



# Engineering Program

Specialty	Manufacturing, Production Technology
Course Number	20201261
Course Title	CNC Workshops
Credit Hours	2
Theoretical Hours	0
Practical Hours	6



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

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**Brief Course Description:**

- ❖ This course is designed to develop the student's ability in the programming, set-up, and operation of Computerized Numerical Control machine tools as well as construct and execute basic operation programs.

**Course Objectives:**

This course aims to:

1. Explain the basic concepts of CNC and describes its historical development.
2. Compare between the conventional machines and CNC machines.
3. Explain practically the CNC preparatory, miscellaneous, and technological commands for turning and milling machines.
4. Explain practically the procedures for constructing and executing CNC programs.
5. Execute applied projects involving the construction and execution of various basic operating programs on CNC turning and milling machines.



**Detailed Course Description:**

Unit Number	Unit Name	Unit Content	Time Needed
1.	<b>Introduction</b>	<ul style="list-style-type: none"> <li>▪ Introducing the computer numerical control (CNC) systems and their historical development</li> <li>▪ Programmable automated versus fixed automated machines</li> <li>▪ Comparing numerical control (NC), computer numerical control (CNC), and direct numerical control (DNC) machines</li> <li>▪ Conventional versus CNC machines</li> </ul>	
2.	<b>The coordinate systems Cartesian coordinate system (X,Y,Z)</b>	<ul style="list-style-type: none"> <li>▪ Polar coordinate system</li> <li>▪ Degrees of freedom and their dependency on the coordinate systems</li> <li>▪ Motion directions (right-hand rule)</li> <li>▪ Types of movements (positional, linear, continuous)</li> <li>▪ Manual movement of axes and with Jog step and Teach In</li> <li>▪ Various zero points of CNC turning and milling machines</li> </ul>	
3.	<b>The basic CNC commands</b>	<ul style="list-style-type: none"> <li>▪ Preparatory words (G-functions)               <ul style="list-style-type: none"> <li>- Milling: G0, G1, G2, G3, F17, G18, G51, G52, G90, G91, G40-</li> <li>- G44, F98, F99</li> <li>- Turning: G00, G01, G02, G03, G96, G94, G95, G92, G53, - G59</li> </ul> </li> </ul>	

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		<ul style="list-style-type: none"> <li>▪ Miscellaneous words (M-functions) <ul style="list-style-type: none"> <li>- Milling: M3, M4, M5, M6, M8, M9, M30, M66</li> <li>- Turning: M03, M04, M05, M08, M30</li> <li>- Technological words: F, S, T</li> </ul> </li> </ul>	
4.	<b>Construction and execution of CNC programs</b>	<ul style="list-style-type: none"> <li>▪ Determination of the following on the working drawing: specifications of cutting tool, operating conditions (feed rate, cutting speed), fixture tools</li> <li>▪ Development the operating program and entering it into the computer for simulation purposes using available software like Mastercam, Walli etc.</li> <li>▪ Transferring the program as well as tool and operating data from the computer to the machine</li> <li>▪ Program simulation on the machine without tool</li> <li>▪ Actual operating program</li> </ul>	
5.	<b>Applied projects</b>	<ul style="list-style-type: none"> <li>▪ Execution of practical exercises involving the construction and miscellaneous execution of basic and programs on the CNC turning and milling machines</li> </ul>	

**Evaluation Strategies:**

Exams		Percentage	Date
Exams	Reports	30%	--/------
	Midterm Exam	20%	--/------
	Final Exam	50%	--/------

**Teaching Methodology:**

- ❖ Workshops

**Text Books & References:**

**Textbook:**

1. "Computer Numerical control of machine tools", Thyer, G., E.



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