Model No.12
Course Specifications: Computer Aided Manufacturing

University: Benha University
Faculty: Faculty of Engineering at Shoubra
Department offering the program: Mechanical Engineering Department
Department offering the course: Mechanical Engineering Department

1- Course Data

Course Code: MDP411

Course Title: Computer Aided Manufacturing

Specialization: production Mechanical Engineering department

Course Type: Compulsory

Study Year: Fourth Year

Teaching Hours: Lecture: 3   Tutorial: 2   Practical: 0   Total: 5

2- Course Aim

For students undertaking this course, the aims are to:

1. Identify the advantages and disadvantages of CNC.
2. Develop CNC part programs (Turning & Milling)
3. State the importance of Computer Integrated Manufacturing (CIM)
4. Identify the types and application of industrial robots.

3- Intended Learning Outcomes of Course (ILO's)

a. **Knowledge and Understanding Skills:** On completing this course, students will be able to demonstrate the knowledge and understanding of:

a.1) Numerical Control Definition, terminologies, Concepts, and Components used in computer aided manufacturing. (A1)

a.2) The Special Requirements for Utilizing CNC, CAM, CIM, CMM, and CAPP. (A4)

a.3) The CNC Machining Centers, Turning Centers, and Other Types of CNC Equipment. (A10)

a.4) Steps to approach programming problem solution using CAD/CAM technology. (A5)

a.5) The principles of Computer Integrated Manufacturing (CIM). (A13)

a.6) The specifications, programming and range of application of CAD and CAD/CAM facilities. (A15)

b. **Intellectual Skills:** At the end of this course, the students will be able to:

b.1) Assess the different types for loop Systems for Controlling Tool Movement. (B4)

b.2) Compare between the different types for programming different Types of CNC Equipment. (B8)

b.3) Analyze the performance of Machining Centers, Turning Centers, and Other Types of CNC Equipment. (B11)

b.4) Establishing Locations via Cartesian Coordinates and explaining CNC Machine Axes of Motion. (B1)

b.5) Explaining Units Used for Positioning Coordinates. (B13)

c. **Practical and Professional Skills:** On completing this course, the students are expected to be able to:

c.1) write a Part Programs for different types of work-pieces. (C1)

c.2) Prepare the process plan for manufacturing using CAD/CAM technology (C.3).

c.3) Prepare and present technical reports. [C11]

c.4) Reading Material Specifications of finished product. (C8)

d. **General and Transferable Skills:** At the end of this course, the students will be able to:

d- 1 - Communicate effectively.[D1]

d- 2- Demonstrate efficient IT capabilities. [D3]

d- 3 - Search for information and engage in life-long self-learning. [D6]

4- Course Contents

Week no.	Topics
1	Introduction to computer numerical control manufacturing
2	Introduction to CNC part programming
3	Part Programming (Turning I)
4	Part Programming (Turning II)
5	Part Programming (Milling 2D)
6	Part Programming (Milling 2.5D)
7	Part Programming (Milling 3D)
8	Mid-term exam
9	Introduction to Industrial Robot I
10	Introduction to Industrial Robot II
11	Computer Integrated Manufacturing (CIM)
12	Coordinate Measuring Machines (CMM)
13	Computer Aided Process planning (CAPP)
14	Review
15	Final exam
16	Final exam

5- Teaching and Learning Methods

5.1- Lectures

5.2- Practical training / laboratory

5.3- Class activity

5.4- Case study

5.5- Other: Reports

6- Teaching and Learning Methods of Disables

- 6.1- Seminar / workshop
- 6.2- Assignments / homework.

7- Student Assessment

a- Student Assessment Methods

1. Three assignments to assess knowledge and intellectual skills.
2. Three quiz to assess knowledge, intellectual and professional skills.
3. Mid-term exam to assess knowledge, intellectual, professional and general skills.
4. Final exam to assess knowledge, intellectual, professional and general skills.
5. Other: Practical exam to assess knowledge, intellectual, professional and general skills.

b- Assessment Schedule

NO.	Assessment	Week
1	Assignments	2,6,11
2	Quizzes	5,9,13
3	Mid-term exam	8
4	Oral Exam	12
5	Final exam	15

c- Weighting of Assessments

Assessment	Weight (%)
Mid-Term Examination	20
Final-Term Examination	60
Oral Examination	20
Practical Examination	10
Semester work	10
Other types of assessment	00
Total	**100**

8- List of References

a- Course Notes: Course notes prepared by instructor.

b- Books

1. G. E. Thyer, "Computer Numerical Control of Machine Tools", NEWNES, ISBN 0750601191, 1991.

c- Recommended Books

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

d- Web Sites

- www.cncsimulator.com • www.delcam.com

Course Coordinator: Assoc. Prof. Dr. Hossam El-Deen M. Zakaria

Head of Department: Prof. Dr. Osama Ezzat Abdelatif

Model No.11A
Course Specifications: Computer Aided Manufacturing

University: Benha University

Faculty: Faculty of Engineering at Shoubra

Department offering the program: Mechanical Engineering Department

Department offering the course: Mechanical Engineering Department

no.	Topics	Week no.	Knowledge and Understanding Skills	Intellectual Skills	Practical and Professional Skills	General and Transferable Skills
	Matrix of Knowledge and Skills of the Course					
1	Introduction to computer numerical control manufacturing	1	a.3	b1	C3	d2
2	Introduction to CNC part programming	2	a.2,a3		C1	
3	Part Programming (Turning I)	3	a.2, a3	b1	C.2	
4	Part Programming (Turning II)	4	a.5			d3
5	Part Programming (Milling 2D)	5	a1	b4	C.2	
6	Part Programming (Milling 2.5D)	6	a.2	b2		d2
7	Part Programming (Milling 3D)	7	a3	b3	C.1	
8	Midterm exam	8				
9	Introduction to Industrial Robot I	9	a.3		C.3, C.4	
10	Introduction to Industrial Robot II	10	a.2,a.4		C3	
11	Computer Integrated Manufacturing (CIM)	11	a.1,a.5	b5	C.2, C.4	d2
12	Coordinate Measuring Machines (CMM)	12	a1,a.2	b4	C3	d1
13	Computer Aided Process planning (CAPP)	13	a.3,a6	b3	C4	d2

Course Coordinator: Assoc. Prof. Dr. Hossam El-Deen M. Zakaria

Head of Department: Prof. Dr. Osama Ezzat Abdelatif

Matrix of Course Aims and ILO's

Course Title: Computer Aided Manufacturing

Course Code: MDP411

Teaching Hours: Lecture: 3   Tutorial: 2   Total: 5

Major or minor element of program: Major

Program on which the course is given: B.Sc. Mechanical production Engineering

Department offering the program: Mechanical Engineering Department

Academic year / level: 2014-2015 Fourth Year / First Semester

Date of specifications approval: 2014

Course aims	Basic Knowledge	Intellectual Skills	professional Skills	General Skills
1- Identify the advantages and disadvantages of CNC.	a1,a3	b3,b5	c1	d1
2- Develop CNC part programs (Turning & Milling)	a2	b2	c2,c4	d1
3- State the importance of Computer Integrated Manufacturing (CIM)	a3,a4	b1	c3	d3
4- Identify the types and application of industrial robots.	a5,a6	b4	c3,c4	d2

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