University/Academy: Arab Academy for Science and Technology & Maritime Transport
Faculty/Institute: College of Engineering & Technology
Program: Electrical and Control Engineering

Form no. (12)
Course Specification

1- Course Data

Course Code:	**Course Title:**	**Academic Year/Level:**
EE 514	**Robotics**	5/10
Specialization:	**No. of Instructional Units:**	**Lecture** 2
Electrical and Control Engineering	3	**Tutorial/Practical** 2

2- Course Aim	Provide the students with main terminology, kinematics and dynamics of robot. This is important in order, for the students, to approach, the sensory system , actuators and control of robots
3- Intended Learning Outcome	
a- Knowledge and Understanding	A.1 Concepts and theories of mathematics and sciences, appropriate to the discipline A.4 Principles of design including elements design, process and/or a system related to specific disciplines A.5 Methodologies of solving engineering problems, data collection and interpretation A.12 Contemporary engineering topics A.15 Principles of operation and performance specifications of electrical and electromechanical engineering systems A.27 Analysis, design and implementation of various methods of control using analogue and digital control systems A.31 Formulate the problem, realizing the requirements and identifying the constraints

b- Intellectual Skills	B.1 Select appropriate mathematical and computer-based methods for modeling and analyzing problems B.3 Think in a creative and innovative way in problem solving and design B.4 Combine, exchange, and assess different ideas, views, and knowledge from a range of sources B.7 Solve engineering problems, often on the basis of limited and possibly contradicting information B.8 Select and appraise appropriate ICT tools to a variety of engineering problems B.11 Analyze results of numerical models and assess their limitations B.15 Integrate electrical, electronic and mechanical components and equipment with transducers, actuators and controllers in creatively computer controlled systems B.19 Design computer programs to analyze and simulate different electrical systems components and control applications
c- Professional Skills	C.1 Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems C.5 Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results C.6 Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs C.13 Design and perform experiments, as well as analyze and interpret experimental results related to electrical power and machines systems C.18 Test and examine components, equipment and systems of electrical power and machines and control engineering C.20 Evaluate different techniques and strategies for solving electrical engineering problems
d- General Skills	D.1 Collaborate effectively within multidisciplinary team D.3 Communicate effectively D.6 Effectively manage tasks, time, and resources D.7 Search for information and engage in life-long self learning discipline

4- Course Content According to Course Matrix (**Form 11a**), Course File Summary (**ISO MPC 3/2-1** and session Plan (**ISO MPC 3/3-1**)	*Week Number 1:* Robotic systems. *Week Number 2:* Rigid motion and homogenous transformation. *Week Number 3:* Homogenous transformation. *Week Number 4:* Direct (forward) kinematics. *Week Number 5:* Direct (forward) kinematics. *Week Number 6:* Inverse solution of kinematic equation. *Week Number 7:* Inverse solution of kinematic equation. *Week Number 8:* Velocity (differential) kinematics. *Week Number 9:* Velocity (differential) kinematics. *Week Number 10:* Velocity (differential) kinematics. *Week Number 11:* Velocity kinematics (cont) and manipulator dynamics. *Week Number 12:* Manipulator robot dynamics. *Week Number 13:* Robot dynamics and robot control. *Week Number 14:* Robot control. *Week Number 15:* Robot control. *Week Number 16:* Final Exam.
5- Teaching and Learning Methods	- Lectures - Tutorials - Discussion papers - Designing codes - Practical training
6- Teaching and Learning Methods for Students with Special Needs	- Lectures - Tutorials - Discussion papers - Designing codes - Practical training - Condensed office hours

7- Student Assessment:		
a- Procedures used:	Quiz to asses part of the 7th week evaluation Quiz to asses part of the 7th week evaluation Report to asses the 7th week practical evaluation Written exam to asses the mid term exam Written exam to asses part of the 12th week evaluation	
b- Schedule:	Assesssment 1 Assesssment 2 Assesssment 3 Assesssment 4 Assesssment 5 Assesssment 5	3rd Week 5th Week 7th Week 10th Week 12th Week 14th Week
c- Weighing of Assessment:	7th Week Examination 12th Week Examination Final-term Examination Oral Examination Practical Examination Semester Work Total	30% 20% 40% 0% 5% 5% 100%

8- List of References:	• M. Shahipoor, " A Robot Engineering Textbook", Harbor & Row Pub. , NY , 1987 • R.J. Schilring ," Fundamentals of Robotic Analyzing & Control ", Prentice -Hall ,1990 • W. Stadler , " Analytical Robotics and Mechatronics" , McGraw-Hill Int. , 1995 • L. Sciavico, B. Siciliano , " Modeling and Control of Robot", McGraw-Hill Inc., 1997
a- Course Notes	
b- Required Books (Textbooks)	Philip John, "Introduction to Robotics", Edison Wesley Publisher
c- Recommended Books	
d- Periodicals, Web Sites, ..., etc.	

Course Instructor

Name: **Dr. Ahmed Elshenawy**

Signature:

Head of Department

Name: **Prof. Hamdy Ashour**

Signature:

Dean of College of Engineering and Technology of AASTMT

Name: **Prof. Moustafa Hussein Aly**

Signature:

Executive Manager of Quality Assurance Center of AASTMT

Name: **Prof. Aziz Ezzat**

Signature: