

**Curriculum of B.Tech. Program
in
Engineering Physics**

(from AY 2023-24 onwards)



Indian Institute of Technology Indore

2nd Year B.Tech. (Engineering Physics)

Semester III			
Course Code	Course Name	(L-T-P)	Credit
ZZXXX	Course -I for Minor Program	X-X-X	3
MA 205	Complex Analysis	3-1-0 (Half semester)	2
MA 207	Differential Equation-II	3-1-0 (Half semester)	2
PH 203/ AA 203	Classical Mechanics	2-1-0	3
PH 205/ AA 205	Electronic Devices and Circuits - I	2-1-0	3
PH 207/ AA 207	Wave Phenomena and Optics	2-1-0	3
PH 209/ AA 209	Fundamental Concepts of Solid State Engineering	2-1-0	3
PH 251/ AA 251	Engineering Physics Lab – I	0-0-3	1.5
PH 255/ AA 255	Electronic Devices and Circuits Lab - I	0-0-3	1.5
PH 2XX	Department Elective - I	2-1-0	3
		13-6-6	22/25

Note: All 2nd-year core courses and labs are common between BTech.-EP (Dept of Physics) and BTech – SSE (DAASE)

List of Department Elective - I*

S. No.	Course Code	Courses	L-T-P	Credits	Direction
1	PH 211	Fundamentals of Vacuum Science and Technology	(2-1-0)	3	Energy Conversion and Storage, Spintronics and Memory Devices, Optoelectronics and Photonics
2	PH 213	Detector Physics	(1-1-2)	3	Experimental HEP, Detector Technology, Nuclear Engineering, Theoretical HEP, Medical Physics

*The list of department electives will be updated as and when new courses get approved for the same.

Semester IV			
Course Code	Course Name	(L-T-P)	Credit
ZZXXX	Course II for Minor Program	X-X-X	3
MA 204N	Numerical Methods	2-0-2	3
PH 206/ AA 206	Electronic Devices and Circuits - II	2-1-0	3
PH 208/ AA 208	Electrodynamics	2-0-0	2
PH 210/ AA 210	Fundamentals of Quantum Mechanics	2-1-0	3
PH 212/ AA 212	Thermal Physics	2-1-0	3
PH 252/AA 252	Scientific Computing Lab	0-0-2	1
PH 256/AA 256	Electronic Devices and Circuits Lab - II	0-0-3	1.5
PH 2XX	Department Elective -II	2-1-0	3
ZZ 2XX	Institute Open Elective -I	2-1-0	3
		14-5-5	22.5/25.5

List of Department Elective - II*

S. No.	Course Code	Course	L-T-P	Credits	Direction
1	PH 214	Classical Field Theory	(2-1-0)	3	Theoretical HEP, Experimental HEP
2	PH 216	Accelerator Physics	(2-1-0)	3	Experimental HEP, Nuclear Engineering, Medical Physics

*The list of department electives will be updated as and when new courses get approved for the same.

3rd Year B.Tech. (Engineering Physics)

Semester V			
Course Code	Course Name	L-T-P	Credit
ZZXXX	Course III Minor Program	X-X-X	3
PH 301	Nuclear Science and Engineering	2-1-0	3
PH 303	Quantum Mechanics	2-1-0	3
PH 305	Advanced Classical Mechanics	2-1-0 (Half semester)	1.5
PH 307	Topics in Mathematical Physics	2-1-0 (Half semester)	1.5
PH 309	Simulation Methods and Analysis	2-0-2	3
PH 351	Engineering Physics Lab - II	0-0-3	1.5
PH XXX	Department Elective -III	2-1-0	3
ZZ 3XX	Institute Open Elective -II	2-1-0	3
		14-6-5	19.5/22.5

List of Department Elective - III*

S. No.	Course Code	Course	L-T-P	Credits	Direction
1	PH 311	Physics of Semiconductor Devices	(3-0-0)	3	Energy Conversion and Storage
2	PH 313	Quantum Transport Theory and Simulations	(2-1-0)	3	Spintronics and Memory Devices, Quantum Technology
3	PH 315	Advanced Quantum Mechanics	(2-1-0)	3	Theoretical HEP, Quantum Technology
4	PH 317	Data Analysis in High Energy Physics	(2-1-0)	3	Experimental HEP

*The list of department electives will be updated as and when new courses get approved for the same.

Semester VI			
Course Code	Course Name	L-T-P	Credit
ZZXXX	Course IV Minor Program	X-X-X	3
PH 302	Cooperative Phenomena in Solids	2-1-0	3
PH 304	Fundamentals of Statistical Mechanics	2-1-0	3
PH 306	Atomic and Molecular Spectroscopy	2-1-0	3
PH 398	UG Seminar	0-1-0	1
PH 352	Solid State Physics Lab	0-0-3	1.5
PH 356	Spectroscopy Lab	0-0-3	1.5
PH 3XX	Department Elective-IV	2-1-0	3
PH 3XX	Department Elective-V	2-1-0	3
ZZ 3XX	Institute Open Elective -III	2-1-0	3
		12-7-6	22/25

List of Department Elective – IV and V*

S. No.	Course Code	Course	L-T-P	Credits	Direction
1	PH 312	Solar Photovoltaics: Fundamentals, Technologies, and Applications	2-1-0	3	Energy Conversion and Storage
2	PH 314	Introduction to Quantum Field Theory	2-1-0	3	Theoretical HEP, Experimental HEP
3	PH 316	Group Theory in Particle Physics	2-1-0	3	Theoretical HEP
4	PH 318	Introduction to String Theory	2-1-0	3	Theoretical HEP
5	PH 320	Physics of the Early Universe and Dark Matter	2-1-0	3	Theoretical HEP, Experimental HEP
6	PH 308	Experimental and Theoretical Aspects of Heavy Ion Collisions	2-1-0	3	Experimental HEP, Theoretical HEP
7	PH 322	Introduction to Quantum Information and Computation	2-0-2	3	Quantum Technology

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4th Year B.Tech. (Engineering Physics)

Semester VII			
Course Code	Course Name	L-T-P	Credit
ZZXXX	Course V Minor Program	X-X-X	2
PH 493	B Tech Project (BTP)	0-0-32	16
	Internship (I+II)		2
	Total	0-0-32	18/20

4th Year (Sem – VIII) Courses

Semester VIII			
Course Code	Course Name	L-T-P	Credit
PH 4XX	Department Elective VI	2-1-0	3
PH 4XX	Department Elective VII	2-1-0	3
ZZ4XX	Institute Open Elective IV	2-1-0	3
ZZ4XX	Institute Open Elective V	2-1-0	3
ZZ4XX	Institute Open Elective VI	2-1-0	3
	Total	10-5-0	15

List of Department Electives* (Semester VIII)

S. N.	Course Code	Course	L-T-P	Credits	Direction(s)
1	PH XXX	Magnetism in Condensed Matter Physics	2-1-0	3	Spintronics and Memory Devices, Quantum Technology
2	PH XXX	Spintronics and Applications	2-1-0	3	Spintronics and Memory Devices
3	PH XXX	Weak Interactions and the Standard Model	2-0-0	2	Theoretical HEP, Experimental HEP
4	PH XXX	Flavor Physics and Neutrino Oscillations	2-1-0	3	Theoretical HEP
5	PH XXX	Advanced Quantum Field Theory	2-1-0	3	Theoretical HEP
6	PH XXX	Collider Physics	1-1-0	2	Theoretical HEP, Expt HEP
7	PH XXX	Astroparticle Physics and Neutrino Astronomy	2-0-0	2	Theoretical HEP
8	PH XXX	Applications of Machine Learning	2-0-2	3	Data Science, Quantum Technology, Experimental HEP
9	PH XXX	Deep Inelastic Scattering and Parton Model	1-0-0	1	Theoretical HEP, Experimental HEP
10	PH XXX	Advanced Materials	2-1-0	3	Spintronics and Memory Devices
11	PH XXX	Characterization of Surfaces and Interfaces of Materials	2-0-2	3	Energy Conversion and Storage, Optoelectronics and Photonics

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