### COURSE DELIVERY PLAN

(This document is to be presented to the students during the first week of commencement of classes and send a soft copy to every student of the class by the course instructor)

**ACADEMIC YEAR:** 2016 – 2017 (ODD)  
**DEPARTMENT:** Mechanical  

**PROGRAMME:** B.Tech Mechatronics  
**SEMESTER:** 7th  

**COURSE TITLE:** Robotics & Machine Vision Systems  
**COURSE CODE:** MH2701  

**COURSE CATEGORY:** Core Engineering  
**TOTAL DURATION (HRS):** 45  

**PREREQUISITE:**  
**CREDITS:** 3  

**INSTRUCTOR (S):** Mr. Shyam R Nair  

**COURSEWARE HOME PAGE:** [https://sites.google.com/a/hindustanuniv.ac.in/samdroid](https://sites.google.com/a/hindustanuniv.ac.in/samdroid)

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**Text Books:**

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**Reference Books:**
PROGRAMME EDUCATIONAL OUTCOMES (PEO) –
(to be achieved by the graduate after 4 to 5 years of graduation)

| PEO – 1 | Student shall gain knowledge in theoretical and applied fields of mechatronics along with ability to apply this knowledge in their specific domains. |
| PEO – 2 | Student shall understand the synergy of various disciplines in Mechatronics and to formulate scientific problems by developing new and original thinking & ability to solve these problems by conventional methods or new techniques. |
| PEO – 3 | Student shall interpret information gained in various disciplines and ability to establish new information. |
| PEO – 4 | Student shall gain good written and verbal communication skills. |
| PEO – 5 | Student shall be able to communicate in writing and oral with an open and systematic way, process and results of work performed in national and international arena. |
| PEO – 6 | Student shall be able to recognize scientific and ethical standards during academic progress and in all professional settings. |
| PEO – 7 | Student shall be able to make a difference and having courage to undertake new and developing theories and applications in the field of mechatronics. |
| PEO – 8 | Student shall be able to understand social and environmental impacts of problems being solved in this field. |
| PEO – 9 | Student shall be able to use modern tools/ computer software and information technologies in his field in an advanced level. |
| PEO – 10 | Student shall be able to apply and assess the need for lifelong learning. |

PROGRAMME OUTCOMES (PO COMMON TO ALL PROGRAMMES)
(To be achieved by the student after every semester/year/and at the time of graduation)

1. Students acquire knowledge required for a degree, including the ability to
   - articulate disciplinary and interdisciplinary theories, concepts, principles, skills and practices.
   - apply knowledge to solve problems and make decisions.

2. Students demonstrate critical thinking, including the ability to
   - evaluate, analyze, and integrate information from a variety of sources.
   - use appropriate strategies and tools to conduct investigation in most appropriate manner

3. Students communicate effectively and they are able to
   - demonstrate effective oral communication to a variety of audience.
   - present the work effectively in report forms.

4. Students practice personal and social responsibility, including the ability to
   - understand ethical values and to practice.
   - recognize an ethical dilemma and apply rational decision making.
   - respond to human needs like environment protection.
5. Students prepare to engage in lifelong learning, including the ability to

- exhibit the skills necessary to acquire, organize, reorganize and interpret new knowledge.
- show proficiency in current technologies and the ability to adapt to emerging technologies.

6. Students work collaboratively, including the ability to

- participate effectively in teams.
- consider different points of view.
- work innovatively with others to support a shared purpose or goal or projects.

Graduate Attributes (NBA): All graduates of any higher education programs are expected to have identified technical/functional, generic and managerial competencies. The competencies that a graduate of a program should have are called Graduate Attributes. The Attributes a graduating engineer should have are generally identified by the Accreditation agency for Engineering and Technical Education, namely, National Board of Accreditation (NBA) in India. The Graduate Attributes of Engineering Programs as identified by NBA are

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

The Bloom’s Taxonomy is to be followed in curriculum development, courseware development, planning and delivery of contents, Assessment, Mapping, Data Analysis and CQI (Continuous Quality Improvement)

### COURSE OUTCOMES (CO)

| CO – 1 | Understand the kinematics of robots and adaptive control. |
| CO – 2 | Understand the robot actuators and controls. |
| CO – 3 | Get knowledge in sensors and selection of sensors for specific need. |
| CO – 4 | Get knowledge in robot cell layouts and their applications. |
| CO – 5 | Get knowledge in robot programming and artificial intelligence and machine vision. |

### MAPPING OF COs TO POs

<table>
<thead>
<tr>
<th>S. No</th>
<th>COURSE OUTCOMES (CO)</th>
<th>PROGRAMME OUTCOMES (PO)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PO 1</td>
</tr>
<tr>
<td>1</td>
<td>CLO-1</td>
<td>SC</td>
</tr>
<tr>
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<td>SC</td>
</tr>
<tr>
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<td>CLO-3</td>
<td>SC</td>
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<td>SC</td>
</tr>
<tr>
<td>5</td>
<td>CLO-5</td>
<td>SC</td>
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1 - Strong Contribution (SC)  
2 - Weak Contribution (WC)  
3 - No Contribution (NC)
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<tr>
<th>Period #</th>
<th>Topic / Session topic</th>
<th>Pertaining CO/CLOs &amp; BTL</th>
<th>Topic Learning Outcome (TLO)</th>
<th>Instructional Methods / Activities</th>
<th>Assessment Method for TLO</th>
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<tbody>
<tr>
<td>1.</td>
<td>OBE, Lesson Plan, Assessment</td>
<td>NA</td>
<td>NA</td>
<td>PPT</td>
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<td></td>
<td>Continuous Assessment - 1</td>
<td>Kinematics of Robot: Introduction, Matrix Representation, Homogeneous transformation</td>
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<tr>
<td>10.</td>
<td>CO-1/CLO-1 &amp; BTL1, BTL2 &amp; BTL3</td>
<td>Remember, Understand, Apply, Analyze and Evaluate Kinematics of Robot</td>
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<td>PPT &amp; Chalk &amp; Board, MOTOSIM Software hands on training</td>
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</table>

**FACULTY SIGNATURE**
**HOD**
**DEAN**

**DEAN (ACADEMICS)**
**IQAC Co-ordinator**