

# Bachelor of Technology in Mechanical Engineering



<b>Programme Level</b>	Under Graduate
<b>Year of Commencement</b>	2009
<b>Minimum Duration</b>	4 Years (8 Semesters)
<b>Maximum Duration</b>	6 Years (12 Semesters)

## **Mechanical Engineering program at IIT Mandi**

Academic courses offered by IIT-Mandi for the B.Tech./B.Tech. (Honours) program are classified as Institute Core (IC), Discipline Core (DC), Discipline Elective (DE) and Free Elective (FE) courses. Hierarchically, IC courses provide a broader view of all engineering disciplines and IIT Mandi believes in making this learning process instrumental. Here, students are conceptualized with the fundamentals of these essential courses via theoretical approach and by conducting methodically structured experiments for same. These IC courses are offered during 1<sup>st</sup> – 4<sup>th</sup> semesters of B. Tech. program.

The DC courses are focused more towards mechanical engineering subjects where the students explore core concepts in further depth. These DC courses are well structured and cover wide range of areas in mechanical engineering. They are offered between 3<sup>rd</sup> – 7<sup>th</sup> semesters of the B. Tech. program along with few IC & DE courses. From the 4<sup>th</sup> semester onwards, discipline elective (DE) courses are offered to the students giving them the option to choose from a long list of courses based on their interest; the list is presented in the latter part of this document. These course help the student gain more width into peripheral areas of mechanical engineering or attain further depth into advanced topics.

In the 4<sup>th</sup> semester, students are offered with the design practicum course which is a flagship source offered by IIT Mandi. The students solve real-world engineering problems through product design and development in this practicum-based course. In this era of interdisciplinary technology, students are encouraged to credit courses apart from the core mechanical engineering subjects. These free electives (FE) are offered from the 6<sup>th</sup> semester onwards. The students have full freedom choosing and registering for the FE courses.

Interactive Socio-Technical Practicum (ISTP) is offered during the 6<sup>th</sup> semester. This course provides an opportunity for the students to explore deeper into the social problems of surrounding regions and propose socio-technical solutions to the same. The students can pursue an optional major technical project (MTP) in the final two semesters to utilize their engineering education for pursuing industry-relevant projects, with the guidance of faculty members.

In a nutshell, the mechanical engineering program of IIT Mandi offers state-of-the-art interdisciplinary education in the field, providing significant freedom to the candidates to pursue ancillary interests with options of minor degrees. With the vision of training the future mechanical engineers of India, the Mechanical Engineering program of IIT Mandi is designed, and regularly updated, to ensure that the students stay top on the technology and are ready to take up the challenges of the future.

**Semester wise distribution of all courses**  
**(Minimum credit requirements for B.Tech. degree 160 credits)**

**Semester I**

Course Code	Course Name	Credits
IC110	Engineering Mathematics (Maths 1)	3
IC152	Data Science 1 (Basic computing - Python)	4
IC160	Electrical Systems	3
IC160P	Electrical Systems Lab	2
IC140	Graphics for Design	4
IC101P	Reverse Engineering	2
HS10X	HSS - Creative Understanding Basket	1
Total		19

**Semester II**

Course Code	Course Name	Credits
IC111	Linear Algebra (Maths 2)	3
IC141	Product Realization Technology	2
IC141P	Product Realization Technology Lab	2
IC161	Applied Electronics	3
IC161P	Applied Electronics Lab	2
IC252	Data Science 2 (Probability and Statistics)	4
IC142	Engineering Thermodynamics	3
HSXX1	HSS - Language Competence Basket	3
Total		22

**Semester III**

Course Code	Course Name	Credits
Science 1	Applied Chemistry / Material Science / Mechanics of Particles and Waves	3
IC240	Mechanics of Rigid Bodies	3
IC272	Data Science 3	3
IC 230 Science 2	Environmental Science / Biotechnology	3
ME 205	Machine Drawing	3
DE	Discipline Elective 1	3
HSXX2	HSS	3
Total		21

**Semester IV**

Course Code	Course Name	Credits
IC201P	Design Practicum	4
IC 221	Electrodynamics	3
IC 222P	Physics Practicum	2
Engineering Sciences	Measurement and Instrumentation/Signals and Systems/Continuum Mechanics	3
ME 210	Fluid Mechanics	3
DE	Discipline Elective 2	3
HSS	HSS	3
Total		21

**Semester V**

Course Code	Course Name	Credits
ME 206	Mechanics of Solids	3
ME 303	Heat Transfer	3
ME 308	Manufacturing Engineering	3
ME 311P	Design Lab 1	1
DE	Discipline Elective 3	3
HSS	HSS Elective	3
HSS	HSS Core/Elective	3
FE	Free Elective	3
Total		22

**Semester VI**

Course Code	Course Name	Credits
ME 309	Theory of Machines	4
ME 307	Energy Conversion Devices	3
ME 312P	Design Lab 2	1
DP 301P / FE	ISTP (or Discipline Elective + Free Elective)	4
DE	Discipline Elective 4	3
HSS	HSS Core / Elective	3
ME 452	Robotics and Control	3
Total		21

**Semester VII**

Course Code	Course Name	Credits
MEXXX	Internship	2
ME 305	Design of Machine Elements	4
ME 310P	Thermo-fluid Lab	2
DP 401P_ME	Major Technical Project 1 (or DE)	3
FE	Free Elective	3
FE	Free Elective	3
FE	Free Elective	3
Total		20

**Semester VIII**

Course Code	Course Name	Credits
DP 401P_ME	Major Technical Project 2 (or DE + FE)	5
FE	Free Elective	3
FE	Free Elective	3
FE	Free Elective	3
FE	Free Elective	1
Total		15

**Overall total credits: 161**

**List of Core courses for Mechanical Engineering Program  
(Total Credits for discipline core = 33)**

<b>S.No.</b>	<b>Course code</b>	<b>Course Title</b>	<b>Total Credits</b>	<b>Semester</b>
1	ME 205	Machine Drawing	3	III
2	ME 210	Fluid Mechanics	3	IV
3	ME 206	Mechanics of Solids	3	V
4	ME 303	Heat Transfer	3	V
5	ME308	Manufacturing Engineering	3	V
6	ME 307	Energy Conversion Devices	3	VI
7	ME 309	Theory of Machines	4	VI
8	ME 452	Robotics and Control	3	VI
9	ME 311P/312P	Design Labs 1 and 2	2	V and VI
10	ME305	Design of Machine Elements	4	VII
11	ME310P	Thermo-Fluid Laboratory	2	VII

**List of Elective courses for Mechanical Engineering Program  
(Discipline elective + free elective)**

S. No.	Course Code	Course Title
1	ME 352	Finite Element Methods in Engineering
2	ME 353	Electronic Materials and Their Applications
3	ME 355	Internal Combustion Engines
4	ME 356	Principles of Energy Conversion
5	ME 451	Refrigeration and Air-Conditioning
6	ME 501	Materials Science for Failure Analysis
7	ME 504	Numerical Methods for Engineering Computation
8	ME 505	Applied Finite Element Method
9	ME 506	Fundamentals of Fracture Mechanics
10	ME 507	Micro and Nano-Scale Fluid Mechanics
11	ME 509	Nano Manufacturing
12	ME 510	Advanced Manufacturing Processes
13	ME 513	Finite Element Method in Engineering
14	ME 601	Finite Element Methods in Engineering
15	ME 602	Mechanical Vibration
16	ME 603	Advanced Fluid Mechanics
17	ME 604	Experimental Methods In Thermal Engineering
18	ME 605	Air Conditioning and Ventilation
19	ME 606	Advanced Solid Mechanics
20	ME 607	Materials Science for Failure Analysis
21	ME 609	Functional Materials
22	ME 610	Advanced Thermodynamics
23	ME 611	Design and Optimization of Thermal Systems
24	ME 613	Thermal Radiation
25	ME 614	Compressible Flow and Gas Dynamics
26	ME 615	Applied Computational Fluid Dynamics
27	ME 616	Convective Heat and Mass Transfer
28	ME 617	Mechanics of Composite Materials
29	ME 618	Stealth Technology: Infrared Signatures
30	ME 619	Experiments in Materials Science
31	ME 620	Modelling and Simulations
32	ME 621	Aircraft Propulsion
33	ME 622	Biomechanics of Musculoskeletal Systems
34	ME 625	Introduction to Turbulence and its Modelling
35	ME 626	Acoustics
36	ME 631	Heat Transfer and Fluid Flow In Energy Systems
37	ME 632	Mechanics for Energy Systems
38	ME 633	Design of Energy Systems
39	ME 634	Thermodynamics of Energy Systems
40	ME 635	Manufacturing for Energy Systems
41	ME 636	Combustion Technology
42	ME 637	Wind Power Plant
43	ME 638	Solar Thermal Power Plant
44	ME 639	Thermal Power Plant Engineering
45	ME 640	Solar Power Utilization
46	ME 641	Finite Element Method

<b>S. No.</b>	<b>Course Code</b>	<b>Course Title</b>
47	CS 508	Introduction to Heterogeneous Computing
48	EE 305	Digital Signal Processing
49	EE 509	Linear Dynamical Systems
50	EE 516	Biomedical Systems
51	EN 501	Energy Source and Power Plants
52	EN 502	Emerging Energy Sources
53	EN 503	Energy Storage Technologies
54	EN 504	Energy Environment Policy and Law
55	EN 613	Creep-Fatigue Interaction
56	MA 521	Functional Analysis
57	MA 522	Partial Differential Equations
58	MA 605	Statistical Data Analysis
59	MA 608	Computational Fluid Dynamics
60	MA 609	Numerics of Partial Differential Equations
61	PH 512	Classical Mechanics
62	PH 513	Quantum Mechanics
63	PH 522	Statistical Mechanics
64	PH 603	Advanced Condensed Matter Physics
65	PH 701	Introduction to Molecular Simulation