

EE 473

- 1. Course Number & Name:** EE 473, Introduction to Robotics and Computer Vision
- 2. Course Credit and Contact Hours:** 3 Units, 3 hours
- 3. Course Coordinator:** Dr. Sudhir Shrestha
- 4. Textbook:** Robot Modeling and Control, Mark W. Spong, Seth Hutchinson, and M. Vidyasagar, ISBN-10 0-471- 64990-2, John Wiley & Sons, 2006
- 5. Supplemental Materials:** None
- 6. Specific Course Information:**
 - a. Description:** Principles of robotics and computer vision, rigid motions and homogeneous transformations, forward and inverse kinematics, velocity kinematics, path and trajectory planning, sensors and actuators, closed-loop control, computer vision, and vision-based control.
 - b. Prerequisites:** EE 282 or CS 215, and MATH 241, EE 210 or consent of instructor
 - c. Co-Requisite:** None
 - d. Status:** Required for EE program, Elective, Selected Elective
- 7. Specific Goals for the Course:**
 - a. Specific outcomes of instruction:** Upon successful completion of this course the students will be able to:
 - i. Demonstrate knowledge of fundamental principles of robotics and computer vision.
 - ii. Implement and utilize coordinate transformation, forward and inverse kinematics, velocity kinematics, and path and trajectory planning.
 - iii. Demonstrate knowledge of various types of sensors and DC motors used in robotics.
 - iv. Design and analyze robotic closed-loop control systems.
 - v. Demonstrate knowledge principles used in computer vision.
 - vi. Utilize computer aided tools for robotics and computer vision.

b. This course supports the following ABET Student Outcomes:

- i. SO-1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.*

8. Brief List of Topics to be Covered:

- a. Introduction, Review & Basic Concepts
- b. Rigid Motions and Homogeneous Transformations
- c. Forward and Inverse Kinematics
- d. Velocity Kinematics – The Jacobian
- e. Path and Trajectory Planning
- f. Joint Control and Effectors & Actuators
- g. Sensors, Actuators & Closed-Loop Control
- h. Computer Vision
- i. Object Recognition
- j. Pattern Recognition and Machine Learning