

## ME 594 - Robotics Applications

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**Hour:** Lecture: 2 Hrs.

Tutorial: 2 Hrs.

Credit: 3.

**Coordinator:** Salem Haggag

### **Text Book:**

- P.J Mc Kerrow, “Introduction to Robotics”, Addison – Wesley Pub. Comp., 1991, 1st edition.

### **Reference Books:**

- Y.Koren, “Robotics for Engineering”, McGraw – Hill, 1985, 1st edition.
- J.Duffy, “Analysis of mechanisms and Robot Manipulators”, Wiley & sons, 1980, 1st edition .
- C.Lee, “Robotics Theory and Practice”, Addison Wesley, 1986, 1st edition.
- M.Brady, “Robot motion Planning and Control”, MIT Press, 1983, 1st edition.

### **Specific course information**

- a. Introduction and field of applications of robotics. Basic concepts in robotics. Homogeneous transformation and coordinate frames. Direct kinematics and forward kinematic algorithm. Inverse kinematics. Control circuits and path control of robots. External and internal sensors for robots. Fluid and electric actuator for robotic applications.
- b. Prerequisite: ME 355
- c. Designation: Required

### **Specific goals for the course:**

- Design a system, process, or component to meet desired needs subject to given constraints. Analyze and evaluate alternative solutions.
- Recognize the need for and demonstrate ability to engage in lifelong learning.
- Use techniques, skills and modern engineering tools necessary for engineering practice.
- To carry out feasibility analyses and optimization procedures in mechanical engineering projects.
- Ability to put forward the design requirements and considerations and manage the different design steps for any mechanical systems.

### **Course instruction outcomes:**

- The students will be familiar with the diverse applications of robots
- The students will be familiar with the subsystem and components of the robot
- The students will be able to Analyze robot kinematics, Control the position of the robot hand

**Student outcomes:**

C, I, K

**Topics Covered:**

- Introduction (fields of applications), Basic Concepts in Robotics
- Homogeneous Transformation, Coordinate Frames, Transform Graph
- Assignment of Coordinate Frames
- Direct Kinematics, Forward Kinematics Algorithm
- Inverse Kinematics
- Problems with Programming Kinematic Models
- Control Circuits, Path Control
- External Sensors, Internal Sensors
- Fluid Actuators, Electrical Actuators

Course / credit hours	Math & Basic Sciences	Engineering Topics	General Education
Robotics applications (ME594)/3		3	