

M.Tech. Program from Department of Mechanical Engineering

M. Tech. in Mechatronics

| Program Learning Objectives | Program Learning Outcomes |
|--|---|
| Program Goal 1: The graduates will acquire the knowledge and concepts of Mechatronics. | Program Outcome 1: After completion of M-Tech in Mechatronics, the students will be able to manage and solve system-level technical problems. |
| Program Goal 2: To provide the students an opportunity to acquire specialized skills in the area of Mechatronics. | Program Outcome 2: After completion of the M-Tech in Mechatronics, the students will be able to apply their knowledge to industry as well as academic research and development. |
| Program Goal 3: To provide the students with an opportunity to gain thorough knowledge in the areas of <ul style="list-style-type: none">• Mechatronics• Robotics and automation,• Aircraft engineering,• Computer-aided design, etc. | Program Outcome 3: The M-Tech Program in Mechatronics will impart the training to the students to become leaders in the cutting-edge areas of Mechatronics. |

| Sl. No. | Subject Code | SEMESTER I | L | T | P | C |
|----------------|---------------------|----------------------------------|-----------|----------|----------|-------------|
| 1. | HS5111 | Technical Writing and Soft Skill | 1 | 2 | 2 | 4 |
| 2. | MH5101 | Fundamentals of Mechatronics | 3 | 0 | 0 | 3 |
| 3. | MH5102 | Mechatronics Lab – I | 0 | 0 | 3 | 1.5 |
| 4. | ME5101 | Advanced Engineering Mathematics | 3 | 1 | 0 | 4 |
| 5. | EC5105 | Embedded System | 3 | 0 | 2 | 4 |
| 6. | XX51PQ/ XX61PQ | DE-I | 3 | 0 | 0 | 3 |
| 7. | XX61PQ | DE-II | 3 | 0 | 0 | 3 |
| 8. | XX61PQ | IDE | 3 | 0 | 0 | 3 |
| | TOTAL | | 19 | 3 | 7 | 25.5 |

IDE (Inter Disciplinary electives) in the curriculum aims to create multitasking professionals/scientists with learning opportunities for students across disciplines/aptitude of their choice by opting level (5 or 6) electives, as appropriate, listed in the approved curriculum.

| Sl. No. | Subject Code | SEMESTER II | L | T | P | C |
|---------|-------------------|--|-----------|----------|----------|-------------|
| 1. | MH5201 | Sensors and Actuators | 3 | 0 | 0 | 3 |
| 2. | MH5202 | Modeling and Simulation of Mechatronic Systems | 3 | 0 | 0 | 3 |
| 3. | MH5203 | Mechatronics Lab – II | 0 | 0 | 3 | 1.5 |
| 4. | XX62PQ | DE-III | 3 | 0 | 0 | 3 |
| 5. | XX62PQ | DE-IV | 3 | 0 | 0 | 3 |
| 6. | XX52PQ/ XX62PQ | DE-V | 3 | 0 | 0 | 3 |
| 7. | RM6201 | Research Methodology | 3 | 1 | 0 | 4 |
| 8. | IK6201 | IKS | 3 | 0 | 0 | 3 |
| | | TOTAL | 21 | 1 | 3 | 23.5 |

| Sl. No. | Subject Code | SEMESTER III | L | T | P | C |
|---------|--------------|-----------------------------------|----------|----------|-----------|-----------|
| 1. | MH6198 | Summer Internship / Mini Project* | 0 | 0 | 12 | 3 |
| 2. | MH6199 | Project I** | 0 | 0 | 30 | 15 |
| | | TOTAL | 0 | 0 | 42 | 18 |

***Note: Summer Internship (Credit based)**

(i) Summer internship (*) period of at least 60 days' (8 weeks) duration begins in the intervening summer vacation between Semester II and III. It may be pursued in industry / R&D / Academic Institutions including IIT Patna. The evaluation would comprise **combined grading based on host supervisor evaluation, project internship report after plagiarism check and seminar presentation at the Department (DAPC to coordinate)** with equal weightage of each of the three components stated herein.

(ii) Further, on return from 60 days internship, students will be evaluated for internship work through combined grading based on host supervisor evaluation, project internship report after plagiarism check, and presentation evaluation by the parent department with equal weightage of each component.

**** Note: M. Tech. Project outside the Institute:** A project-based internship may be permitted in industries/academia (outside IITP) in 3rd or 4th semester in accordance with academic regulations. In the IIIrd Semester, students can opt for a semester long M. Tech. project subject to confirmation from an Institution of repute for research project, on the assigned topic at any external Institution (Industry / R&D lab / Academic Institutions) based on recommendation of the DAPC provided:

(i.) The project topic is well defined in objective, methodology and expected outcome through an abstract and statement of the student pertaining to expertise with the proposed supervisor of the host institution and consent of the faculty member from the concerned department at IIT Patna as joint supervisor.

(ii.) The consent of both the supervisors (external and institutional) on project topic is obtained a priori and forwarded to the academic section through DAPC for approval by the competent authority for office record in the personal file of the candidate.

(iii.) Confidentiality and Non Disclosure Agreement (NDA) between the two organizations with clarity on intellectual property rights (IPR) must be executed prior to initiating the semester long project assignment and committing the same to external organization and vice versa.

(iv.) The evaluation in each semester at Institute would be mandatory and the report from Industry Supervisor will be given due weightage as defined in the Academic Regulation. Further, the final assessment of the project work on completion will be done with equal weightage for assessment of the host and Institute supervisors, project report after **plagiarism check**. The award of grade would comprise **combined assessment based on host supervisor evaluation, project report quality and seminar presentation at the Department (DAPC to coordinate)** with equal weightage of each of the components stated herein.

(v.) In case of poor progress of work and / or no contribution from external supervisor, the student need to revert back to the Institute essentially to fulfill the completion of M. Tech. project as envisaged at the time of project allotment. However, the recommendation of DAPC based on progress report and presentation would be mandatory for a final decision by the competent authority.

| Sl. No. | Subject Code | SEMESTER IV | L | T | P | C |
|---------|--------------|-------------|----------|----------|-----------|-----------|
| 1. | MH6299 | Project II | 0 | 0 | 42 | 21 |
| | TOTAL | | 0 | 0 | 42 | 21 |

Total Credit from Semester I to IV - 88

ELECTIVE GROUPS

| Department Elective - I | | | | | | |
|--------------------------------|--------------|--|---|---|---|---|
| Sl. No. | Subject Code | Subject | L | T | P | C |
| 1. | ME6105 | Acoustics | 3 | 0 | 0 | 3 |
| 2. | ME6106 | Mobile Robotics | 3 | 0 | 0 | 3 |
| 3. | ME6107 | Digital Manufacturing and Industry 4.0 | 3 | 0 | 0 | 3 |
| 4. | EC5114 | Advanced Digital Image Processing | 3 | 0 | 0 | 3 |

| Department Elective - II | | | | | | |
|---------------------------------|--------------|---|---|---|---|---|
| Sl. No. | Subject Code | Subject | L | T | P | C |
| 1. | ME6103 | Continuum Mechanics | 3 | 0 | 0 | 3 |
| 2. | ME6109 | Vehicle Dynamics and Multi-body Systems | 3 | 0 | 0 | 3 |
| 3. | EC6104 | VLSI Signal Processing | 3 | 0 | 0 | 3 |

| Department Elective - III | | | | | | |
|----------------------------------|--------------|---|---|---|---|---|
| Sl. No. | Subject Code | Subject | L | T | P | C |
| 1. | ME6208 | Robot Motion Planning | 3 | 0 | 0 | 3 |
| 2. | ME6209 | Non-linear Systems Dynamics | 3 | 0 | 0 | 3 |
| 3. | ME6215 | Computer Numerical Controlled Machine Tools | 3 | 0 | 0 | 3 |

| Department Elective - IV | | | | | | |
|---------------------------------|---------------------|--|----------|----------|----------|----------|
| Sl. No. | Subject Code | Subject | L | T | P | C |
| 1. | ME6206 | Microfluidics and Microsystems | 3 | 0 | 0 | 3 |
| 2. | ME6210 | Robotics: Advanced Concepts & Analysis | 3 | 0 | 0 | 3 |

| Department Elective - V | | | | | | |
|--------------------------------|---------------------|---|----------|----------|----------|----------|
| Sl. No. | Subject Code | Subject | L | T | P | C |
| 1. | EC5205 | Patterns Recognition and Machine Learning | 3 | 0 | 0 | 3 |
| 2. | EC6208 | Generative AI for Video Surveillance System | 3 | 0 | 0 | 3 |

Interdisciplinary Elective (IDE) Course for M. Tech. (Available to students other than ME)

| Sl. No. | Subject Code | IDE | L | T | P | C |
|----------------|---------------------|---|----------|----------|----------|----------|
| 1. | ME6113 | Soft Computing Application in Engineering | 3 | 0 | 0 | 3 |