

COURSE FAB3150: CNC MILLING (COMPUTER NUMERICAL CONTROL)**Level:** Advanced**Theme:** Production Systems and Processes**Prerequisite:** FAB1130 Principles of Machining**Description:** Students develop skills in computer numerical control (CNC) programming to manufacture a three-dimensional product.**Parameters:** Access to a CNC milling centre and to instruction from an individual with specialized training in CNC mill work.**Supporting Course:** FAB2150 CNC Turning (Computer Numerical Control)**Curriculum and Assessment Standards**

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate three-dimensional CNC programming skills apply CNC programming and operating skills to manufacture a milled part identify further training and employment opportunities related to CNC machining 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> development of a 3-D program to produce a machineable part on a CNC mill using absolute coordinates, canned cycles and/or CAD file conversion performing the appropriate programming set-up, testing and running procedures to produce a milled part presentation of an occupational profile that outlines: <ul style="list-style-type: none"> description of the occupation and conditions of work employment opportunities training requirements and locations. <p><i>Assessment Tool</i> <i>Assessment Framework: Research Process, CTSRES</i></p> <p><i>Standard</i> <i>Performance rating of 3 in each applicable task</i></p>	<p>60</p> <p>30</p> <p>10</p>
<ul style="list-style-type: none"> demonstrate basic competencies. 	<ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

COURSE FAB3150: CNC MILLING (COMPUTER NUMERICAL CONTROL) (continued)

Concept	Specific Outcomes	Notes
<p>Orientation</p> <ul style="list-style-type: none"> • Mill Operation • Programming • Canned Cycles 	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • after observing the operation of a CNC mill, describe how the cutting speeds, feed rates and depth of cuts are controlled; cutting tools and different sizes and shapes of workpieces are mounted • identify milling capabilities of a given machine, e.g.: size of cutters, size and types of materials • describe the safety features that are built into the CNC equipment • identify the relationship of the x, y and z axis on a vertical milling machine • determine how to program a CNC mill using absolute coordinates • describe the types of canned cycles used in machining operations • identify when to use canned cycles to improve efficiency • list the information required to calculate and format a canned cycle. 	<p>Demonstrate how to program and use a CNC mill using pre-designed/programmed part.</p>
<p>Planning and Management</p> <ul style="list-style-type: none"> • Health and Safety • 3-D Programming 	<ul style="list-style-type: none"> • describe the: <ul style="list-style-type: none"> – appropriate use of personal protective equipment – importance of keeping all covers and guards in place and following the manufacturer's recommendations – need to keep the work area clean and free of personal hazards • describe a safety plan in case of accident • prepare a program from a print using absolute coordinates and/or produce a CAD design. 	

COURSE FAB3150: CNC MILLING (COMPUTER NUMERICAL CONTROL) (continued)

Concept	Specific Outcomes	Notes
Implementation	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • load the program or convert a CAD file • mount and secure the workpiece • identify reference and clearance points • mount and set cutting tool(s) • carry out a test run • manufacture the part. 	
<p>Assessment</p> <ul style="list-style-type: none"> • Quality Control • Career Information 	<ul style="list-style-type: none"> • inspect the part to see that it meets the print dimensions, tolerances and specifications • research and describe further education and work opportunities related to the use of computer-controlled equipment • evaluate personal interests and abilities related to making realistic career choices • prepare a record of completed activities within a portfolio. 	<p>Note: This field is expanding as new technology is developed and applications are found.</p>

