

# Indian Institute of Space Science and Technology

Department of Space, Govt. of India  
Thiruvananthapuram



## Dual Degree Program

Bachelor of Technology in Engineering Physics with  
Master of Technology in Optical Engineering or  
Master of Science in Solid State Physics

Curriculum and Syllabus

### Semester – I

Code	Title	L	T	P	C
MA111	Calculus	3	1	0	4
PH111	Physics I	3	1	0	4
CH111	Chemistry	2	1	0	3
AE111	Introduction to Aerospace Engineering	3	0	0	3
MA112	Computer Programming and Applications	2	0	3	3
HS111	Communication Skills	2	0	3	3
PH131	Physics Lab	0	0	3	1
AE131	Basic Engineering Lab	0	0	3	1
	Total	15	3	12	22

### Semester – II

Code	Title	L	T	P	C
MA121	Vector Calculus and Differential Equations	2	1	0	3
AV121	Data Structures and algorithms	3	1	0	4
PH121	Physics II	3	1	0	4
CH121	Material Science and Metallurgy	3	0	0	3
AV122	Basic Electrical and Electronics Engineering	3	1	0	4
AE141	Engineering Graphics	1	0	3	2
CH141	Chemistry Lab	0	0	3	1
	Total	15	4	6	21

### Semester – III

Code	Title	L	T	P	C
MA211	Linear Algebra, Complex Analysis, and Fourier Series	3	0	0	3
PH211	Electrodynamics and Special Relativity	3	0	0	3
PH212	Mathematical Physics	3	1	0	4
AV211	Analog Electronic Circuits	3	0	0	3
PH213	Classical Mechanics	3	1	0	4
HS211	Introduction to Economics	2	0	0	2
PH231	Optics Lab I	0	0	3	1
	Total	17	2	3	20

### Semester – IV

Code	Title	L	T	P	C
MA221	Integral Transforms, PDE, and Calculus of Variations	3	0	0	3
PH221	Modern Optics	3	0	0	3
PH222	Quantum Mechanics	3	1	0	4
AE225	Fluid Dynamics	3	0	0	3
AV223	Signals and Systems	3	0	0	4
AV227	Instrumentation and Measurement	3	0	0	3
HS221	Introduction to Social Science and Ethics	2	0	0	2
PH241	Optics Lab II	0	0	3	1
	Total	20	1	3	22

Semester – V

Code	Title	L	T	P	C
MA311	Probability, Statistics, and Numerical Methods	3	0	0	3
PH311	Atomic and molecular spectroscopy	3	1	0	4
PH312	Statistical Mechanics	3	0	0	3
AE315	Thermodynamics	3	0	0	3
HS311	Principles of Management Systems	3	0	0	3
PH331	Modern Physics Lab	0	0	6	2
AV337	Instrumentation and Measurement Lab	0	0	3	1
	Total	15	1	9	19

Semester – VI

Code	Title	L	T	P	C
PH321	Introduction to Solid State Physics	3	0	0	3
ES322	Introduction to Earth, Atmosphere and Ocean Sciences	3	0	0	3
ES323	Astrophysical Concepts	3	0	0	3
CH321	Environmental Science and Engineering	2	0	0	2
E01	Elective I	3	0	0	3
E02	Elective II	3	0	0	3
PH341	Solid State Physics Lab	0	0	3	1
PH351	Comprehensive Viva-Voce I	0	0	0	3
	Total	17	0	3	21

### Elective I and II Courses

Code	Title	L	T	P	C
PH361	Quantum Information Theory	3	0	0	3
PH362	Non-linear Dynamics, Chaos and Fractals	3	0	0	3
ES361	Introduction to Remote Sensing	3	0	0	3
ES362	Geographic Information System	3	0	0	3
MA361	Computer Modelling and Simulation	3	0	0	3
MA362	Optimization Techniques	3	0	0	3
MA363	Artificial Neural Networks	3	0	0	3
AE361	Operations Research	3	0	0	3
AV489	Pattern Recognition and Machine Learning	3	0	0	3
AV490	Deep Learning for Computational Data Science	3	0	0	3
AV491	Advanced Sensors and Interface Electronics	3	0	0	3
AV493	Machine Learning for Signal Processing	3	0	0	3

## Master of Technology in Optical Engineering

### Semester – VII

Code	Title	L	T	P	C
PH411	Optical Engineering Fundamentals	3	0	0	3
PH412	Opto Mechanical Design Analysis	3	0	0	3
Ph413	Optical Fabrication and Testing	3	0	0	3
PH414	Lasers and Optoelectronics	3	0	0	3
PH419	Fourier Optics	3	0	0	3
PH431	Optics and Optoelectronics Lab	0	0	3	1
PH432	Design and Analysis Lab	0	0	3	1
PH452	Summer Internship and Training	0	0	0	3
	Total	15	0	6	20

### Semester – VIII

Code	Title	L	T	P	C
PH421	Guide Wave Optics and Optical Communication	3	0	0	3
PH422	Adaptive Optics	3	0	0	3
PH423	Optical System Analysis and Design	3	0	0	3
PH4xx	PG Elective I	3	0	0	3
PH4xx	PG Elective II	3	0	0	3
PH441	Guided Wave Optics Lab	0	0	3	1
PH442	Adaptive Optics Lab	0	0	3	1
PH451	Seminar	0	0	0	1
	Total	15	0	6	18

### Semester – IX

Code	Title	L	T	P	C
PH551	Project Phase I	0	0	0	13
PH552	Comprehensive Viva-Voce II	0	0	0	2
	Total	0	0	0	15

### Semester – X

Code	Title	L	T	P	C
PH554	Project Phase II	0	0	0	20
	Total	0	0	0	20

### Semester-wise credits

Semester	I	II	III	IV	V	VI	VII	VIII	IX	X	Total
Credits	22	20	20	22	19	21	20	18	15	20	197

### List of PG Electives

Code	Title	L	T	P	C
PH461	Optical Thin Films Science and Technology	3	0	0	3
PH462	Optical and Electro-Optical Sensors	3	0	0	3
PH463	Integrated Optics	3	0	0	3
PH464	Introduction to Quantum Optical Technologies	3	0	0	3
PH465	Advanced Optoelectronics	3	0	0	3
PH466	Statistical and Quantum Optics	3	0	0	3
PH467	Non-Linear Optics	3	0	0	3
PH468	MEMS and MOEMS	3	0	0	3
PH469	Laser Applications	3	0	0	3
PH470	Quantum Optical Communication	3	0	0	3
PH471	Nano Optics	3	0	0	3
PH361	Quantum information Theory	3	0	0	3