



BENHA UNIVERSITY



FACULTY OF ENGINEERING AT SHOUBRA

COURSE SPECIFICATIONS (2014-2015)

Model No.12

Course Specifications: Jigs and Fixture Design

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: MDP457

Course Title: Jigs and Fixture Design

Specialization: Mechanical Production Engineering

Course Type: Elective

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. Know and understand the importance of tooling in manufacturing related with the various design aspects related to jigs and fixtures to introduce the student to the complex field of Tool Design.
2. The concepts of accuracy and errors of manufacturing with reference to the practical manufacturing processes.

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

a. Knowledge and Understanding Skills: On completing this course, students will acquiring and understanding of :

- a.1) Techniques used in Jigs And Fixture Design. (A1)
- a.2) The basic principles of Ferrous Tool Materials, Nonferrous Tool Materials, Heat Treating. (A12)
- a.3) The basic principles of Cutting Tool Design. Metal cutting principles, cutting tool selection, Chip Formation, Tool Wear, Cutting Forces, Control of the Causes of Tool Wear and Failure. (A7)
- a.4) Steps to approach problem solution for Jigs And Fixture Design (A5).
- a.5) The effect of varying the key parameters on the design and fabricate Jig and fixture. (A10)

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

- b.1) Assess the differences between different types of tool Materials. (B6)
- b.2) Compare between the different types of Jigs And Fixture. (B8)
- b.3) Analyze the performance of nonconventional machines.(B1)

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

- c.1) Sketch schematic and accompanying diagrams for Jigs Fixture. (C2)
- c.2) Use the property data table and charts for the key points in Jigs And Fixture design. (C10)
- c.3) Prepare and present technical reports. [C11]

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]



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4- Course Contents

Week no.	Topics
1	Purpose and advantages of jigs and fixtures
2	Principles of location, types of locators
3	Principles and types of clamping, clamping forces
4	Design procedure of drilling and indexing jigs
5	Design procedure of indexing table, milling, turning
6	Assembly fixtures, single and multiple piece fixtures, welding fixtures
7	Constructional design for function, loading and rigidity
9	Requirements for dimensional accuracy, manufacturing of jigs and fixtures
10	Economy of jigs and fixtures, methods of tool design
11	Gauges and gauge design
12	Inspection
13	Quality control
14	Practicality

5- Teaching and Learning Methods

- 5.1 Lectures
- 5.2 Class activity
- 5.3 Assignments/ Homework

6- Teaching and Learning Methods of Disables

Nothing.

7- Student Assessment

a- Student Assessment Methods

1. Six assignments to assess knowledge and intellectual skills.
2. Two quizzes to assess knowledge, intellectual and professional skills.
3. Midterm exam to assess knowledge, intellectual, professional and general skills.
4. Final exam to assess knowledge, intellectual, professional and general skills.

b- Assessment Schedule

NO.	Assessment	Week
1	Assignments	2, 4, 5, 7, 11, 12
2	Quiz	4, 10
3	Midterm exam	8
4	Final exam	15

c- Weighting of Assessments

Assessment	Weight (%)
Midterm Examination	20
Final Term Examination	64
Oral Examination	00
Semester Work	16
Other Types of Assessment	00
Total	100



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8- List of References

a- Course Notes: Course notes prepared by instructor.

b- Recommended Books

1. Donaldson, Lecain and Goold - "Tool Design", McGraw Hill, New York, 2001
2. SME - Tool and Manufacturing Engineers Handbook, 2002
3. SME - Die Design Handbook, 2003
4. E. K. Henriksen - "Jig and Fixture Design Manual", Industrial Press, New York, 2003

Course Coordinator: Dr.Ibrahim Mousa & Dr. Sameh Shawky

Head of Department: Prof. Dr. Osama Ezzat Abdelatif



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FACULTY OF ENGINEERING AT SHOUBRA

COURSE SPECIFICATIONS (2014-2015)

Model No.11A

Course Specifications: Jigs and Fixture Design

University: Benha University

Faculty: Faculty of Engineering at Shoubra

Department offering the program: Mechanical Engineering Department

Department offering the course: Mechanical Engineering Department

Matrix of Knowledge and Skills of the Course

No.	Topics	week	Basic Knowledge	Intellectual Skills	Professional Skills	General Skills
1	Introduction to the subject. Objectives of Tool Design, Economics of Design,	1				
2	Analysis of Small Tool Costs. Some typical examples	2	a1, a2			
3	Ferrous Tool Materials, Nonferrous Tool Materials, Heat Treating	3	a4	b2		
4	Cutting Tool Design. Metal cutting principles, cutting tool selection,	4	a5	b3		
5	Chip Formation, Tool Wear, Cutting Forces, Control of the Causes of Tool Wear and Failure	5		b1	c3	
6	Work holding Principles, General Considerations, Locating Principles, work piece Surfaces, Types of Location, degrees of Freedom.	6	a3	b2		d1
7	Basic Locating Rules, Locational Tolerances, Fool proofing, Basic Types of Locators, Clamping Principles, types of clamps, standard components, Other elements	7		b2	c2	
8	Jig Design, General Considerations, Developing the Preliminary Jig Design, Drill Jigs, Designing a Jig	8	a5	b1	c1	
9	Mid-term exam	9				
10	Fixture Design, General Considerations, Developing the Preliminary fixture Design	10	a3	b1		
11	Various types of fixtures	11		b2	c1	
12	Designing a fixture	12	a4			d2
13	Inspection	13	a4	b3	c2	
14	Quality control	14	a4	b2		d1
15	Practicality	15	a2			d3

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COURSE SPECIFICATIONS (2014-2015)

Matrix of course aims and ILO's

Course Title: Jigs and Fixture Design **Code:** MDP457

Lecture: 3 **Tutorial/Practical:** 2 **Total:** 5

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

Major or minor element of program: Minor.

Department offering the program: Mechanical Engineering Department

Department offering the course: Mechanical Engineering Department

Academic year / level: **Fourth Year / Second semester**

Date of specifications approval: 2014

Course aims	Basic Knowledge	Intellectual Skills	professional Skills	General Skills
Know and understand the importance of tooling in manufacturing related with the various design aspects related to jigs and fixtures.	a1,a3	b1,b2	c1,c2	d1
The concepts of accuracy and errors of manufacturing with reference to the practical manufacturing processes.	a4,a5	b3	c3	d2,d3

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