Alabama Department of Postsecondary Education

Representing the Alabama Community College System

STATEWIDE CAREER/TECHNICAL EDUCATION COURSE ARTICULATION REVIEW MINUTES

Articulation Agreement Identifier: MTT139-2006-1 Identifier is the postsecondary course prefix followed by Plan-of-Instruction version number (e.g.; INT 100 (2007-1)).

Applicable CIP code(s): 48.0507

Postsecondary course prefix, number, and title: MTT 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: September 17, 2009 DPE Annual Review: March 13, 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.**

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

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

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