# MECH4710 Introduction to Robotics

<table>
<thead>
<tr>
<th>Course Code:</th>
<th>MECH 4710</th>
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<tbody>
<tr>
<td>Course Title:</td>
<td>Introduction to Robotics</td>
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<tr>
<td>Required Course Or Elective Course:</td>
<td>Elective</td>
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<tr>
<td>Terms Offered (Credits):</td>
<td>Fall or Spring, 3 credits</td>
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<td>Faculty In Charge:</td>
<td>Lilong Cai</td>
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<td>Pre/Co-Requisites:</td>
<td>MECH2030</td>
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## Course Structure:
Lecture 2 hour, Lab 1 hour per week

## Textbook/Required Material:

## Course Description:
This is an elective course for the BEng in Mechanical Engineering with Option in Design and manufacturing.

## Course Topics:
1. Introduction to Robotics
2. Spatial Transformations
3. Orientation Matrices
4. Forward Kinematics
5. Inverse Kinematics
6. Jacobian and Singularities
7. Manipulator Dynamics

## Course Objectives:
1. The goal of the course is to familiarize the students with the concepts and techniques in design and analysis of robot manipulator and its application.
2. To introduce basic and entry level theories and terminology for students to develop the skill to description and transforms of the robot in forward and inverse kinematic and dynamic equations for different robotic structures.
3. To provide student hands on experience in laboratory practice to learn simple robot programming and control.

## Course Outcomes:
A. The student will have a thorough understanding of the fundamental kinematics and dynamics of industrial robots.
B. The student will be able to analysis and establish kinematic and dynamic equation for different robot manipulators.
C. Students will know enough about different applications of robotic systems and be able to evaluate, chose, and incorporate robots in engineering systems according to the kinematic and dynamic features of the robots.

## Assessment Tools:
- Regular homework problems: 10%
- Lab projects: 5%
- Mid-term and Final exams: 85%