

**School of Engineering and Computer Science**  
**Mech 468: Robotics**

<b>Catalog Data:</b>	<b>Mech 468 Robotics;</b> 3 credits Industrial robots, kinematics, control, robot programming, interfacing, sensors, actuators, vision systems and mobile robots. Credit not granted for both Mech 468 and Mech 568.
<b>Class Schedule:</b>	Three 50-minute lectures per week, for one semester.
<b>Laboratory Schedule:</b>	Lecture sessions converted into laboratory sessions as needed for demonstrations and hands-on activities.
<b>Prerequisites by Course:</b>	Mech 304, Mech 348
<b>Prerequisites by Topic:</b>	<ol style="list-style-type: none"> <li>1. Linear algebra,</li> <li>2. Understanding of dynamics and electrical circuits,</li> <li>3. Basic understanding of computer programming</li> </ol>
<b>Required Texts:</b>	W. Stadler, <i>Analytical Robotics and Mechatronics</i> , McGraw-Hill, 1995.
<b>Course Coordinator:</b>	Dr. Hakan Gurocak
<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>1. Understand the main components of a robotic system</li> <li>2. Understand mathematical models for motion analysis and control of a robot</li> <li>3. Understand sensors and actuators commonly used in robotic systems</li> <li>4. Understand basic navigation algorithms used in mobile robots</li> </ol>
<b>Topics Covered:</b>	<ol style="list-style-type: none"> <li>1. Sub-systems and components of a robot</li> <li>2. Spatial descriptions and transformations</li> <li>3. Manipulator kinematics</li> <li>4. Force and torque analysis</li> <li>5. Trajectory planning and control</li> <li>6. Sensors, measurement and perception</li> <li>7. Vision systems in robotics</li> <li>8. Kinematic modeling of mobile robots</li> <li>9. Navigation algorithms</li> <li>10. Robot programming</li> </ol>
<b>Lab Experiments and Activities:</b>	Lecture sessions converted into laboratory sessions as needed for demonstrations and hands-on activities.
<b>Course Outcomes:</b>	Students will be able to: A-1. Apply spatial position and orientation description of an object through the use of coordinate systems and transforms. C-2. Design a robotic system following design process. C-3. Design a robotic system that will meet realistic constraints such as economical, manufacturability, safety, etc. C-4. Build a system prototype that meets design specifications. D-1. Contribute to the team work by sharing responsibilities. D-2. Create conceptual designs for the team project. D-3. Work effectively with other on the team through good interpersonal skills.

	E-3. Simulate robot motion. G-2. Deliver project presentations. J-1. Describe the impact of robotics in a contemporary issue, such as healthcare, environmental, etc. K-2. Interface devices to a robot. K-3. Program a robot to provide solutions for practical problems.		
<b>Required or Elective Course:</b>	Elective		
<b>Contribution to Professional Component:</b>	Engineering Topics		
<b>Relationship of Course to Program:</b>	Meets: Educational Objectives <u>1, 2, 3, 4</u> Program Outcomes <u>A, C, D, E, G, J, K</u>		
<b>Prepared by:</b>	Dr. Hakan Gurocak	Date:	November 1, 2006
<b>Approved by CAC:</b>			