COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the program specification.

1. Teaching Institution	Al-Khwarizmi College of Engineering
2. University Department/Centre	Automated Manufacturing Department
3. Course title/code	Automation and Robotics / AME415
4. Program(s) to which it contributes	Automated Manufacturing Engineering
5. Modes of Attendance offered	
6. Semester/Year	Semester
7. Number of hours tuition (total)	4 hours
8. Date of production/revision of this specification	May 2019
9. Aims of the Course	Expose students to fundamental issues related to the applications of robotic systems. The course covers the industrial manipulators robots. Students will be able to learn the mathematic tools for modeling, analysis, and control of a robotic system
10· Learning Outcomes, Teaching, Learning and Assessment Method	(A) Knowledge and Understanding (A1, A2, A3, A4, A5, A6) (B) Subject-specific skills (B1, B2, B3) (C) Thinking skills (C1, C2, C3, C4) (D) General and Transferable Skills (other skills relevant to employability and personal development (D1, D2, D3, D4)

11. Course Structure					
Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
١			Solving inverse kinematic problem using matrix inverse algorithm.		
٢			Workspace analysis and Trajectory Planning: workspace analysis, work envelope, joint space work envelope, work envelope of Rhino XR-3 robot, Work envelope of SCARA robot (Adept one)		
٣			Workspace fixtures, the pick and place operation.		
٤			Continuous Path Motion: Path and trajectories.		
٥			Continuous path control of Rhino –XR3 robot, Continuous path control of SCARA robot.		
٦			Interpolated motion: cubic polynomial paths, Linear interpolation with parabolic blends		
٧			Straight line motion		
٨			Differential motion and statics: the tool configuration Jacobian matrix (examples : Rhino, SCARA, and 3-axis		
٩			The manipulator Jacobian (examples : Rhino, SCARA, and 3-axis planar robots)		
١٠			Induced joint torques and forces.		
١١			Manipulator dynamics		
١٢			Manipulator dynamics		
١٣			Manipulator dynamics		
١٤			Robot Control		
١٥			Robot Control		

12. Infrastructure

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	"Automation, Production Systems, and Computer Integrated Manufacturing", Mikell P. Groover, Pearson, 2015. "Introduction to Robotics Analysis, Control, Applications", Saeed Benjamin Niku, Wiley, 2011. "Industrial Robotics: Technology, Programming, and Aplications", M. Groover, M. W. Weiss, R. N. Nagel, & N. G. Odrey, McGraw Hill, 1986.
Special requirements (include for example workshops, periodicals, IT software, websites)	
Community-based facilities (include for example, guest Lectures , internship , field studies)	

13. Admissions	
Pre-requisites	
Minimum number of students	5
Maximum number of students	25