**B.Tech. Engineering Physics Semester wise Course Distribution**

| Sl. No. | Sem | Type | Course Code | Course Name | L | T | P | C | L - T - P - C | Remarks | Semester wise Credits | Credits Completed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | **First Semester** | | | | | | | | |
| 1 | I | IC | ICxxx | Calculus | 1.5 | 0.5 | 0 | 2 | 1.5-0.5-0-2 | | | |
| 2 | I | IC | ICxxx | Complex and Vector Calculus | 1.5 | 0.5 | 0 | 2 | 1.5-0.5-0-2 | | | |
| 3 | I | IC | IC140 | Engineering Graphics for Design | 2 | 0 | 3 | 4 | 2-0-3-4 | | | |
| 4 | I | IC | IC152 | Introduction to Python and Data Science | 3 | 0 | 2 | 4 | 3-0-2-4 | | | |
| 5 | I | IC | IC230 | Environmental Science (IC Core basket – 1) | 2.5/3 | 0.5/0 | 0 | 3 | 2.5-0.5-0-3 | https://cloud.iitmandi.ac.in/f/f7a48 5930ece4b0fbaa0/ | | |
| 6 | I | HSS | HSXXX | HSS Course | 3 | 0 | 0 | 3 | 3-0-0-3 | Preferably English Course for weak students; Other courses may also run | | |
| 7 | I | IKS | IKS181 | Ikshma Course | 3 | 0 | 0 | 3 | 3-0-0-3 | | | |
| 8 | | | ICXXX | Foundations of Design Practicum | 1 | 0 | 6 | 4 | 1-0-6-4 | Only one course (FDP/IKS) needs to be taken by students. They may take the other course in the 2nd semester | | |
| | | | | | | | | | | The total credits may be 18 if HSS course is not taken by the student. Accordingly the subsequent number would changed. The compulsary 12 credits from HSS need to be completed by Sem VI. IKS and FDP may run in both semesters. Half of the batch does one course while the other half of the students do the other course. In the second semester, this will be swapped. Accordingly students may do 18-22 credits | 21 | 21 |
| | | | | **Second Semester** | | | | | | | | |
| 1 | II | IC | ICxxx | Linear Algebra | 1.5 | 0.5 | 0 | 2 | 1.5-0.5-0-2 | | | |
| 2 | II | IC | ICxxx | ODE & Integral Transforms | 2.5 | 0.5 | 0 | 2 | 2.5-0.5-0-2 | | | |
| 3 | II | IC | IC161 | Applied Electronics | 3 | 0 | 0 | 3 | 3-0-0-3 | | | |
| 4 | II | IC | IC 161P | Applied Electronics Lab | 0 | 0 | 3 | 2 | 0-0-3-2 | | | |
| 5 | II | IC | IC252 | Probability and Statistics | 3 | 0 | 2 | 4 | 3-0-2-4 | | | |
| 6 | II | IC | IC121 | Mechanics of Particles and Waves (IC Core Basket II) | 2.5/3 | 0.5/0 | 0 | 3 | 2.5-0.5-0-3 | | | |
| 7 | II | IC | ICXXX | Foundations of Design Practicum | 1 | 0 | 6 | 4 | 1-0-6-4 | | | |
| 8 | II | IC | IC222P | Physics Practicum | 0 | 0 | 3 | 2 | 0-0-3-2 | | | |
| 9 | II | IC | IKS | Iksmha courses | | | | | | IKSHMA course and FDP may swap their batches from 1st year. Total credits may be 20-21 based on the courses | 22 | 43 |
| | | | | **Third Semester** | | | | | | | | |
| 1 | III | IC | IC272 | Machine Learning | 3 | 0 | 0 | 3 | 3-0-0-3 | | | |
| 2 | III | DC | PH301 | Quantum Mechanics and Application | 3 | 0 | 0 | 3 | 3-0-0-3 | | | |
| 3 | III | DC | EP301 | Engineering Mathematics-2 | 3 | 1 | 0 | 4 | 3-1-0-4 | | | |
| 4 | III | DC | EP321 | Foundations of Electrodynamics | 3 | 0 | 0 | 3 | 3-0-0-3 | | | |
| 5 | III | DE | | Discipline Elective | 3 | 0 | 0 | 3 | 3-0-0-3 | | | |
| | III | FE | | Free Elective | 3 | 0 | 0 | 3 | 3-0-0-3 | | | |
| 6 | III | HSS | HSXXX | HSS Course | | | | 3 | | | | |
| | | | | | | | | | | Discipline Core and elective courses may be included as per requirement; please fill the details of the courses here. Machine learning may be offered in 3rd semester, and design practicum may be offered in 4th semester | | |
| | | | | **Fourth Semester** | | | | | | | 22 | 65 |

| No. | Sem | Cat | Code | Course | L | T | P | C | L-T-P-C | Remarks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | IV | IC | IC201P | Design Practicum | 0 | 0 | 6 | 3 | | | | |
| 2 | IV | DC | EP403 | Physics of Atoms and Molecules | 3 | 0 | 0 | 3 | 3-0-0-3 | | | |
| 3 | IV | DC | PH501 | Solid State Physics | 3 | 0 | 0 | 3 | 3-0-0-3 | | | |
| 4 | IV | DC | EPXXX | Reverse Engineering | 0 | 0 | 2 | 1 | 0-0-2-1 | | | |
| 5 | IV | HSS | HSXXX | HSS Course | | | | | 3-0-0-3 | | | |
| 6 | IV | DC | PH302 | Introduction to Statistical Mechanics | 3 | 0 | 0 | 3 | 3-0-0-3 | | | |
| | IV | DE | | Discipline Elective | | | | 3 | 3-0-0-3 | | | |
| | IV | DE | | Discipline Elective | | | | 3 | | | | |
| | IV | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | **Fifth Semester** | | | | | | | 22 | 87 |
| 1 | V | DC | EE.... | Device Electronics | 3 | 0 | 0 | 3 | 3-0-0-3 | This course is same as EE 311. It is under revision by SCEE and will be floated with a new course number. | | |
| 2 | V | DC | EP302 | Computational Methods for engineering | 3 | 0 | 0 | 3 | 3-0-0-3 | | | |
| 3 | V | DC | EP402P | Engineering Physics Practicum | 1 | 0 | 5 | 4 | 1-0-5-4 | | | |
| 5 | V | DE | | Discipline Elective | | | | 3 | | | | |
| 6 | V | DE | | Discipline Elective | | | | 3 | | | | |
| | | FE | | Free Elective | | | | 3 | | | | |
| | | HSS | HSXXX | HSS Course | | | | 3 | | | | |
| | | | | | | | | | | | 22 | 109 |
| | | | | **Sixth Semester** | | | | | | | | |
| 1 | VI | DC | EP401P | Engineering of Instrumentation | 1 | 0 | 5 | 4 | 1-0-5-4 | | | |
| 2 | VI | DC | PH502 | Photonics | 3 | 0 | 0 | 3 | 3-0-0-3 | | | |
| 4 | VI | DE | | Discipline Elective | | | | 3 | | | | |
| 5 | VI | DE | | Discipline Elective | | | | 3 | | | | |
| 6 | VI | DE | | Discipline Elective | | | | 3 | | | | |
| | VI | FE | | Free Elective | | | | 3 | | | | |
| | VI | ISTP | ISTP | ISTP/Alternatives | | | | 4 | | All core courses need to be completed by 6th semester. If the discipline core courses are completed by 5th semesters, the students may go for semester internship, without much issues of completing the core courses. ISTP and Internship are added to make 18 in Seventh Semester. | 19 | 128 |
| | | | | | | | | | | | | |
| | | | | **Seventh Semester** | | | | | | | | |
| 1 | VI/VII | IC | IC010 | Internship | | | | 2 | | Internship needs to be completed before start of 8th semester. The grades for the internship may be added to 8th semester grades. | 18 | 146 |
| 1 | VII | DE | DE-7 | Discipline Elective | | | | 3 | | | | |
| 2 | VII | FE | | Free Elective | | | | 3 | | | | |
| 4 | VII | FE | | Free Elective | | | | 3 | | | | |
| 6 | | | | MTP-1 | | | | 3 | | | | |
| | | | | **Eighth Semester** | | | | | | | | |
| 1 | VIII | DE | | Discipline Elective | | | | 3 | | | | |
| 2 | VIII | FE | | Free Elective | | | | 3 | | | | |
| 3 | VIII | FE | | Free Elective | | | | 3 | | | | |
| 5 | VIII | MTP 2 | | MTP-2 | | | | 5 | | | 14 | 160 |
| | | | | | | | | | | If 3 credits HSS is done in Sem I then only one 3 credits needs to be done in either Se V or Sem VI. Hence the total HSS credits would be 12 and Overall Credits would be 160. | | |

## List of Discipline ElectivesElectives

| Sl. No | Course Code | Course Name | L | T | P | Cr | L-T-P-C | Remarks |
|---|---|---|---|---|---|---|---|---|
| 1 | PH503 | Laser and Applications | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 2 | PH504 | Organic Optoelectronics | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 3 | PH507 | X-ray as a probe to study the material pro | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 4 | PH508 | Magnetism and Magnetic Materials | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 5 | PH601 | Mesoscopic Physics and Quantum Transp | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 6 | PH603 | Advanced Condensed Matter Physics | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 7 | PH612 | Nuclear and Particle Physics | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 8 | PH613 | Special Topics in Quantum Mechanics | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 9 | PH605 | Superconductivity | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 10 | PH606 | Quantum Field Theory | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 11 | PH604 | Optical Properties of Solids | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 12 | PH528 | Introduction to General Relativity | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 13 | PH607 | Physics of Ultra cold Quantum Gases | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 14 | PH521 | Electromagnetic Theory | 4 | 0 | 0 | 4 | 4-0-0-4 | |
| 15 | PH608 | Computer Assisted quantum mechanics | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 16 | PH609 | Theory of quantum collision and spectros | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 17 | MA513 | Ordinary Differential Equations | 3 | 1 | 0 | 4 | 3-1-0-4 | |
| 18 | MA522 | Partial Differential Equations | 3 | 1 | 0 | 4 | 3-1-0-4 | |
| 19 | MA511 | Real Analysis | 3 | 1 | 0 | 4 | 3-1-0-4 | |
| 20 | MA521 | Functional Analysis | 3 | 1 | 0 | 4 | 3-1-0-4 | |
| 21 | MA512 | Linear Algebra | 3 | 1 | 0 | 4 | 3-1-0-4 | |
| 22 | EE614 | Optical communication systems | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 23 | EE611 | VLSI Technology | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 24 | EE520 | Microelectronics Devices and Modelling | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 25 | EE307 | Theory of Measurement | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 26 | EE621 | Radiating Systems | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 27 | EE551 | Applied Photonics for Scientists and Engi | 2 | 1 | 0 | 3 | 2-1-0-3 | |
| 28 | CS241 | Introduction to Cryptography | 3 | 0 | 0 | 3 | 3-0-0-3 | has not been offered for a long time |
| 29 | CS208 | Mathematical Foundations of Computer S | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 30 | CS202 | Data Structures and Algorithms | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 31 | CS403 | Algorithm Design and Analysis | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 32 | ME307 | Energy Conversion Devices | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 33 | ME615 | Applied Computational Fluid Dynamics | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 34 | ME210 | Fluid Mechanics | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 35 | ME509 | Nano Manufacturing | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 36 | ME603 | Advanced Fluid Mechanics | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 37 | PH701 | Introduction to molecular simulations | 2 | 0 | 4 | 4 | 2-0-4-4 | |
| 38 | PH706 | Introduction to stochastic problems in ph | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 39 | PH621 | Computational Methods for Physicists | 2 | 0 | 4 | 4 | 2-0-4-4 | |
| 40 | EP502 | Informatics for Material Design | 2 | 0 | 2 | 3 | 2-0-2-3 | we have to check if this has been approved by the BoA |
| 41 | MA516 | Topology | 3 | 1 | 0 | 4 | 3-1-0-4 | New additions based on students' suggestions |
| 42 | EN502 | Emerging energy sources | 3 | 0 | 0 | 3 | 3-0-03 | |
| 43 | DS201 | Data Handling and Visualization | 2 | 0 | 2 | 3 | 2-0-2-3 | |
| 44 | DS404 | Information Security and Privacy | 3 | 0 | 0 | 3 | 3-0-0-3 | In place of Introduction to Cryptography |
| 45 | CS309 | Information and Database Systems | 3 | 0 | 2 | 4 | 3-0-2-4 | |
| 46 | CS671 | Deep Learning and Applications | 3 | 1 | 0 | 4 | 3-1-0-4 | |
| 47 | CS672 | Advanced Topics in Deep Learning | 3 | 0 | 2 | 4 | 3-0-2-4 | |
| 48 | EE203 | Network theory | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 49 | EE512 | CMOS Analog IC Design | 3 | 0 | 2 | 4 | 3-0-2-4 | |
| 50 | DS301 | Mathematical Foundations of Data Scienc | 3 | 0 | 1 | 4 | 3-1-0-4 | |
| 51 | DS403 | Introduction to Statistical Learning | 2 | 0 | 2 | 3 | 2-0-2-3 | |
| 52 | CS511 | Introduction to Probability | 2 | 0 | 0 | 2 | 2-0-0-2 | |
| 53 | ME503 | Heat Transfer | | | | 3 | | |
| 54 | MA560 | Nonlinear Dynamics and Chaos | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 55 | ME210 | Fluid Mechanics | 2.5 | 0.5 | 0 | 3 | 2.5-0.5-0-3 | |
| 56 | DS401 | Optimization for Data Science | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 57 | CS304 | Formal Language and Automata Theory | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 58 | EE211 | Analog Circuit Design | 2 | 0 | 2 | 3 | 2-0-2-3 | |
| 59 | EE511 | Computer Vision | 3 | 0 | 2 | 4 | 3-0-2-4 | |
| 60 | EE519P | CMOS Digital IC Design Practicum | 1 | 0 | 2 | 2 | 1-0-2-2 | |
| 61 | EE524 | Digital MOS LSI Circuits | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 62 | EE534 | Probability and Random Processes | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| 63 | EE593 | Low power VLSI Design | 3 | 0 | 0 | 3 | 3-0-0-3 | |
| | | | | | | | | |
| | **NOTE:** | | | | | | | |

This Discipline Electives list will be maintained by Academics Office. Elective courses are not allowed to delete. The addition of courses is permitted. This list may be modified during the time of next curriculum revision. UG students may preferably be allowed to take upto 5 level courses as Discipline Courses. 6 level courses may be offered as free electives.

| Semester | DC | DE | DC + DE |
|----------|----|----|---------|
| III | 10 | 3 | 16 |
| IV | 10 | 6 | 13 |
| V | 10 | 6 | 16 |
| VI | 7 | 9 | 16 |
| VII | 0 | 3 | 3 |
| VIII | 0 | 3 | 3 |
| Total | 37 | 30 | 67 |

| Symbol | Course Type | Credits | |
|--------|-------------|---------|---|
| DC | Discipline core | 37 | |
| DE | Discipline elective | 30 | |
| FE | Free elective | 21 | |
| HSS | Humanities and Social Science Course | 12 | |
| IC | Institute Core | 45 | Including the baskets |
| IKS | Indian knowledge system | 3 | |
| ISTP | Interactive Socio-Technical Practicum | 4 | |
| MTP 1 | Major Technical project 1 | 3 | |
| MTP 2 | Major Technical project 2 | 5 | |
| | | 160 | |

## Double major Courses

| Sl. No. | Type | Course Code | Course Name | L | T | P | C | L - T - P - C |
|---------|------|-------------|-------------|---|---|---|---|---------------|
| 1 | DC | PH301 | Quantum Mechanics and Application | 3 | 0 | 0 | 3 | 3-0-0-3 |
| 2 | DC | EP301 | Engineering Mathematics-2 | 3 | 1 | 0 | 4 | 3-1-0-4 |
| 3 | DC | EP321 | Foundations of Electrodynamics | 3 | 0 | 0 | 3 | 3-0-0-3 |
| 4 | DC | PH302 | Introduction to Statistical Mechanics | 3 | 0 | 0 | 3 | 3-0-0-3 |
| 5 | DC | EP403 | Physics of Atoms and Molecules | 3 | 0 | 0 | 3 | 3-0-0-3 |
| 6 | DC | PH501 | Solid State Physics | 3 | 0 | 0 | 3 | 3-0-0-3 |
| 7 | DC | EP402P | Engineering Physics Practicum | 1 | 0 | 5 | 4 | 1-0-5-4 |
| 8 | DC | PH502 | Photonics | 3 | 0 | 0 | 3 | 3-0-0-3 |
| 9 | IC | IC121 | Mechanics of Particles and Waves | 3 | 0 | 0 | 3 | 3-0-0-3 |
| 10 | DE | | Discipline Elective | | | | 3 | |
| 11 | DE | | Discipline Elective | | | | 3 | |
| 12 | DE | | Discipline Elective | | | | 3 | |
| | | | | | | | 38 | |