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


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