

## Master Syllabus

### CAM 1213 - Fundamentals of Computer Numerical Control

**Division:** Science, Mathematics and Engineering

**Department:** Computer Aided Manufacturing

**Credit Hour Total:** 4.0

**Lecture Hrs:** 3.0 **Lab Hrs:** 2.0

**Prerequisite(s):** CAM 1109 OR CAM 1161 AND MET 1131

**Date Revised:** October 2013

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#### Course Description:

Development of Computer Numerical Control (CNC) programs for three axis CNC milling machines including linear and circular interpolation, drilling and tapping and G&M codes. Setup and operation of milling machines. Adjusting tool offsets to hold part tolerance. Three classroom, two lab hours per week.

#### General Education Outcomes:

- Critical Thinking/Problem Solving
- Computer Literacy
- Information Literacy
- Oral Communication

#### Course Outcomes:

##### Process Planning

Analyze part and develop an appropriate manufacturing operations process plan utilizing tooling for CNC milling machine.

**Assessment Method:** Performance appraisals

**Performance Criteria:** At least 70% of all part features must be linked to correct process at first submission by all students

**Assessment Method:** Portfolios

**Performance Criteria:** 100% of process plans will become part of the course portfolio

##### Part Programming

Following an operations process plan, write and debug a CNC program for the CNC milling machine.

**Assessment Method:** Performance appraisals

**Performance Criteria:** At least 70% of all CNC programs must be without errors that would cause incorrect cutting of part feature, damage to tool or machine.

**Assessment Method:** Portfolios

**Performance Criteria:** 100% of original(draft) and final program printouts will become part of the course portfolio

##### Setup and Operation

Utilizing the process plan and CNC program, setup the CNC milling machine (student teams) with all tools and fixtures, program and manufacture the part.

**Assessment Method:** Behavioral observations

**Performance Criteria:** Using instructional materials, the students (in teams) must correctly identify and set all tool offsets, work offset and program at 100%.

**Assessment Method:** Performance appraisals

**Performance Criteria:** Work offset must be within .010" of actual location. Tool offsets must be within .005". All (100%) of part features must be within tolerance of part.

#### Outline:

Safety procedures in the CNC shop  
Cartesian coordinate system  
CNC and metalworking terminology  
Program codes, development and editing  
Development of process plan  
Machine setup and operation  
Tool setup and offsets