

COURSE FAB2150: CNC TURNING (COMPUTER NUMERICAL CONTROL)**Level:** Intermediate**Theme:** Production Systems and Processes**Prerequisite:** FAB1130 Principles of Machining**Description:** Students develop skills in computer assisted design (CAD) and computer numerical control (CNC) programming to manufacture a product on a CNC lathe.**Parameters:** Access to a fabrication work centre complete with CNC turning centre and to instruction from an individual with specialized training in CNC practices.**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"> • identify safety hazards associated with CNC equipment and, take preventive measures to avoid accidents and personal injury to self and others • demonstrate two dimensional programming and/or CAD skills • apply CNC programming skills to manufacture a turned part 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • ongoing observation related to: <ul style="list-style-type: none"> – appropriate selection and use of personal protective equipment – use of safety covers and guards – use of dry runs • development of a 2-D program to produce a machineable part on a CNC lathe using absolute coordinates and/or CAD file conversion • performing the appropriate set-up testing and running procedures to produce a turned part. <p><i>Assessment Tool</i> <i>Assessment Framework: Product Assessment, FABPRD</i></p> <p><i>Standard</i> <i>Product is to be within stated machine tolerances.</i> <i>Performance rating of 2 for each applicable task</i></p>	<p>10</p> <p>60</p> <p>30</p>

COURSE FAB2150: CNC TURNING (COMPUTER NUMERICAL CONTROL) (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <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>

Concept	Specific Outcomes	Notes
<p>Orientation</p> <ul style="list-style-type: none"> Lathe Operation 	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe the principles of machining and the operation of a metal lathe analyze a CNC lathe and describe how turning speeds and feed rates are controlled; tools and work pieces are mounted identify the turning capabilities of a lathe; e.g.: <ul style="list-style-type: none"> types of materials set-ups cutting tools describe the safety features that are built into the CNC equipment 	<p>Demonstrate the proper set-up and operation of a CNC lathe.</p>
<ul style="list-style-type: none"> Programming 	<ul style="list-style-type: none"> identify the relationship of the x and y axis on a metal lathe explain how to program a lathe using absolute coordinates 	<p>More and more industries are using computer-controlled equipment. Students who enter the machining field will require a knowledge of basic programming principles.</p> <p>Use the Cartesian system to describe a point.</p>
<ul style="list-style-type: none"> Dimensioning Systems 	<ul style="list-style-type: none"> compare the advantages of using incremental and absolute systems of measurements explain the difference between using a fixed zero and full floating zero 	
<ul style="list-style-type: none"> G and M Codes 	<ul style="list-style-type: none"> describe the purpose of G and M codes explain how canned cycles are used in programming 	

COURSE FAB2150: CNC TURNING (COMPUTER NUMERICAL CONTROL) (continued)

Concept	Specific Outcomes	Notes
<ul style="list-style-type: none"> • CAD/CAM 	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • explain how a CAD file can be converted to a machineable part file. 	
<p>Planning and Management</p> <ul style="list-style-type: none"> • Health and Safety • 2-D Programming 	<ul style="list-style-type: none"> • describe the: <ul style="list-style-type: none"> – appropriate use of protective equipment and clothing – need to keep work area clean and free of hazards – importance of following the manufacturer’s instructions and keeping all guards in place in working order • describe a safety plan in case of accident • prepare a program from a print using absolute coordinates and/or produce a CAD design • simulate the tool path using computer graphics. 	
<p>Implementation</p> <ul style="list-style-type: none"> • Production 	<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) • complete a test run • manufacture the part. 	
<p>Assessment</p> <ul style="list-style-type: none"> • Quality Control • Career Preparation 	<ul style="list-style-type: none"> • inspect the part to see that it meets the print dimensions, tolerances and specifications • prepare a record of completed activities within a portfolio. 	

