

COURSE PLAN

FIRST: BASIC INFORMATION

College					
College	: Al-Karak University College				
Department	: Mechanical Engineering				
Course					
Course Title	: Special Welding				
Course Code	: 020209222				
Credit Hours	: 2 (1 Theoretical, 1 Practical)				
Prerequisite	:				
Instructor					
Name	: Dr. Khaleel Abushgair				
Office No.	:				
Tel (Ext)	:				
E-mail	: abushgair@bau.edu.jo				
Office Hours	:				
Class Times	The building	today	Start time	End time	Hall number
Text Book					
Title	:				

References

1. Modern Welding; last Edition Althouse/Turnquist/Bowditch/Bowditch Goodheart-Wilcox Co., Inc.
2. Welding Technology American Technical Society Chicago last edition
3. J. W Giachino W. weeks G.s Johnson 2. Modern Welding, by A.D Althouse C.H Turnquist and W.A. Bowditch, South Holland Illinois, last edition

SECOND: PROFESSIONAL INFORMATION

COURSE DESCRIPTION

This course deals with the advanced welding techniques and equipment mainly resistance welding, laser beam, electron beam and friction welding, the various welding advanced processes used in today's industries, their effects to weld mild steel, stainless steels, alloy steels and non-ferrous metals in multiple positions, good safety practices, understanding of welding theory and implementation of blueprint reading, symbols and mathematics that are essential in any welding career, developing manipulative proficiency in the use of resistance welding, laser beam, electron beam and friction welding in the horizontal (2F-2G), vertical (3F-3G) positions on steel.

COURSE OBJECTIVES

The main objectives of this course are to enable the student to do the follows;

- Explain the processes and safety issues involved in usage of the various resistance welding, laser beam, electron beam and friction welding processes.
- Explain the basic set-up configurations of various resistance welding, laser beam, electron beam and friction welding equipment.
- Explain the principle of weldability, welding symbols, how to weld the different metals using special welding techniques.
- Explain testing and inspection on the welded parts by special weldings including laser beam and resistance welding, .

COURSE LEARNING OUTCOMES

On successful completion of this course, students are expected to be able to:

CLO1. Explain a basic knowledge on special welding skills on joint designs and positions used in industry

CLO2. **Perform** the principles of resistance welding technique, complete resistance welding on thin plates

CLO3. **Perform** plasma metal arc cutting and welding technology and equipment, complete plasma metal cutting on various joint configurations in all position according to plate thickness

CLO4. **Perform** electro welding technology and equipment such as electro slag welding, electro gas welding and electro beam welding

CLO5. Explain laser welding technology and equipment of ultrasonic laser welding

CLO6. Explain special welding technique such as thermit welding, explosive welding, friction welding, flex core arc welding

CLO7. **Perform** laser welding technique on non-ferrous metals, and test and inspect the welded parts

COURSE SYLLABUS

Week	Topic	Topic details	Related L.O. and Reference (chapter)	Proposed assignments
1	Introduction to arc welding and safety in welding workshops	<ul style="list-style-type: none"> • Course introduction • Welding and general shop safety • Personal protection equipment's (PPE) used in welding and functionality • Basic weld joints and positions 	CLO1	
2	Resistance Welding	<ul style="list-style-type: none"> • Introduction to resistance welding • Machines, machines controls, electrodes • Resistance spot welding, multiple spot welding • Practical experience in the use and application of spot welding on various on plate with different thickness 	CLO2	
3	Resistance Welding	<ul style="list-style-type: none"> • Seam welding projection • Welding flash • Welding upset • Spike welding • Practical experience in the use and 	CLO2	



Week	Topic	Topic details	Related L.O. and Reference (chapter)	Proposed assignments
		application of seam and flash welding on various on plate with different thickness		
4	Plasma arc welding technology	<ul style="list-style-type: none"> • Plasma arc welding technology and equipment • Practical experience in the use and application of plasma arc welding on various joint configurations in all position on plate • Visual inspection of welded joints 	CLO3	
5	Plasma arc metal cutting technology	<ul style="list-style-type: none"> • Plasma metal arc cutting technology and equipment • Practical experience in the use and application of plasma metal cutting on various joint configurations in all position on plate thickness • Visual inspection of catted joints • Problems and limitations of plasma metal cutting 	CLO3	
6	Electro slag welding technology and equipment	<ul style="list-style-type: none"> • Welding of thick plates vertically and its applications • Electro slag welding technology and equipment • Practical experience in the use and application of Electro slag metal welding on various joint configurations in verticals position on thick plate • Welding problems and solutions 	CLO4	
7	Electro gas welding technology and equipment	<ul style="list-style-type: none"> • Welding of thick plates vertically and its applications • Electro gas welding technology and equipment • Practical experience in the use and application of electro gas metal welding on various joint configurations in verticals position on thick plate • Welding problems and solutions 	CLO4	
8	Midterm Exam			
9	Electron beam welding technology and equipment	<ul style="list-style-type: none"> • Precision welding and its applications • Electron beam welding technology and equipment • Practical experience in the use and application of electron beam welding metal on various joint configurations in plate 	CLO4	

Week	Topic	Topic details	Related L.O. and Reference (chapter)	Proposed assignments
		<ul style="list-style-type: none"> Welding problems of electron beam welding and solutions 		
10	Laser welding technology and equipment	<ul style="list-style-type: none"> Precision welding and its applications Laser welding beam welding technology and equipment Practical experience in the use and application of laser beam in welding on various joint configurations in plate Welding problems of laser welding beam welding and solutions 	CLO5	
11	Ultrasonic Laser welding technology and equipment	<ul style="list-style-type: none"> Ultrasonic laser beam welding technology and equipment Practical experience in the use and application of ultrasonic laser welding beam in welding metal on various joint configurations in plate Welding problems of ultrasonic laser beam welding and solutions 	CLO5	
12	Thermit and Explosive welding and equipment	<ul style="list-style-type: none"> Thermit and Explosive welding and equipment welding problems of thermit and explosive welding and solutions 	CLO6	
13	Friction and Pressure welding and their equipment	<ul style="list-style-type: none"> Friction and pressure welding technology and their equipment Practical using friction and pressure welding for welding of workpieces Welding problems and solutions 	CLO6	
14	Flux Core arc welding (FCAW)	<ul style="list-style-type: none"> Flux Core arc welding (FCAW) technology and their equipment Practical using flux core arc welding (FCAW)for welding of workpieces with different horizontal (2F-2G) welding joints Welding problems and solutions 	CLO6	
15	Laser Welding methods for nonferrous metals	<ul style="list-style-type: none"> Copper and its alloys welding problems Aluminum and its alloys welding methods problems Testing and inspecting welds joints methods 	CLO7	
16	Final Exam			

COURSE LEARNING RESOURCES

The methods used in teaching the program, are mentioned, sch as lectures, discussion sessions, practivity, and other activities)



- Discussion and explanation sessions
- Practical activity and execution

ONLINE RESOURCES

- 1) <https://www.aws.org/home>

**ASSESSMENT TOOLS**

Assessment Tools	%
Projects and Quizzes	20%
MID Exam	30%
Final Exam	50%
Total Marks	100%

THIRD: COURSE RULES**ATTENDANCE RULES**

Attendance and participation are extremely important, and the usual University rules will apply. Attendance will be recorded for each class. Absence of 10% will result in a first written warning. Absence of 15% of the course will result in a second warning. Absence of 20% or more will result in forfeiting the course and the student will not be permitted to attend the final examination. Should a student encounter any special circumstances (i.e. medical or personal), he/she is encouraged to discuss this with the instructor and written proof will be required to delete any absences from his/her attendance records.

GRADING SYSTEM**Example:**

Average	Maximum	Minimum
Excellent	100%	90%
Very Good	89%	80%
Good	79%	70%
Satisfactory	69%	60%
Weak	59%	50%
Failed	49%	35%

REMARKS

{ The instructor can add any comments and directives such as the attendance policy and topics related to ethics }

COURSE COORDINATOR**Course Coordinator****Signature:****Date:****Department Head:****Signature:****Date:**