programming Handbook, 3<sup>rd</sup> ed.

Topics Covered During the Semester:

Week 1	Explore CNC Basics	Week 9	Create Geometry Using CAD/CAM System
Week 2	Explore CNC Basics / Using Cartesian Coordinate System	Week 10	Create Geometry Using CAD/CAM System
Week 3	Using Cartesian Coordinate System	Week 11	Create Geometry Using CAD/CAM System
Week 4	Writing G-Code Programs	Week 12	Create Geometry Using CAD/CAM System
Week 5	Writing G-Code Programs	Week 13	Create Programs using CAM System for CNC Milling Machines
Week 6	Writing G-Code Programs	Week 14	Create Programs using CAM System for CNC Milling Machines
Week 7	Writing G-Code Programs / Personal Computer Use	Week 15	Create Programs using CAM System for CNC Milling Machines
Week 8	Personal Computer Use / Create Geometry Using CAD/CAM System	Week 16	Review and Final Exam

**Specialized Knowledge**

1. Describes the scope and principal features of the field of study, citing at least some of its core theories and practices, and offers a similar explication of at least one related field.
2. Illustrates contemporary terminology used in the field.
3. Generates substantially error-free products, reconstructions, data, juried exhibits or performances as appropriate to the field.

**Broad Integrative Knowledge**

4. Describes how existing knowledge or practice is advanced, tested and revised
5. Describes and examines a range of perspectives on key debates and their significance both within the field and in society.
6. Illustrates core concepts of the field while executing analytical, practical or creative tasks.
7. Selects and applies recognized methods of the field in interpreting characteristic discipline-based problems.
8. Assembles evidence relevant to characteristic problems in the field, describes the significance of the evidence, and uses the evidence in analysis of these problems.
9. Describes the ways in which at least two disciplines define, address and interpret the importance of a contemporary challenge or problem in science, the arts, society, human services, economic life or technology.

**Intellectual Skills – Analytic Inquiry**

10. Identifies, categorizes and distinguishes among elements of ideas, concepts, theories and/or practical approaches to standard problems.

**Intellectual Skills – Use of Information Resources**

11. Identifies, categorizes, evaluates and cites multiple information resources necessary to engage in projects, papers or performance in his or her program.

**Intellectual Skills – Engaging Diverse Perspectives**

12. Describes how knowledge from different cultural perspectives would affect his or her interpretations of prominent problems in politics, society, the arts and/or global relations.

**Intellectual Skills – Communication Fluency**

13. Presents accurate calculations and symbolic operations, and explains how such calculations and operations are used in either his or her specific field of study or in interpreting social and economic trends.
14. Presents substantially error-free prose in both argumentative and narrative forms to general and specialized audiences.

**Applied Learning**

15. Describes in writing at least one substantial case in which knowledge and skills acquired in academic settings are applied to a challenge in a non-academic setting; applies that learning to the question; and analyzes at least one significant concept or method related to his or her course of study in light of learning outside the classroom.
16. Locates, gathers and organizes evidence on an assigned research topic addressing a course-related question or a question of practice in a work or community setting; offers and examines competing hypotheses in answering the question.

**Civic Learning**

17. Describes his or her own civic and cultural background, including its origins and development, assumptions, and predispositions.
18. Describes diverse positions, historical and contemporary, on selected democratic values or practices, and presents his or her own position on a specific problem where one or more of these values or practices are involved.
19. Takes an active role in a community context (work, service, co-curricular activities, etc.), and examines the civic issues encountered and the insights gained from the community experience.

Adopted by CRDAP: April 11, 2012