Kingdom of Saudi Arabia Ministry of Higher Education **Qassim University** College of Engineering		المملكة العربية السعودية وزارة التعليم العالي **جامعة القصيم** **كليه الهندسه**

Manufacturing Automation

College: Engineering

Department: Mechanical

First: Course Definition

1- Course Code: ME 638

2- Units: 3 credit hrs

3- Semester: All

4- Prerequisite: None

5- Co-requisite: None

6- Location (if not on main Campus):

Second: Course Objectives

The Course makes students able to:

1- Introduce the elements and benefits of manufacturing automation
2- Develop basic programming knowledge of CNC machines and CNC code using integrated CAD/CAM systems
3- Be familiar with fundamental concepts of industrial robotics
4- Learn concepts in material handling, manufacturing systems, and manufacturing support systems

Third: Course Specifications

1- Topics to be covered

Subject	No of Weeks	Units
Introduction to Automation	1	3
Industrial Control Systems	2	6
Sensors, actuators, and other control system components	2	6

Discrete control using programmable logic controllers and personal computers	2	6
Automatic data capture	1	3
Material transport systems	2	6
Automated assembly systems	2	6
Storage Systems	2	6
Automated Guided Vehicle Systems	1	3

2- Course components (Total hrs in the Semester): 3

Lecture	Exercise or lab	Other
45	---	--

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

a. *Knowledge*

i) Description of the knowledge to be acquired:

After studying this course, the student will be able to:

- List the basic Elements of an Automated System
- Describe the different Levels of Automation.
- Recognize the Components of the PLC and its Operating Cycle
- Define the different types of Sensors, actuators, and other control system components
- Present the Various types of Material transport systems

ii) Teaching strategies to be used to develop that knowledge

- Class lectures.
- Students' presentations.
- Group discussion.

iii) Methods of assessment of knowledge acquired

- Exams.
- Quizzes.
- Homework assignments.

b- Cognitive (Intellectual) Skills

i) Cognitive skills to be developed

After studying this course, the student will be able to:

- Differentiate between the Automatic Identification Methods.

- Practice the Quantitative Analysis of Assembly Systems
- Practice the Engineering Analysis of storage systems
- Discuss the ideas of the Programmable Logic Controllers

ii) Teaching strategies to be used to develop these cognitive skills

- Class lectures.
- Simulation software Application.
- Practical Training.

iii) Methods of assessment of students' cognitive skills

- Students' seminars and presentations.
- Class Discussions.
- Case study Reports.

c. Interpersonal Skills and Responsibility

i) Description of the interpersonal skills and capacity to carry responsibility to be developed

- Decision making based on engineering analysis.
- Communication skills.
- Analysis Skills.

ii) Teaching strategies to be used to develop these skills

- Class lectures.
- Case study analysis.

iii) Methods of assessment of students' interpersonal skills and capacity to carry responsibility

- Specific Assignments.
- Written reports.
- Students' seminars and presentations.

d. Communication, Information Technology and Numerical Skills

i) Description of the skills to be developed in this domain

- Literature research.
- Problems modeling.
- Utilization of computer applications in analysis and design.

ii) Teaching strategies to be used to develop these skills

- Class lectures.
- Case studies analysis.
- Computer lab sessions.

iii) Methods of assessment of students numerical and communication skills
- Written reports.
- Students' seminars and presentations.

e. Psychomotor (if applicable) & Other Non-cognitive Skills

i) Description of the psychomotor or other skills to be developed and the level of performance required
- NA

ii) Teaching strategies to be used to develop these skills-
- NA

iii) Methods of assessment of student's psychomotor skills
- NA

4- Student Assessment Schedule

Serial	*Assessment tool (test, group project, examination etc.)*	*Week due*	*Weight*
1	Assignments	3rd	10 %
2	Mid Term Exam	7th	20 %
3	Class/Lab Activities	10th	15 %
4	Case Study	13th	15 %
5	Final Exam	16th	40 %

5- Student Support

- Providing electronic library of textbooks and scientific periodicals.
- Providing the necessary computer applications for the course.

6- Learning Resources

i) Essential Books (References)
1- Thomas Boucher, Computer Control of Manufacturing systems, Springer Ver-lag, 2002.
2- M. P Groover, Automation Production systems and CIM, Pearson Education, 2007.

ii) Course Notes
- NA

iii) Recommended Books

- Richard C. Dorf and Andrew Kusiak, Handbook of design, manufacturing and automation, John Wiley & Sons, Inc., 1994
- Shimon Y. Nof editor, Springer Handbook of Automation, Springer-Verlag Berlin Heidelberg, 2009

iv) Electronic Books & Web Sites:

- Scientific journals and forums.
- Instructor's instruction.

v) Periodicals

- International Journal of Automation and Computing
- Journal of Automation and Information Sciences.
- Journal of Design and Manufacturing Automation

7- Course Evaluation and Improvement Processes

i) Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Students' questioners.
- Students' evaluation of course and instructor.

ii) Other Strategies for Evaluation of Teaching by the Instructor or by the Department

- Public faculty seminars.
- Assessment by external evaluators of students achievements.

iii) Processes for Improvement of Teaching

- Assessment of students' work by external examiners.
- Analysis of students' evaluation of course and instructor.
- Seminars by industry professionals.

iv) Processes for verifying standards of student achievement

- Check marking by an independent faculty member of a sample of student work.
- Periodic exchange and remarking of a sample of assignments/exams with a external evaluator.

v) Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- A continuous improvement process through adopting a closed loop assessment/improvement. The process depends on assessment by all stake holders

for the M.Sc. program educational outcomes followed by instructor/program committee evaluation ending with proposing the necessary improvements.