

Bachelor of Technology in Engineering Physics



Programme Level	Under Graduate
Year of Commencement	2019
Minimum Duration	4 Years (8 Semesters)
Maximum Duration	6 Years (12 Semesters)
Senate Meeting reference	20.9/30.4

B.Tech. in Engineering Physics at IIT Mandi

Preamble to the program:

Engineering Physics (EP) at IIT Mandi is a unique program, which is designed to prepare graduates with rigorous foundation in Physics along with Engineering in order to tackle today's technology challenges. EP will enhance the cross-functionality and bridge the gap between pure science and traditional engineering disciplines which conventionally are pursued independently. This is necessary because in today's world major scientific and technological breakthroughs happen in a multi-disciplinary environment where scientists from pure science work along with engineers. It is, therefore, highly important to inculcate both scientific and technological aspects, and the EP programme will serve this purpose.

The curriculum for EP at IIT Mandi introduces students to a wide variety of fields in pure as well as applied Physics. The core courses cover basic areas in Physics, such as Quantum Mechanics, Condensed Matter Physics; as well as basic courses in Mathematics and Engineering. In addition to the compulsory courses, students will complete a certain number of elective courses in Physics intended to provide a good exposure in various directions in both theoretical and applied Physics. The vision is to cater to and enhance the curiosity of students with varied interests in the field. Besides, a number of courses in other branches of science and engineering, along with humanities and social sciences, will also be available as electives. This will allow students to explore their areas of interest. If a student is inclined towards electrical engineering, s/he can take the requisite number of courses/credits in that program and get a minor.

Interdisciplinary areas in physical sciences and engineering, like Quantum technology, Photonics, Nano-electronics and Artificial Intelligence, promise to become dominant in the 21st century. EP that teaches science underlying engineering will prepare students to apply Physics to tackle these 21st century engineering challenges and vice-versa. Additionally, EP will also prepare students to pursue an advanced degree in Physics as well as engineering.

Objectives of the program

After the completion of the degree, students would

- be prepared with a varied range of expertise in different aspects of physics and engineering
- acquire solid understanding of both the theory and experimental physics to take up the challenging future problems.
- be better trained professionals to cater the growing demand for interdisciplinary professionals with engineer cum physicist in industry.

**Revised list of Core courses for Engineering Physics Program
(Total Credits for discipline core = 33)**

Sr. No.	Code	Course Title	Lecture	Tutorial	Practical	Total Credit
1	EP301	Engineering Mathematics-2	3	1	0	4
2	PH301	Quantum Mechanics and Applications	3	0	0	3
3	PH302	Introduction to Statistical Mechanics	3	0	0	3
4	PH501	Solid State Physics	3	0	0	3
5	EE311	Device Electronics for Integrated Circuits	3	0	0	3
6	ME352	Finite Element Methods in Engineering replaced with	3	0	0	3
	EP302	Computational Methods for Engineering <i>as approved by Senate in its 30th meeting held on 3rd February, 2021</i>	2	1	0	3
7	EP402P	Engineering Physics Practicum	1	0	5	4
8	PH502	Photonics	3	0	0	3
9	EP403	Physics of Atoms and Molecules	3	0	0	3
10	EP401P	Engineering of Instrumentation	1	0	5	4

B.Tech. (Engineering Physics) - 1st Sem.						
Sr.No.	Core/Elective	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
1.	IC-110	Engineering Mathematics	2	1	0	3
2.	IC-152	Data Science-1	3	0	0	3
3.	IC-152P	Data Science-1 Lab	0	0	3	2
4.	IC-160	Electrical Systems Around Us	3	0	0	3
5.	IC-160P	Electrical Systems Around Us Lab	0	0	3	2
6.	IC-140	Graphics for design	2	0	3	4
7.	IC-101P	Reverse Engineering	0	0	3	2
8.	IC	HSS Course	3	0	0	3
9.	IC	HSS - Creative understating				1
					Total Credits	23

Completed Credits: 23

Remaining Credits: 137

B.Tech. (Engineering Physics) – 2nd Sem.						
Sr.No.	Core/Elective	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
1.	IC-111	Linear Algebra	3	0	0	3
2.	IC-252	Data Science-2	3	0	2	4
3.	IC-161	Applied Electronics	3	0	0	3
4.	IC-161P	Applied Electronics Lab	0	0	3	2
5.	IC-142	Engineering Thermodynamics	3	1	0	4
6.	IC-141	Product Realization Technology	2	0	0	2
7.	IC-141P	Product Realization Technology Lab	0	0	3	2
8.	IC	HSS Course	3	0	0	3
					Total Credits	23

Completed Credits: 23+23=46

Remaining Credits: 114

B.Tech. (Engineering Physics) – 3rd Sem.						
Sr.No.	Core/Elective	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
1.	IC-121	Mechanics of particles and waves	3	0	0	3
2.	IC-130	Applied Chemistry for Engineers	3	0	0	3
3.	IC-130P	Chemistry Practicum	0	0	3	2
4.	C-1, EP301	Engineering Mathematics-2	3	0	0	3
5.	IC-352	Data Science-3	3	0	0	3
6.	IC-240	Mechanics of Rigid Bodies	3	0	0	3
7.	IC	HSS Course	3	0	0	3
					Total Credits	20

Completed Credits: 23+23+20=66

Remaining Credits: 94

B.Tech. (Engineering Physics) – 4rd Sem.						
Sr.No.	Core/Elective	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
1.	IC-221	Foundation of electrodynamics	3	0	0	3
2.	IC-222P	Physics Practicum	0	0	3	2
3.	IC-221	Signals and systems	3	0	0	3
4.	IC-241	Materials Science for Engineers	3	0	0	3
5.	IC-242	Continuum Mechanics	3	0	0	3
6.	IC-201P	Design Practicum	0	0	6	4
7.	IC-136	Understanding Biotechnology & Its Applications	3	0	0	3
					Total Credits	21

Completed Credits: $23+23+20+21=87$

Remaining Credits: 73

B.Tech. (Engineering Physics) – 5th Sem.						
Sr.No.	Core/Elective	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
1.	C-2, PH301	Quantum Mechanics and Applications	3	0	0	3
2.	C-3, EE311	Device Electronics for Integrated Circuits	3	0	0	3
3.	C-4, EP302	Computational Methods for Engineering	3	0	2	4
4.	DE-1	Discipline Elect.- 1	3	0	0	3
5.	DE-2	Discipline Elect.-2	3	0	0	3
6.	IC	HSS Course	3	0	0	3
					Total Credits	19

Completed Credits: 23+23+20+21+19=106

Remaining Credits: 56

B.Tech. (Engineering Physics) – 6th Sem.						
Sr.No.	Core/Elective	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
1.	C-5, PH302	Introduction to Statistical Mechanics	3	0	0	3
2.	C-6, PH501	Solid State Physics	3	0	0	3
3.	C-7, EP401P	Engineering of Instrumentation	1	0	3	4
4.	C8-PH502	Photonics	3	0	0	3
5.	E	Open/Free Elective	3	0	0	3
6.	DP301P(E)	Interdisciplinary Socio-Technical Practicum (ISTP)				4
					Total Credits	20

Completed Credits: 23+23+20+21+19+20=126

Remaining Credits: 34

B.Tech. (Engineering Physics) – 7th Sem.						
Sr.No.	Core/Elective	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
1.	C-9,EP402P	Engineering Physics Practicum	1	0	3	4
F2.	DE-3	Discipline Elective	3	0	0	3
3.	DP401P(E)	MTP-I	0	0	0	3
4.	E	Open/Free Electives (2 No.)	-	-	-	6
					Total Credits	16

Completed Credits: 23+23+20+21+19+20+16=142

Remaining Credits: 18

B.Tech. (Engineering Physics) – 8th Sem.						
Sr.No.	Core/Elective	Course Name	Lecture (L)	Tutorial (T)	Practical (P)	Credit (C)
1.	DE-4	Disci. Elective	3	0	0	3
2.	DP402P(E)	MTP-II	-	-	-	5
3.	E	Open/Free Electives (3 no.)	-	-	-	9
					Total Credits	17

Completed Credits: 23+23+20+21+19+20+16+17=159

Internship: 2

Total credits completed: 159+2 (internship) = 161

- List of Courses, as decided by the CIG, from Physics, Mathematics, Electrical, Mechanical and Computer Science are included in the Discipline Electives.

Tentative list of elective courses from Physics are listed below.

Sr.No.	Code	Course Name
1.	PH503	Laser and Applications
2.	PH503	Organic Optoelectronics
3.	PH507	X-ray as a probe to study the material properties
4.	PH508	Magnetism and Magnetic Materials
5.	PH601	Mesoscopic Physics and Quantum Transport
6.	PH603	Advanced Condensed Matter Physics
7.	PH612	Nuclear and Particle Physics
8.	PH524	Atomic and Molecular Physics
9.	PH613	Special Topics in Quantum Mechanics
10.	PH605	Superconductivity