**Alabama**
**Department of**
**Postsecondary Education**

*Representing the Alabama Community College System*

**STATEWIDE CAREER/TECHNICAL EDUCATION COURSE ARTICULATION REVIEW MINUTES**

Articulation Agreement Identifier:_CNC 139-2006-1_____ Identifier is the postsecondary course prefix followed by Plan-of-Instruction version number (e.g.; INT 100 (2007-1)).

Applicable CIP code(s):___48.0599_____

Postsecondary course prefix, number, and title:___CNC 139 Basic Computer Numerical Control_____

Secondary Education course(s) title and number:__480512/540042 - Introduction to Computer Numerical Control + 480514/540043 - Intermediate Computer Numerical Control_____

Initial Review:_____Sept 17, 2009_____ ___Annual DPE Review: February 14, 2012_____

Effective date: **Fall Semester 2011**.

Course Content Analysis (all postsecondary course objectives must be sufficiently addressed in the secondary courses):
**Notes:**
  **1 Skills and knowledge contained in the postsecondary course objectives must be present in the corresponding secondary objectives for a "match" to occur.**
  2. **Postsecondary and Secondary objectives must reflect similar content and performance levels before the course articulation agreement will be recommended to the TEDAC Oversight Committee.**
  3. **More than one Secondary course may be used in order to articulate to a Postsecondary course.**

| Postsecondary Course Objectives | Secondary Objectives and Location(s) | TEDAC Comments |
|---|---|---|
| **MODULE A – PRINCIPLES OF CNC**<br>**Competency:**<br>A1.0    Explain the principles of CNC.<br>**Performance Objective –** None<br>**Learning Objectives:**<br>A1.1.1  Define terms associated with CNC.<br>A1.1.2  Describe common uses of CNC in machining applications.<br>A1.1.3  Describe various axis motions.<br>A1.1.4  Describe various tooling compensation methods.<br>A1.1.5  Describe various fixture or work offset compensation methods.<br>**MODULE B – CNC PROGRAMMING CONCEPTS**<br>**Competency:**<br>B1.0    Explain the basic principles of CNC programming.<br>**Performance Objective –** None<br>**Learning Objectives:**<br>B1.1.1  Describe word types and letter address specifications.<br>B1.1.2  Describe decimal point programming.<br>B1.1.3  List other programming functions.<br>B1.1.4  Differentiate between various program formats.<br>B1.1.5  Differentiate between the applications of various methods of programming.<br>B1.1.6  Describe methods for storage and retrieval of program information.<br>**MODULE C – CNC MACHINE CHARACTERISTICS**<br>**Competency:**<br>C1.0    Describe components and capabilities of machines commonly used for CNC applications.<br>**Performance Objective –** None<br>**Learning Objectives:**<br>C1.1.1  Describe basic machining practices.<br>C1.1.2  Describe various machine components.<br>C1.1.3  Describe the properties of machine capacity and | **Introduction to Computer Numerical Control**<br>**Unit 1-2 – Safety**<br>**Content Standard(s)**<br>1.  Apply safety rules, regulations, and procedures when using CNC equipment.<br>2.  Demonstrate care and maintenance for CNC machines.<br>**Learning Objective(s)**<br>1.  Explain the role that safety plays in the classroom/lab (machine shop).<br>2.  Explain the appropriate safety precautions applicable to common manufacturing facilities.<br>3.  Demonstrate the use and care of appropriate personal protective equipment (PPE).<br>4.  Properly don and remove personal protective equipment (safety goggles, hearing protection, and hard hat).<br>5.  Explain the importance of Hazard Communications (HazCom) and material safety data sheets (MSDS).<br>6.  Describe fire prevention and firefighting techniques.<br>7.  Demonstrate correct selection and use of hand tools.<br>8.  Maintain CNC machine to keep it running at optimum performance.<br>**Unit 3-5 – Operations**<br>**Content Standard(s)**<br>3.  Identify basic G and M codes, speed and feed codes, and cutter positioning.<br>4.  Demonstrate skills for writing a basic CNC mill program for straight and circular moves.<br>5.  Demonstrate skills for writing a basic CNC lathe program for turning, facing, and corner radii.<br>**Learning Objective(s)**<br>1.  Create basic CNC milling programs utilizing cutter compensation for positioning.<br>2.  Create basic CNC lathe program utilizing tool nose compensation for positions. | |

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| construction.<br>C1.1.4 Explain axis of motion.<br>C1.1.5 Describe various common programmable functions.<br>C1.1.6 Differentiate between various operation modes.<br>C1.1.7 Explain various sequences of operation for CNC machines.<br>C1.1.8 Explain why a given sequence of operation is used.<br>**MODULE D – CNC PROGRAMMING APPLICATIONS**<br>**Competency:**<br>D1.0 Develop basic CNC programs for milling and turning machines.<br>**Performance Objective**:<br>D1.1 Write a basic CNC program for various lathe applications.<br>**Learning Objectives:**<br>D1.1.1 Describe safety considerations for lathe operations.<br>D1.1.2 Describe considerations for writing a CNC program for turning.<br>D1.1.3 Describe considerations for writing a CNC program for facing.<br>D1.1.4 Describe considerations for writing a CNC program for cornering.<br>**Performance Objective:**<br>D1.2 Write a basic CNC program for various milling machine applications.<br>**Learning Objectives:**<br>D1.2.1 Describe safety considerations for milling machine operations.<br>D1.2.2 Describe considerations for writing a CNC program for straight moves.<br>D1.2.3 Describe considerations for writing a CNC program for angular moves.<br>D1.1.4 Describe considerations for writing a CNC program for circular moves. | 3. Create CNC milling and lathe programs using canned cycles.<br>**Unit 6-7 – Projects**<br>**Content Standard(s)**<br>6. Create a finished project using CNC mill.<br>7. Create a finished project using CNC lathe<br>**Learning Objective(s)**<br>1. Input CNC mill programs into controller.<br>2. Input CNC lathe programs into controller.<br>3. Edit, graph and simulate mill and lathe programs.<br>**Intermediate Computer Numerical Control**<br>**Unit 3-5 – Operations**<br>**Content Standard(s)**<br>3. Demonstrate intermediate skills for writing a CNC program.<br>4. Demonstrate advanced skills for writing a CNC program.<br>5. Demonstrate proper setup of CNC machines, including homer setup and tool setup.<br>**Learning Objective(s)**<br>1. Identify G and M codes.<br>2. Identify speed and feed codes.<br>3. Identify cutter positioning codes.<br>4. Write an intermediate CNC mill program for straight, angular, and circular moves.<br>5. Write an intermediate CNC lathe program for turning, facing, angle cuts, and corner radii.<br>6. Define G and M codes.<br>7. Define speed and feed codes.<br>8. Write advanced CNC milling programs for straight, angle, radii, and circular cuts.<br>9. Write advanced CNC lathe program for turning, facing, corner radii, threading, and angle cuts.<br>10. Set up and machine part according to specifications of blueprint. | |