***Course Specifications of:***

***Computer Aided Manufacturing (CAM)* (*MED 505*)**

**Program(s) on which the course is given:** Diploma in Automation and Mechatronics

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

**Department offering the program:** Mechanical engineering department

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

**Date of specification approval:** 10/05/2014

1. **Basic Information**

**Title: Computer Aided Manufacturing (CAM) Code: MED 505**

**Credit Hours: 3 Lecture: 3**

**Tutorial: Practical: Total: 3**

**B- Professional Information**

1. **Overall aims of course:**

This course introduces students to:

* Understand the different components of CAM Environments and the relevance of CNC Systems.
* Utilize the PC-based commercial "CAM" software, to produce Computer Numerical Control (CNC) machine tool programs.

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

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

**2.1 Knowledge and understanding**

2.1.1 Demonstrate knowledge and understanding of scientific principles and methodology necessary to underpin their education in mechatronic engineering, to enable appreciation of its scientific and engineering context, and to support their understanding of historical, current and future developments and technologies.

2.1.3 Demonstrate a comprehensive understanding of concepts from electronic mechanical and software engineering, as well as business and management studies and apply them effectively in engineering projects.

**2.2 Intellectual skills**

2.2.2 Identify, classify, practice and describe the performance of mechatronic systems and components through the use of analytical methods and modelling techniques.

2.2.3 Apply quantitative methods and computer software relevant to mechatronic engineering, in order to solve engineering problems.

2.2.4 Demonstrate understanding of ability to apply a systems approach to engineering problems.

**2.3 Professional and practical skills**

2.3.1 Demonstrate extensive practicing and understanding of a wide range of engineering control and components.

2.3.2 Demonstrate extensive practicing and understanding of a wide range of industrial automation and its components.

**2.4 General and transferable skills**

2.4.1 Make effective and appropriate use of Information and Communications Technology skills.

2.4.4 Exercise planning, organizational, problem-solving, and time-management skills and effectively use available resources.

2.4.6 Set basis and standards to assess the performance of others.

1. **Contents**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No of weeks** | **Topic** | **No. of hours** | **Teaching / learning methods and strategies** | **Assessment method** |
| 1 | Automatic manufacturing processes principles- production economics | 3 | Lecture, Class activity | - |
| 2 | Assembly; lines and systems – numerical control (DDC) production systems | 3 | Lecture./Assign, case study | Assignment 1 |
| 3 | Assembly; lines and systems – numerical control (DDC) production systems | 3 | Lecture, Class activity | Assignment 1 |
| 4 | Industrial robot (Technology – programming – applications)‎ | 3 | Lecture, Class activity | Assignment 2 |
| 5 | Industrial robot (Technology – programming – applications)‎ | 3 | Lecture/Assign. | Assignment 2, Quiz |
| 6 | Automatic material storage and handling – technological groups and flexible operating system | 3 | Lecture, Class activity | Assignment 3 |
| 7 | Automatic material storage and handling – technological groups and flexible operating system | 3 | Lecture, Class activity | Assignment 3, Quiz |
| 8 | **Midterm exam** | | | |
| 9 | Quality control – automatic inspection – control systems | 3 | Lecture /Assign. | Assignment 4 |
| 10 | computer integrated manufacturing systems – computer aided manufacturing planning – production workshop control | 3 | Lecture, Class activity | Assignment 4, , Quiz |
| 11 | computer integrated manufacturing systems – computer aided manufacturing planning – production workshop control | 3 | Lecture/Assign. | Assignment 5 |
| 12 | computer integrated manufacturing systems – computer aided manufacturing planning – production workshop control | 3 | Lecture, Class activity | Assignment 5 |
| 13 | Computer manufacturing net – automatic future factories – computer manufacturing applications | 3 | Lecture, Class activity | Quiz |
| 14 | Computer manufacturing net – automatic future factories – computer manufacturing applications | 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  2.1.3 | Formal lectures | Individual coursework assignments, quizzes, oral discussions and reports. Midterm and /or final written examination is given. |
| 2.2.2  2.2.3  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. |
| 2.3.1  2.3.2 | Experiments demonstrations, practical work, laboratory visits. | Practical skills are assessed through laboratory experimental write-ups, coursework exercises and reports, project reports and presentations. |
| 2.4.1  2.4.4  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)**
* P. N. Rao, “CAD/CAM Principles and Applications”, 2ndEdition, McGraw Hill, 2004.
  1. **Recommended Books**
* James V. Valentino, Joseph Goldenberg, "Introduction to Computer Numerical Control (CNC), 2ndEdition, Prentice Hall, ISBN 0130142964, 2000.
* 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.cncsimulator.com](http://www.cncsimulator.com)

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

* Lecture room with computer and **data** show
* Computer Laboratory
* DelcamFeatureCAM commercial software
* CNC Simulator.
* CNC Lab.

**Course coordinator:** Prof. Dr. Saber Abd Rabbo

**Course instructor: 10.10.2015**

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