



Arab Academy for Science, Technology & Maritime Transport  
College of Engineering & Technology  
Mechanical Engineering (Mechatronics) Program

**University/Academy:** Arab Academy for Science, Technology & Maritime Transport  
**Faculty/Institute:** College of Engineering & Technology  
**Program:** B.Sc. Mechanical Engineering

## Form no. (12): Course Specification

**1- Course Data**

Course Code: <b>ME 594</b>	Course Title: <b>Robotics and Applications</b>	Academic Year/Level: <b>5th year / 10th semester</b>
Specialization: <b>Mechanical</b>	No. of Instructional Units <b>3 credits</b>	Lecture <b>2 hrs.</b>
		Practical <b>2 hrs.</b>

**2- Course Aim**

<ul style="list-style-type: none"> <li>• Introduce the diverse applications of robots</li> <li>• Introduce the subsystem and components of the robot</li> <li>• Analyze robot kinematics</li> <li>• Control the position of the robot hand</li> </ul>
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**3- Intended Learning Outcomes**

<b>pp- Knowledge and Understanding</b>	<b>Through knowledge and understanding, students will be able to:</b> K15 <sub>ME</sub> ) The principles of sustainable design and development.
<b>qq- Intellectual Skills</b>	<b>Through intellectual skills, students will be able to:</b> I1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems. I13 <sub>ME</sub> ) Identify at an appropriate level the design, production, interfacing and software needs of different parts of Mechatronics systems.
<b>rr- Professional Skills</b>	<b>Through professional and practical skills, students will be able to:</b> P2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, Products and/or services P3) Create and/or re-design a process, component or system, and carry out specialized engineering designs P5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results P13 <sub>ME</sub> ) Compete, in-depth, in at least one engineering discipline, namely mechanics, electronics or Interfacing and software P16 <sub>ME</sub> ) Apply the principles of sustainable design and development.
<b>ss- General Skills</b>	<b>Through general and transferable skills, students will be able to:</b>

#### 4- Course Content

<b>Week No.1</b>	Introduction
<b>Week No.2</b>	Basic concepts in robotics
<b>Week No.3</b>	Homogeneous transformation
<b>Week No.4</b>	Coordinate frames, transform graphs
<b>Week No.5</b>	Assignment of coordinate frames
<b>Week No.6</b>	Direct kinematics
<b>Week No.7</b>	Forward Kinematics algorithms / 7th week evaluation
<b>Week No.8</b>	Inverse kinematics
<b>Week No.9</b>	Problems with programming kinematic models
<b>Week No.10</b>	Control circuits
<b>Week No.11</b>	Path control
<b>Week No.12</b>	External sensors and perception / 12 <sup>th</sup> week evaluation
<b>Week No.13</b>	Internal sensors.
<b>Week No.14</b>	Fluid actuators
<b>Week No.15</b>	Electrical actuators
<b>Week No.16</b>	Final Examination

#### 5- Teaching and Learning Methods

- Lectures
- Tutorials
- Reports & sheets
- Laboratories
- Seminars

**6-Teaching and Learning Methods for Students with Special Needs**

<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Tutorials</li> <li>• Reports &amp; sheets</li> <li>• Laboratories</li> <li>• Seminars</li> </ul> <p><b><u>Academic Support:</u></b></p> <ul style="list-style-type: none"> <li>• The general academic advisor appoints an academic supervisor for handicapped students.</li> <li>• Continuous follow ups are made for handicapped students after each assessment to evaluate their academic level of achievement</li> </ul>
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**7- Student Assessment**

<b>a-Procedures used</b>	1-Written Examinations to assess The Intended Learning Outcomes.	
	2-Class Activities (Reports, Discussions, -----) to assess The Intellectual Skills.	
<b>b- Schedule:</b>	Assessment 1	7 <sup>th</sup> Week Assessment
	Assessment 2	12 <sup>th</sup> Week Assessment
	Assessment 3	Continuous Assessments
	Assessment 4	16 <sup>th</sup> Week Final Written Exam
<b>c- Weighing of Assessment</b>	7 <sup>th</sup> Week Evaluation	30 %
	12 <sup>th</sup> Week Evaluation	20 %
	Final-term Examination	40 %
	Oral Examination	00 %
	Practical Examination	00 %
	Semester Work	10 %
	Total	100%

**8- List of References:**

<b>a- Course Notes</b>	N/A
<b>b- Required Books (Textbooks)</b>	• J.J. Craig, "Introduction to Robotics; Mechanics and Control," Pearson Prentice Hall, Latest Edition.
<b>c- Recommended Books</b>	<ul style="list-style-type: none"> <li>• M. Xie," Fundamentals of Robotics; Linkage, Perception to Action," World Scientific Publishing Co., Latest Edition.</li> <li>• P.J Mc Kerrow, "Introduction to Robotics", Addison – Wesley Pub. Comp., latest edition.</li> <li>• C.Lee, "Robotics Theory and Practice", Addison Wesley, latest edition.</li> <li>• M.Brady, "Robot motion Planning and Control", MIT Press, latest edition.</li> </ul>
<b>d- Periodicals, Web Sites, etc.</b>	N/A

**Course coordinator:**

**Program Manager:**