***Course Specifications of:***

***CNC Machines and Economics*(MED 503)**

**Program(s) on which the course is given:** Diploma in Computer Numerical Control Machines

**Compulsory or Elective element of program**: Compulsory

**Department offering the program:** Mechanical Engineering

**Academic year / Level:** year/ 2014-2015

**Date of specification approval:**2012

1. **Basic Information**

**Title:** CNC Machines and Economics **Code:** MED503

**Credit Hours: 3 Lecture:3**

**Tutorial:2 Practical: Total: 3**

1. **Professional Information**
2. **Overall aims of course**

At the end of this course, the students will be able to:

* Explain the terminology used to describe CNC machine tools.
* Explain the basic types of CNC machine tools and the manufacturing operations for which they are best suited.
* Cost estimations of CNC components.

1. **Intended learning outcomes of course (ILOs)**

By completion of the course, the student should be able to:

* 1. **Knowledge and understanding**

2.1.1Identify theories, fundamentals and specialized knowledge in the computer numerical control machines and categorize sciences related to professional practice.

2.1.2List ethical and legal principles of professional practice in the area of computer numerical control machines.

2.1.3 Current problems, being treated in a critical and evaluative manner.

* 1. **Intellectual skills**

2.2.1Discern and analyze the problems in the area of ropotics and automation and categorize them according to their priority. (2.2.1)

2.2.4Assess the risks and hazards in professional practices. (2.2.4)

* 1. **Professional and practical skills**

2.3.2Prepare professional reports.

* 1. **General and transferable skills**

2.4.2 Use information technology in order to serve the development of professional practice.

2.4.5 Work in a group and manage time effectively.

2.4.6 Lead a team in familiar professional contexts.

1. **Contents**

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| **No of weeks** | **Topic** | **No. of hours** | **Teaching / learning methods and strategies** | **Assessment method** |
| 1 | Introduction to CNC machines types, parts of CNC – CNC m/c systems, | 3 | Lecture,Class activity | - |
| 2 | Technology of mechanical processing by cutting using CNC machine tools, aspects regarding evolution in time of CNC machine tools and equipment | 3 | Lecture./Assign, case study | Assignment 1 |
| 3 | Data coding – Methods of data entry and saving | 3 | Lecture, Class activity | Assignment 1 |
| 4 | Types of numerical control  Methods of CNC machine tools programming | 3 | Lecture,Class activity | Assignment 2 |
| 5 | Methods of manual numerical programmingof CNC machine tools (position – linear – curved – repeated )  Computer aided numerical programming of CNC machine tools | 3 | Lecture/Assign. | Assignment 2, Quiz |
| 6 | Connection between drawing and modification by computer | 3 | Lecture,Class activity | Assignment 3 |
| 7 | Case study for production by CNC and conventional method – Optimum cutting conditions - control –Parametric control. | 3 | Lecture,Class activity | Assignment 3, Quiz |
| 8 | **Midterm exam** | | | |
| 9 | Optimum cutting conditions - control –Parametric control. | 3 | Lecture/Assign. | Assignment 4 |
| 10 | Parametric programming - Cost calculation – cost elements 1/2 | 3 | Lecture, Class activity | Assignment 4, , Quiz |
| 11 | Parametric programming - Cost calculation – cost elements 1/2 | 3 | Lecture/Assign. | Assignment 5 |
| 12 | Design of pneumatics and hydraulics circuits. | 3 | Lecture, Class activity | Assignment 5 |
| 13 | Connection between drawing and modification by computer | 3 | Lecture, Class activity | Quiz |
| 14 | Case study for production by CNC and conventional method – Optimum cutting conditions - control –Parametric control. | 3 | Lecture, Case Study | Oral Exam |
| 15 | **Final exam** | | | |

1. **Course Matrix**

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| --- | --- | --- |
| **ILO’s code number** | **Teaching/learning methods and strategies** | **Assessment methods and strategies** |
| 2.1.1  2.1.2  2.1.3 | Formal lectures | Individual coursework assignments, quizzes, oral discussions and reports. Midterm and /or final written examination is given. |
| 2.2.1  2.2.4 | Analysis and problem‐solving skills are developed through tutorial/problem sheets and small group exercises.  Research skills are developed through a small subject oriented research project. | Analysis and problem‐solving skills are assessed through oral and written examinations.  Design and research skills are assessed through project write-ups, coursework and project reports. |
| 2.3.15ز  2.3.2 | Experiments demonstrations, practical work, laboratory or factory visits. | Practical skills are assessed through laboratory experimental write-ups, coursework exercises and reports, project reports and presentations. |
| 2.4.2  2.4.5  2.4.6 | Those skills are not explicitly taught; however, along the course of study the student will acquire those skills to be able to perform his obligations. Attendance of seminars, workshops or conferences will help the student in developing those skills. Presentation by students (either group or individual) will train students for those skills. | Project presentation |

1. **Teaching and Learning Methods**

* Lectures
* Practical training / laboratory

Seminar / workshop

* Class activity
* Case study
* Assignments / homework

Other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Student Assessment Methods**

* Assignments to assess knowledge and intellectual skills.
* Quiz to assess knowledge, intellectual and professional skills.
* Mid-term exam to assess knowledge, intellectual, professional and general skills.
* Oral exam to assess knowledge and intellectual skills.
* Final exam to assess knowledge, intellectual, professional and general skills.
* Other: Practical exam to assess knowledge, intellectual, professional and general skills.

1. **Assessment schedule**

Assessment 1 Assignments on weeks 2, 3, 4, 5 , 6, 7 ,9, 10, 11, and 12

Assessment 2 Quizzes on weeks 5, 7, 10, and 13

Assessment 3 Mid-term exam on weeks 8

Assessment 3 Oral exam on week 14

Assessment 4 Final exam on week 15

1. **Weighting of Assessments**

Mid-Term Examination 20%

Final-TermExamination 60%

Oral Examination 05%

Practical Examination 05%

Semester Work 10%

Other 00%

Total 100%

1. **List of References**
   1. Course Notes

* Course notes prepared by instructor
* PowerPoint slides.
  1. Essential Books (Text Books)
* James V. Valentino, Joseph Goldenberg, "Introduction to Computer Numerical Control (CNC), 2ndEdition, Prentice Hall, ISBN 0130142964, 2000.
  1. Recommended Books
* FaridAmirouche, “Principles of Computer Aided Design & Manufacturing”, 2ndEdition, Pearson Education, 2004.
* Steve Krarand Arthur Gill, “Computer numerical Control Programming Basics”, Industrial Press Edition, 1999.
  1. Periodicals Web sites, etc
* www.delcam.com

1. **Facilities Required for Teaching and learning**

* Lecture room with computer and data show
* Computer Laboratory.
* CNC Lab.

**Course coordinator: Prof.** Dr. Hossam Zakria

**Course instructor: Date**10 /10 /2015

**Head of department:** Osama Ezzt Abdellatif