Course specifications of

Tool Design - MDP 451

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given	B. Sc.. in Design and production department .
Major or minor element of programme	N.A.
Department offering the programme	Design and production department
Department offering the course :	Design and production department Fifth
Academic year/ Level :	year/Second semester
Date of specification approval :	

A- Basic Information

Title :	Tool Design	**code :**	MDP-451
Credit Hours :	N.A.	**Lecture :**	3
Tutorial :	3	**Practical**	0 **Total:** 6

B- Professional Information

1 – Overall aims of course

By the end of the course the students will be able to:

- Demonstrate knowledge and understanding of jigs, fixtures, cutting tool design and injection molding.
- Represent the different techniques of tool designs.
- Recognize and calculate the different types of clamping and cutting forces during machining.
- Formulate the stresses and deflection due to the clamping and cutting forces.
- Solve by using a block diagrams the design problems of clamping and cutting forces.
- construct the jig, fixture, cutting tool and injection molding

2- Intended learning outcomes of course (ILOs)

a-Knowledge and understanding

a1 - Explain advantages of jigs and fixtures.
a2 - Identify principal of locations.
a3 - Explain types of locators.
a4 - Define over determined locations.
a5 - Describe principal of clamping.
a6 - Explain types of clamping and clamping force.
a7 - Define Drilling jigs and indexing jigs.
a8 - Define Milling fixtures and indexing table.
a9 - Identify single and multiple piece fixtures.
a10 - Explain turning, welding and assembly fixtures.

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a11 - Explain Manufacturing of jigs and fixture.
a12 - Identify Economy of jigs and fixture.
a13 - Describe Modern cutting tool materials.
a14 - Describe manufacturing of turning form tools.
a15 - Define Drilling tools.
a16 - Define Form relieved milling cutters.
a17 - Identify Broaching tools.
a18 - Describe Gear cutting tools.
a19 - Identify Threading tools.
a20 - Describe High speed machining tools.
a21 - Explain Types of injection molds for thermoplastics.
a22 - Define Number of cavities and layout.
a23 - Identify Feeding, cooling, and ejection system.
a24 - Explain Manufacturing of injection molds.

b-Intellectual skills

b1 - Recognize how to construct the jigs and fixtures.
b2 - check the stresses and deflections on the cutting tool.
b3 - construct the detail drawing of injection molding.

c-Professional and practical skills

c1 - Problem definition and mathematical simulations of jigs, fixtures, cutting tool, and injection molding.
c2 - Deal with professional computer programs used for tool design.
c3 - Select the force, deflection and stress analysis of the different tools.

d-General and transferable skills

d1 - Present and analysis the given problems in groups.
d2 - Write technical reports and conduct presentation about tool design.
d3 - practice drawing of the given problem.

3- Contents

No	Course Content	Class Lectures	Tutorials/Software application	Total
1	Advantages of jigs and fixtures	6	6	12
2	Principal of locationsAnd types of locators	6	6	12
3	Principal of clamping	6	6	12
4	Drilling jigs and indexing jigs	5	6	11
5	Modern cutting tool materials	4		4
6	Drilling and milling tools	6	6	12
7	Broaching tools. Gear cutting tools	6	6	12
8	Types of injection molds	2	3	5
9	Feeding system, Cooling system & Ejection system	4	6	10
	Total Hours	45	45	90

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4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Assignment		Assignment 1	Week 3	1
Assignment		Assignment 2	Week 5	1
Written exams		Mid term exam	Week 7	15
Assignment		Assignment 3	Week 9	1
Assignment		Quiz	Week 10	5
Report		Report	Week 11	5
Assignment		Assignment 4	Week 12	2

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Written exams		Final exam	Week 16	70
Total				100 %

5- List of references

5. 1 Course notes

- Lecture Notes

5. 2 Essential books (text books)

- Course Notes

6- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board and data show

Course Content/ILO Matrix

Course Conter	a1	a10	a11	a12	a13	a14	a15	a16	a17	a18	a19	a2	a20	a21	a22	a23	a24	a3	a4	a5	a6	a7	a8	a9	b1	b2	b3	c1	c2	c3	d1	d2	d3
Advantages of jigs and fixtures	●		●	●																				●	●								
Principal of locationsAnd types of locators		●										●						●	●														
Principal of clamping																				●	●					●							
Drilling jigs and indexing jigs							●															●	●										
Modern cutting tool materials					●	●																								●			
Drilling and milling tools								●			●		●																●			●	
Broaching tools.Gear cutting tools									●	●																							
Types of injection molds														●	●																		
Feeding system, Cooling system & Ejection system																●	●										●	●			●		●

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Learning Method /ILO Matrix

earning Metho	a1	a10	a11	a12	a13	a14	a15	a16	a17	a18	a19	a2	a20	a21	a22	a23	a24	a3	a4	a5	a6	a7	a8	a9	b1	b2	b3	c1	c2	c3	d1	d2	d3
Class Lectures	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
Tutorials/Software application	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●

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Assessment Methods /ILO Matrix

Assessment	a1	a10	a11	a12	a13	a14	a15	a16	a17	a18	a19	a2	a20	a21	a22	a23	a24	a3	a4	a5	a6	a7	a8	a9	b1	b2	b3	c1	c3	d1	d2	d3
Assignments and Quiz to assess ability to solve problems and analyze results independently : Assignment 1	●											●						●	●	●												
Assignments and Quiz to assess ability to solve problems and analyze results independently : Assignment 2																				●	●	●	●									
Written exams (mid-term & final) to assess understanding and scientific knowledge : Mid term exam																												●	●			●
Assignments and Quiz to assess ability to solve problems and analyze results independently : Assignment 3		●	●	●																				●								
Assignments and Quiz to assess ability to solve problems and analyze results independently : Quiz																									●		●					

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Assessment Methods /ILO Matrix

Assessment	a1	a10	a11	a12	a13	a14	a15	a16	a17	a18	a19	a2	a20	a21	a22	a23	a24	a3	a4	a5	a6	a7	a8	a9	b1	b2	b3	c1	c3	d1	d2	d3
Report to assess practical, and presentation skills : Report														●	●	●	●													●	●	●
Assignments and Quiz to assess ability to solve problems and analyze results independently : Assignment 4					●	●	●	●	●	●	●		●																			
Written exams (mid-term & final) to assess understanding and scientific knowledge : Final exam	●			●												●				●						●	●	●	●			●

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