

Course specifications of

Manufacturing Technology (2) – MDP 211

University: Ain Shams

Faculty: Engineering

Programme on which the course is given:	All Mechanical Engineering Programmes
Major or minor element of programme:	N. A.
Department offering the programme:	All mechanical engineering departments
Department offering the course:	Design and Production Engineering
Academic year/ Level:	2 nd year, second term
Date of specification approval:	

A- Basic Information

Title:	Manufacturing Technology (2)	Code:	MDP 211
Credit Hours:	N.A.	Lecture:	4
Tutorial :	1	Practical:	2
Total:	7		

B- Professional Information

1- Overall aims of course

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

- Get a basic idea of solidification and casting, alloys, structure and properties, casting products and applications,
- know about the different casting processes, mould and core-making, sand properties and testing, behavior of liquid metals, melting and melt treatment,
- Make design for a sound casting using basic equations and to specify the required moulding materials,
- Deal with casting quality control methods,
- Learn the basics of different traditional and innovative joining technologies,
- Get to know the correlation between materials behavior and joining technology and how to improve quality assurance in industrial manufacturing,
- Know the methods of testing the joints (strength, non-destructive testing, metallographic examination) are known,
- Design weld-joints for safe constructions.

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2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding

- a1- Get a basic idea of solidification and casting, alloys, structure and properties, casting products and applications.
- a2- Explain different casting processes, mould and core-making, sand properties and testing, behavior of liquid metals, melting and melt treatment.
- a3- State the design basics for a sound casting using basic equations, and to specify the required moulding materials.
- a4- Learn the basics of different traditional and innovative joining technology.
- a5- Know the correlation between materials behaviour and joining technology and how to improve quality assurance in industrial manufacturing.
- a6- Know the different methods of testing the joints.

b. Intellectual skills

- b1- Design a sound casting using basic equations.
- b2- Design weld-joints for safe constructions.

c. Professional and practical skills

- c1- Identify different casting processes, mould and core-making, sand properties and testing, behavior of liquid metals, melting and melt treatment.
- c2- Deal with design of casting mould , and cores.
- c3- Analyze the casting and predict the various casting defects.

d. General and transferable skills

- d1- Make scientific Presentation by the casting project.
- d2- Write technical reports about the advanced welding technology.
- d3- Practice working in team in the casting project.

3- Contents

No	Course Content	Laboratory (hrs)	Lecture (hrs)	Tutorial (hrs)	Total (hrs)
1	Introduction to solidification and casting processes		2		2
2	Casting of wrought alloys, continuous casting		2		2
3	Principles of shaped casting, alloys & products, and processes		4		4

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4	Sand, moulding and core-making processes	2	4	3	9
5	Liquid metal behaviour & fluid dynamics		2		2
6	Casting design, pattern, gating, feeding systems	2	2	6	10
7	Heat extraction & solidification		4	3	7
8	Melt treatment & melting equipment	2	2	2	6
9	Cast-iron	2	2		4
10	Casting defects & finishing	2	2	2	6
11	Quality control, environment, safety, computer application		2		2
12	Introduction to welding and joining principles		4		4
13	Classification of welding processes		4	2	6
14	Thermal welding: oxy-acetylene welding, arc welding, resistance welding, submerged arc welding, spot and seam welding, plasma	2	12	4	18
15	Cold welding: cold pressure welding, adhesive welding	2	4	4	10
16	Advanced welding		2		2
17	Design of weld joints and constructions		2		2
18	Testing of welded joints, welding defects and quality control	1	2		3
19	Casting project		2	4	6
	Total hours	15	60	30	105

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4- Assessment schedule

Assessment method	No	Description	Week No	Weight
Reports		Reports	Weekly	10
Assignments		Assignments	Weekly	20
Written exam		Mid-term	Week 8	10
Oral exam		Discussion	Week 15	35
Written exam		Final exam	Week 16	100
Total				175

5- List of references

a. Course notes

- Laboratory manual provided by course instructors
- Notes distributed by the instructor

b. Essential books (text books)

- M. Lal – O. P. Khanna, 1979, Text Book of Foundry Technology,
- John Campell, Casting, 2nd edition, Butterworth-Heinemann 2003
- Killing, R. Welding Processes and Thermal Cutting, English Edition Band 1 (2001), 192 Seiten,
- 265 Bilder, 40 Tabellen, ISBN:3-87155-790-0
- 1998 أحمد سالم الصباغ، هندسة لحام المعادن، عالم الكتب، -

c. Recommended books

- أحمد سالم الصباغ، هندسة المواد – الجزء الثاني: الخواص الميكانيكية، عالم الكتب للنشر -
- Radaj, D. Welding residual stresses and distortion calculation and measurement English
- Edition Band 2, (2003) 415 Seiten, 410 Abbildungen, ISBN: 3-87155-791-9
- Materials Handbook, v. 15 – casting, ASM Int., USA, 1998

d. Periodicals, Web sites, ... etc

- Journal of Metals, ASM, USA

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-Websites on casting and websites on welding.

6- Facilities required for teaching and learning

- Data show and computer and internet facilities,
- Laboratories for foundry, sand testing, and materials testing
- Text books, handbooks and standard specifications availability in student library

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	c1	c2	c3	d1	d2	d3
Introduction to solidification and casting processes	●													
Casting of wrought alloys, continuous casting		●	●											
Principles of shaped casting, alloys & products, and processes				●										
Sand, moulding and core-making processes		●	●		●									
Liquid metal behaviour & fluid dynamics						●			●					
Casting design, pattern, gating, feeding systems		●	●				●		●					
Heat extraction & solidification										●	●			
Melt treatment & melting equipment									●					
Cast-iron									●	●				
Casting defects & finishing									●	●				
Quality control, environment, safety, computer application											●			

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Introduction to welding and joining principles								●	●						
Classification of welding processes								●							
Thermal welding: oxy-acetylene welding, arc welding, resistance welding, submerged arc welding, spot and seam welding, plasma							●								
Cold welding: cold pressure welding, adhesive welding							●		●						
Advanced welding										●					
Design of weld joints and constructions									●						
Testing of welded joints, welding defects and quality control								●	●					●	
Casting project													●	●	●

Learning Method /ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	c1	c2	c3	d1	d2	d3
Lecture	●	●	●	●	●	●		●						
Tutorial		●	●			●	●		●	●	●	●	●	●
Laboratory		●	●			●	●	●	●	●		●		●

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	b1	b2	c1	c2	c3	d1	d2	d3
Reports:		●	●		●	●								
Assignments:	●	●	●	●	●	●	●							
Mid-term: midterm					●	●	●	●	●	●				
Oral: Exam												●	●	●
Written exam:	●	●	●	●	●	●	●			●	●			

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