***Course Specifications of:***

***Programming of CNC Machines* (MED 504)**

**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

Basic Information

Title: Programming of computer numerical control Code: MED 504

Credit Hours: 3 Lecture: 3

Tutorial: 2 Practical: Total: 3

**B- Professional Information**

1. **Overall aims of course:**

This course introduces students to:

- Analysis and problem‐solving skills are developed through tutorial/problem sheets and small group exercises.

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

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

Understand the basic of Computer Numerical Control (CNC)

Solve problems

Research skills are developed through a small subject oriented research project.

**2.1 Knowledge and understanding**

2.1.1 Identify theories, fundamentals and specialized knowledge in the field of specialization and categorize sciences related to professional practice.

2.1.2 List ethical and legal principles of professional practice in the area of specialization.

**2.2 Intellectual skills**

2.2.1 Discern and analyze the problems in the area specialization in both a systematic and a creative way.

2.2.2 Solve specialized problems in his/her profession.

2.2.4 Assess the risks and hazards in professional practices.

**2.3 Professional and practical skills**

2.3.2 Prepare professional reports in the area of CNC.

**2.4 General and transferable skills**

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

2.4.5Work in a group and manage time effectively.

2.4.6Lead a team in familiar professional contexts.

2.4.7 Conduct self-learning and continuous education practices.

1. **Contents**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No of weeks | Topic | No. of hours | Teaching / learning methods and strategies | Assessment method |
| 1 | Basic programming and operation of CNC machines- The basic operation of CNC milling machines and lathes | 3 | Lecture, Class activity | - |
| 2 | The basic operation of CNC milling machines and lathes | 3 | Lecture./Assign, case study | Assignment 1 |
| 3 | Data systems | 3 | Lecture, Class activity | Assignment 1 |
| 4 | Coding | 3 | Lecture, Class activity | Assignment 2 |
| 5 | Coding | 3 | Lecture/Assign. | Assignment 2, Quiz |
| 6 | Coding | 3 | Lecture, Class activity | Assignment 3 |
| 7 | CNC machine operation | 3 | Lecture, Class activity | Assignment 3, Quiz |
| 8 | Midterm exam | | | |
| 9 | Advance programming methods and practices | 3 | Lecture /Assign. | Assignment 4 |
| 10 | computer aided manufacturing, CAM, is used to generate more complex part geometries using a software package | 3 | Lecture, Class activity | Assignment 4, , Quiz |
| 11 | computer aided manufacturing, CAM, is used to generate more complex part geometries using a software package | 3 | Lecture/Assign. | Assignment 5 |
| 12 | Advanced machine operations | 3 | Lecture, Class activity | Assignment 5 |
| 13 | 4-axis programming and machining | 3 | Lecture, Class activity | Quiz |
| 14 | 5-axis programming and machining | 3 | Lecture, Case Study | Oral Exam |
| 15 | Final exam | | | |

1. **Course Matrix**

|  |  |  |
| --- | --- | --- |
| ILO’s code number | Teaching/learning methods and strategies | Assessment methods and strategies |
| 2.1.1  2.1.2 | Formal lectures | Individual coursework assignments, quizzes, oral discussions and reports. Midterm and /or final written examination is given. |
| 2.2.1  2.4.2 | 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. |
| 2.3.1 | 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  2.4.7 | 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

Assignments/homework

1. **Student Assessment Methods**

Assignments to assess knowledge and intellectual skills.

Quizs to assess knowledge, intellectual and professional skills.

Mid-term exam to assess knowledge, intellectual, professional and general skills.

Practical/Oral Examto assess knowledge, intellectual, professional and general 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**

**9.1 Course Notes**

Course notes prepared by instructor

PowerPoint slides.

**9.2 Essential Books (Text Books)**

James V. Valentino, Joseph Goldenberg, "Introduction to Computer Numerical Control (CNC), 2ndEdition, Prentice Hall, ISBN 0130142964, 2000.

Steve Krarand Arthur Gill, “Computer numerical Control Programming Basics”, Industrial Press Edition, 1999.

**9.3 Recommended Books**

P. N. Rao, “CAD/CAM Principles and Applications”, 2ndEdition, McGraw Hill, 2004.

Farid Amirouche, “Principles of Computer Aided Design & Manufacturing”, 2ndEdition, Pearson Education, 2004.

**9.4 Periodicals Web sites, etc**

[www.delcam.com](http://www.delcam.com)

Denford.com.

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

Lecture room with computer and data show.

CNC Lab.

Computer Laboratory.

CNC Simulator Software.

Denford Simulation Software.

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

**Course instructor:** 10.10.2015

**Head of department:** Prof. Dr. Osama Ezzat Abdellatif