

**Nirma University**  
**School of Technology, Institute of Technology**  
**B. Tech (Instrumentation and Control Engineering)**

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<b>Course Code</b>	<b>2ICDE54</b>
<b>Course Title</b>	<b>Mechatronics</b>

**Course Learning Outcome:**

At the end of the course, students will be able to –

- illustrate principles and working of devices and elements for mechatronics and robotics
- select and utilize various sensors and actuators for mechatronic and robotic systems
- perform simulation, systems level analysis and design for mechatronics and robotics

<b>Syllabus</b>	<b>Teaching Hours</b>
<p><b>UNIT 1: Introduction</b></p> <p>Mechatronics-History, definition, multi-disciplinary scenario, mechatronic systems, components and modules, examples of mechatronic systems.</p>	<b>02</b>
<p><b>UNIT 2: Sensors</b></p> <p>Overview of sensors, proprioceptive and exteroceptive sensors, distance sensors, global positioning sensor, light detection and ranging sensor, vision sensors, other robotic sensors and related applications.</p>	<b>07</b>
<p><b>UNIT 3: Actuators</b></p> <p>Actuators characteristics, joint actuating system, hydraulic and pneumatic actuators, various motors, robotic arm and end effectors, miscellaneous actuators.</p>	<b>07</b>
<p><b>UNIT 4: Mobile Robots</b></p> <p>Types of non-holonomic wheeled mobile robot, different types of drive trains, kinematic model, odometry localization, motion control of legged robots and mobile vehicles.</p>	<b>08</b>
<p><b>UNIT 5: Mechatronics and Robotic Systems:</b></p> <p>Mechatronic systems with control, robot programming, movement of multiple DOF robotic arm, mechatronic and robotic systems case study examples like industrial manufacturing operations, automotive, robotics.</p>	<b>06</b>

**Self-Study:**

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

**Laboratory Work:**

Laboratory Work will consist of minimum 10 experiments based on the above syllabus.

**References:**

1. Robert Bishop, Mechatronics: Introduction, CRC Press.
2. Paul regtien, Sensors for Mechatronics, Elsevier Publishers.
3. Godfrey Onwubolu, Mechatronics: Principles and Applications, Butterworth Heinmann Publishers.
4. John Billingsley, Essentials of Mechatronics, Wiley-Interscience Publishers.
5. N A Hmt, Mechatronics, McGraw Hill Education publishing.