

**Common Course Outline**  
CAMM 101  
**Computerized Numerically Controlled Machines**  
3 Credits

**Community College of Baltimore County**

**Description**

**CAMM 101 – Computerized Numerically Controlled Machines** introduces the basic principles of Computerized Numerical Control (CNC) machines, the Cartesian coordinate system, related shop math, and discusses the history and theory of CNC's planning and applications along with programming CNC machines.

**3 Credits**

**Prerequisites:** CAMM 111 with a passing grade of “C” or higher or NIMS “Measurement, Material and Safety” certification.

**Overall Course Objectives**

Upon completion of this course, students will be able to:

1. describe and make use of the Cartesian coordinate system;
2. list the advantages of CNC machines;
3. describe absolute and incremental positioning;
4. create manually a working part program for a CNC machining center;
5. debug a CNC program;
6. identify the 3 basic machine axes;
7. use necessary shop math for programming a CNC machining center;
8. use correct “G” and “M” codes in a program;
9. calculate position for angles in a program;
10. write a program using arcs;
11. use canned cycle codes in a written program; and
12. verify programs using CNC software.

**Major Topics**

- I. Introduction to CNC machines
  - A. Brief history of CNC machining centers
  - B. Program storage
  - C. Program transfer
- II. CNC Systems
  - A. Point to point systems
  - B. Continuous path systems
  - C. Open and closed loop systems
- III. Shop Math

- A. Cartesian coordinate system
  - B. Absolute and incremental positioning
  - C. Right angle trigonometry
- IV. Programming FANUC Language
- A. Modal and non-modal commands
  - B. Linear and circular interpolation
  - C. Programming angles
  - D. Canned cycles
  - E. Cutter compensation
  - F. Fixture offsets

### **Course Requirements**

Grading procedures will be determined by the individual faculty member but will include the following:

### **Grading/exams**

- Minimum of 5 classwork assignments
- Minimum of 4 programming projects
- Minimum of 2 Quizzes
- Minimum of 6 homework assignments
- Class participation
- 1 Midterm
- 1 Final exam

Written Assignments: Students are required to use appropriate academic resources.

### **Other Course Information**

This course is taught in a computerized environment.