

COURSE PLAN

FIRST: BASIC INFORMATION

College					
College	: Al-Karak University College				
Department	: Mechanical Engineering				
Course					
Course Title	: Welding Automation				
Course Code	: 020209224				
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. The Procedure Handbook of Arc Welding, last Edition.
The Lincoln Electric Company Publisher: The Lincoln Electric Company
2. Modern Welding; last Edition Althouse/Turnquist/Bowditch/Bowditch
3. Goodheart-Wilcox Co., Inc.
4. Welding Technology American Technical Society Chicago last edition,
5. 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 covers the advance and professional skills of application of automation to the welding process, hands-on training in examination of simple automation techniques such as tools, clamping and fixtures to aid in the rapid joining of production runs, equipment that carries the welding gun, tractors, and carriages to fully automated systems with the student performing set-up and troubleshooting(submerged arc welding) and automated parts processing(optical tracer torch), programmable controllers, programming and use of industrial robot for welding.

COURSE OBJECTIVES

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

- Explain the advantages / disadvantages of automation, an available equipment used in welding automation.
- Explain compute software and hardware system for welding automation.
- Explain types of robot, sensors in robot, robot programming and robot applicants used in welding automation.
- Develop welding automation system by practicing welding automation.

COURSE LEARNING OUTCOMES

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

- CLO1. Explain welding automation, basic elements of an automation system, reasons of automation, automation principles
- CLO2. Explain hardware components for automation, process and numerical controls including NC, CNC and DNC system
- CLO3. Explain compute aided welding design and compute system for welding automation
- CLO4. Explain robot types, sensors in robot, program for robot and robot applicants used in welding automation
- CLO5. [Develop working competence of](#) welding automation system by practicing using available automated welding system of GTAW, GMAW, FCAW and SAW, etc.

COURSE SYLLABUS

Week	Topic	Topic details	Related L.O. and Reference (chapter)	Proposed assignments
1	Introduction To Automation	<ul style="list-style-type: none"> • History of Automation • Functional areas (Application) of automation • Automation in production systems • Reasons for automation • Benefits and drawback of automation • Automation principles & strategies • Basic elements of an automated system • Advance automation functions • Levels of automation 	CLO1	
2	Hardware Components For Automation And Process Control	<ul style="list-style-type: none"> • Sensors • Actuators • Analog-to-digital converter • Digital-to-analog converter • Input/output devices for discrete data • PLC (Programmable Logic Controller) 	CLO2	
3	Numerical Control	<ul style="list-style-type: none"> • Fundamental of NC technology • Difference between conventional & NC machine tools • Main components / elements of NC machine • The NC procedure 	CLO2	

Week	Topic	Topic details	Related L.O. and Reference (chapter)	Proposed assignments
		<ul style="list-style-type: none"> • Classification of NC machines • Data input and storage media • Tape code • NC words • Tape format • Data processing techniques • Manual part programming • Computer aided programming • The programming languages • Tape reader • Tooling for NC machines • Advantages, disadvantages and applications of NC machines • Computer numerical control-CNC • Distributed/Direct numerical control-DNC • Adaptive control machining system • Machining center 		
4	Computer Aided Welding Design	<ul style="list-style-type: none"> • Introduction and welding analysis • Engineering design v/s welding design • Perspective in welding design • Computer aided welding analysis • Computer aided welding design • Use of interactive computer graphics 	CLO3	
5	Computer Systems For Welding Engineering	<ul style="list-style-type: none"> • Introduction • Computer system • Software for welding engineers 	CLO3	
6	Industrial Robotics	<ul style="list-style-type: none"> • Robot anatomy & related attribute • Robot control systems • End effectors • Sensors in robotics • Industrial robot applications • Introduction of robot programming 	CLO4	
7	Welding Robots	<ul style="list-style-type: none"> • Introduction of welding robots • Robotic welding system • Types of welding robots • Robot selection mechanics • Integrated the welding system • Joint tracking system 	CLO4	
8	Midterm Exam			
9	Welding Automation	<ul style="list-style-type: none"> • Introduction of welding automation • Concept of welding automation • Welding operation, structure analysis • Classification of welding automation 	CLO5	



Week	Topic	Topic details	Related L.O. and Reference (chapter)	Proposed assignments
		<ul style="list-style-type: none"> Machine welding Automatic welding Flexible automated welding 		
10	Welding Automation practice	<ul style="list-style-type: none"> The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills 	CLO5	
11	Welding Automation practice	<ul style="list-style-type: none"> Show video films/animation films/photographs of different automated manufacturing process and discuss their features 	CLO5	
12	Welding Automation practice	<ul style="list-style-type: none"> Using available automated welding system (GTAW / GMAW / FCAW / SAW) in training of students 	CLO5	
13	Welding Automation practice	<ul style="list-style-type: none"> Using available automated welding system (GTAW / GMAW / FCAW / SAW) in training of students 	CLO5	
14	Welding Automation practice	<ul style="list-style-type: none"> Using available automated welding system (GTAW / GMAW / FCAW / SAW) in training of students 	CLO5	
15	Welding Automation practice	<ul style="list-style-type: none"> Using available automated welding system (GTAW / GMAW / FCAW / SAW) in training of students 	CLO5	
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>

ASSESSMANT 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: