

ME 4451 Robotics (Elective)

- Catalog Description:** ME 4451 Robotics (2-2-3)
Prerequisites: ME 3015 System Dynamics and Control
Mathematical modeling, simulation, and control of robotic systems with mechanical and sensory elements.
- Textbook:** No Textbook.
- Reference:** John J. Craig, *Introduction to Robotics, Mechanics and Control*, 3rd edition, Addison-Wesley, 2004.

Topics Covered:

1. History and Applications
2. Components
3. Object Location
4. Manipulator Kinematics
5. Manipulator Statics
6. Manipulator Dynamics
7. Mobile Robots
8. Task Planning
9. Sensors
10. Vision
11. Control

Course Outcomes:

Outcome 1: To teach students basic mathematical and computational tools for modeling and analysis of robotic systems.

1.1 Students will demonstrate understanding of various mathematical models, such as homogeneous matrices, Jacobians, and representation of environmental constraints for robotic systems.

Outcome 2: To train students to identify, model, analyze, design, and simulate robotic systems.

2.1 Students will demonstrate the ability to simulate the kinematic, dynamic responses and control of robotic systems.

Outcome 3: Students will demonstrate an understanding of sensory and mechanical components integrated within a robotic system.

Correlation between Course Outcomes and Program Educational Outcomes:

ME 4451												
	Mechanical Engineering Program Educational Outcomes											
Course Outcomes	a	b	c	d	e	f	g	h	i	j	k	l
Course Outcome 1.1	X	X			X						X	
Course Outcome 2.1	X	X			X						X	
Course Outcome 3.0	X	X			X		X				X	

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