



Arab Academy for Science, Technology & Maritime Transport
College of Engineering & Technology
Mechanical Engineering Department

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

2- Course Aim

- Introduce the diverse applications of robots
- Introduce the subsystem and components of the robot
- Analyze robot kinematics
- Control the position of the robot hand

3- Intended Learning Outcomes

a- Knowledge and Understanding	Through knowledge and understanding, students will be able to: a.m.3) The principles of sustainable design and development
b- Intellectual Skills	Through intellectual skills, students will be able to: b.1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems. b.m.1) Identify at an appropriate level the design, production, interfacing and software needs of different parts of Mechatronics systems
c- Professional Skills	Through professional and practical skills, students will be able to: c.2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, Products and/or services c.3) Create and/or re-design a process, component or system, and carry out specialized engineering designs

	<p>c.5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results</p> <p>c.m.1) Compete, in-depth, in at least one engineering discipline, namely mechanics, electronics or Interfacing and software</p> <p>c.m.4) Apply the principles of sustainable design and development</p>
d- General Skills	Through general and transferable skills, students will be able to:

4- Course Content

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

5- Teaching and Learning Methods

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

6-Teaching and Learning Methods for Students with Special Needs

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

Engineering Requirements and Design Considerations in college Buildings and its Leading Passages

- The design of college buildings and pedestrian passages leading to it are sloppy to allow the transportation of the handicapped;
- Doors are wide enough to let wheel chairs pass through easily and conveniently.
- Lifts are provided for movement between floors.
- Doors are made from light weight materials to make it easy for the handicapped suffering from weakness in limb muscles or those handicapped using prosthetic limbs to deal with them with the least muscular effort.
- Class floors are made from non-slippery materials to prevent falls on the part of the handicapped.
- Sudden changes in the floor level are prevented.

Design Considerations of the Classes

- Class boards are placed at 60 cm high to allow wheeled chair users or those suffering from limited arm mobility use them.
- Enough spaces are left between seats and benches to prevent hindering the movement of wheeled chairs between them.
- Handicapped students sit among normal people in class to be able to interact with them. Nevertheless, in urgent cases according to the nature of the disability, the handicapped students sit in fixed suitable places whether at the front or the back of the class.
- Handicapped students sit close to the main exits of the class to be able to evacuate in case of emergencies.

Academic Support:

- The general academic advisor appoints an academic supervisor for handicapped students.
- Continuous follow ups are made for handicapped students after each assessment to evaluate their academic level of achievement

7- Student Assessment

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

8- List of References:

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

Course Instructor: Prof. Sohair Rezeka **Head of Department:** Prof. El-Sayed Saber

Program Manager: Prof. El-Sayed Saber

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: