

# **Integrated MSc Programme**

## **PHYSICS**

### **CURRICULUM**

**2023 admission onwards**

**SEMESTER I**

Code No	Course Title	L T P	Cr
21ENG101	Communicative English	2 0 2	3
	Language I	1 0 2	2
23CHY102	Chemistry I	3 0 0	3
23PHY101	Problem Solving and Computer Programming: Introduction to Python	3 0 0	3
23MAT103	Trigonometry and Differential Equations	3 1 0	4
23PHY102	Mechanics and Properties of Matter	3 1 0	4
23CHY182	Chemistry Lab I	0 0 2	1
23PHY181	Problem Solving and Computer Programming: Introduction to Python Lab	0 0 2	1
22ADM101	Foundations of Indian Heritage	2 0 0	2
<b>TOTAL</b>			<b>23</b>

**SEMESTER II**

Code No	Course Title	L T P	Cr
21ENG111	Professional Communication	1 0 2	2
	Language II	1 0 2	2
23CHY112	Chemistry II	3 0 0	3
23PHY111	Advanced Computer Programming - using Python	3 0 0	3
23MAT113	Matrices and Vector Calculus	3 1 0	4
23PHY112	Basics of Electricity and Magnetism	3 1 0	4
23CHY183	Chemistry Lab II - Instrumental	0 0 2	1
23PHY182	Advanced Computer Programming - using Python Lab	0 0 2	1
23PHY183	Physics Lab I - Mechanics and Properties of Matter	0 0 2	1
22ADM111	Glimpses of Glorious India	2 0 0	2
22CUL100	Yoga(I AM TECH)	0 0 2	2
22AVP103	Mastery Over Mind	1 0 2	2
<b>TOTAL</b>			<b>27</b>

**SEMESTER III**

Code No	Course Title	L T P	Cr
23PHY201	Basic Experimental Techniques in Physics	3 1 0	4
23PHY202	Optics and Wave Motion	3 1 0	4
	Elective A	3 0 0	3
23PHY203	Basic Electronics	3 1 0	4
23PHY204	Introduction to Mathematical Physics	3 1 0	4
23PHY281	Physics Lab II –Heat, Electricity and Magnetism	0 0 2	1
21SSK201	Life Skills I	1 0 2	2
	Amrita Value Programme I	1 0 0	1
<b>TOTAL</b>			<b>23</b>

**SEMESTER IV**

Code No	Course Title	L T P	Cr
21ENV200	Environmental Science and Sustainability	3 0 0	3
23PHY211	Advanced electronics	3 1 0	4
	Elective B	3 0 0	3
23PHY212	Introduction to computational Physics	3 1 0	4
23PHY282	Physics Lab III - Optics	0 0 2	1
23PHY213	Modern Physics	3 1 0	4
21SSK211	Life Skills II	1 0 2	2
	Amrita Value Programme II	1 0 0	1
<b>TOTAL</b>			<b>22</b>

**SEMESTER V**

Code No	Course Title	L T P	Cr
23PHY301	Thermal Physics	3 1 0	4
23PHY302	Electrodynamics	3 1 0	4
23PHY303	Solid State Physics	3 1 0	4
23PHY390	Free/Open Elective* /Living Lab@	3 0 0	3
	Elective C	3 0 0	3
23PHY381	Physics Lab IV – Modern Physics	0 0 2	1
21SSK301	Life Skills III	1 0 2	2
<b>TOTAL</b>			<b>21</b>

**SEMESTER VI**

Code No	Course Title	L T P	Cr
23PHY311	Atomic and Molecular Physics	3 1 0	4
23PHY312	Intermediate Mechanics	3 1 0	4
23PHY313	Modern Optics	3 1 0	4
	Elective D	3 0 0	3
23PHY382	Physics Lab V – Electronics	0 0 2	1
<b>TOTAL</b>			<b>16</b>
23PHY399	Project (for Exit-option students)		6
	<b>TOTAL (for Exit-option students)</b>		<b>22</b>
	<b>TOTAL</b>		<b>132</b>
	For Exit option		138

**SEMESTER VII**

Code No	Course Title	L T P	Cr
23PHY501	Classical Mechanics	3 1 0	4
23PHY502	Quantum Mechanics I	3 1 0	4
23PHY503	Mathematical Physics I	3 1 0	4
23PHY504	Computational Physics	3 1 0	4
23PHY581	Advanced Physics Lab	0 0 6	2
23PHY582	Simulation Lab	0 0 3	1
<b>TOTAL</b>			<b>19</b>

**SEMESTER VIII**

Code No	Course Title	L T P	Cr
23PHY511	Quantum Mechanics II	3 1 0	4
23PHY512	Mathematical Physics II	3 1 0	4
23PHY513	Statistical Mechanics	3 1 0	4
23PHY514	Advanced Electrodynamics	3 1 0	4
23PHY515	Experimental Techniques	3 1 0	4
23PHY583	Advanced Electronics Lab	0 0 6	2
<b>TOTAL</b>			<b>22</b>

**SEMESTER IX**

Code No	Course Title	L T P	Cr
23PHY601	Atomic, Molecular and Optical Physics	3 1 0	4
23PHY602	Condensed Matter Physics	3 1 0	4
23PHY603	Nuclear and Particle Physics	3 1 0	4
	Elective I	3 0 0	3
	Elective II	3 0 0	3
23PHY681	Spectroscopy Lab	0 0 6	2
23PHY691	Mini Project	0 0 3	1
<b>TOTAL</b>			<b>21</b>

**SEMESTER X**

Code No	Course Title	L T P	Cr
23PHY696	Dissertation		18
23PHY697	Viva voce		2
<b>TOTAL</b>			<b>20</b>
	<b>TOTAL for 5 YR Int. MSc</b>		<b>214</b>

**Electives – A, B, C, D**

<b>Course Code</b>	<b>Course Title</b>	<b>L T P</b>	<b>Cr</b>
23PHY331	Medical Physics	3 0 0	3
23PHY332	Introduction to Nanophysics and Applications	3 0 0	3
23PHY333	Biophysics	3 0 0	3
23PHY334	Astronomy	3 0 0	3
23PHY335	Computational Methods for Physicists	3 0 0	3
23PHY336	Concepts of Nanophysics and Nanotechnology	3 0 0	3
23PHY337	Introduction to Photonics	3 0 0	3
23PHY338	Nonlinear Optics	3 0 0	3
23PHY339	Optical Engineering	3 0 0	3
23PHY340	Physics of Semiconductor Devices	3 0 0	3
23PHY341	Principles of Lasers and Laser Applications	3 0 0	3
23PHY342	Laser Theory	3 0 0	3
23PHY343	Laser Applications	3 0 0	3
23CHY331	Batteries and Fuel Cells	3 0 0	3
23CHY332	Forensic science	3 0 0	3
23CHY333	Electrochemistry	3 0 0	3
23CHY334	Applied Electrochemistry	3 0 0	3

**ELECTIVES – I, II**

<b>Course Code</b>	<b>Course Title</b>	<b>L T P</b>	<b>Cr</b>
23PHY631	Astrophysics	3 0 0	3
23PHY632	Biophotonics	3 0 0	3
23PHY633	Earth's Atmosphere	3 0 0	3
23PHY634	Earth's Structure and Evolution	3 0 0	3
23PHY635	Fibre-optic Sensors and Applications	3 0 0	3
23PHY636	Fibre Optics and Technology	3 0 0	3
23PHY637	Nanophotonics	3 0 0	3
23PHY638	Nonlinear Dynamics	3 0 0	3
23PHY639	Nuclear Physics	3 0 0	3
23PHY640	Optoelectronic Devices	3 0 0	3
23PHY641	Physics of Cold Atoms and Ions	3 0 0	3
23PHY642	Quantum Electrodynamics	3 0 0	3
23PHY643	Quantum Optics	3 0 0	3
23PHY644	Thin Film Technology	3 0 0	3
23PHY645	Fundamentals of Plasma Physics	3 0 0	3
23PHY646	Space Physics	3 0 0	3
23PHY647	Ultrafast lasers and Applications	3 0 0	3
23PHY648	Energy and Environment in the 21st century	3 0 0	3
23PHY649	Introduction to solar physics	3 0 0	3
23PHY650	Micro and Nano Magnetism Materials and its Applications	3 0 0	3
23PHY651	X-ray Diffraction and its Applications	3 0 0	3
23PHY652	Solar energy conversion	3 0 0	3
23PHY653	Fabrication of Advanced Solar cell	3 0 0	3
23PHY654	Astrophysics and Cosmology	3 0 0	3
23PHY655	Special Theory of Relativity	3 0 0	3

## Open Electives

Course Code	Course Title	L T P	Cr
21OEL231	Advertising	3 0 0	3
21OEL232	Basic Statistics	3 0 0	3
21OEL233	Citizen Journalism	3 0 0	3
21OEL234	Creative Writing for Beginners	3 0 0	3
21OEL235	Desktop Support and Services	3 0 0	3
21OEL236	Development Journalism	3 0 0	3
21OEL237	Digital Photography	3 0 0	3
21OEL238	Emotional Intelligence	3 0 0	3
21OEL239	Essence of Spiritual Literature	3 0 0	3
21OEL240	Film Theory	3 0 0	3
21OEL241	Fundamentals of Network Administration	3 0 0	3
21OEL242	Gender Studies	3 0 0	3
21OEL243	Glimpses of Indian Economy and Polity	3 0 0	3
21OEL244	Graphics and Web-designing Tools	3 0 0	3
21OEL245	Green Marketing	3 0 0	3
21OEL246	Healthcare and Technology	3 0 0	3
21OEL247	History of English Literature	3 0 0	3
21OEL248	Indian Writing in English	3 0 0	3
21OEL249	Industrial Relations and Labour Welfare	3 0 0	3
21OEL250	Introduction to Ancient Indian Yogic and Vedic Wisdom	3 0 0	3
21OEL251	Introduction to Computer Hardware	3 0 0	3
21OEL252	Introduction to Event Management	3 0 0	3
21OEL253	Introduction to Media	3 0 0	3
21OEL254	Introduction to Right to Information Act	3 0 0	3
21OEL255	Introduction to Translation	3 0 0	3
21OEL256	Linguistic Abilities	3 0 0	3
21OEL257	Literary Criticism and Theory	3 0 0	3
21OEL258	Macro Economics	3 0 0	3
21OEL259	Managing Failure	3 0 0	3
21OEL260	Media Management	3 0 0	3
21OEL261	Micro Economics	3 0 0	3
21OEL262	Micro Finance, Small Group Management and Cooperatives	3 0 0	3
21OEL263	Negotiation and Counselling	3 0 0	3
21OEL264	New Literatures	3 0 0	3
21OEL265	Non-Profit Organisation	3 0 0	3
21OEL266	Personal Effectiveness	3 0 0	3
21OEL267	Perspectives in Astrophysics and Cosmology	3 0 0	3
21OEL268	Principles of Marketing	3 0 0	3
21OEL269	Principles of Public Relations	3 0 0	3
21OEL270	Science, Society and Culture	3 0 0	3
21OEL271	Statistical Analysis	3 0 0	3
21OEL272	Teamwork and Collaboration	3 0 0	3
21OEL273	The Message of Bhagwad Gita	3 0 0	3
21OEL274	Understanding Travel and Tourism	3 0 0	3
21OEL275	Videography	3 0 0	3

21OEL276	Vistas of English Literature	3 0 0	3
21OEL277	Web-Designing Techniques	3 0 0	3
21OEL278	Organic Farming	3 0 0	3
21OEL279	Basic Legal Awareness on Protection of Women and Rights	3 0 0	3
21OEL280	Ritual Performances of Kerala	3 0 0	3
21OEL281	Documenting Social Issues	3 0 0	3
21OEL282	Fabrication of Advanced Solar Cell	3 0 0	3
21OEL283	Basic Concepts of X-ray Diffraction	3 0 0	3
21OEL284	Introduction to FORTRAN and GNU PLOT	3 0 0	3
21OEL285	Introduction to Porous Materials	3 0 0	3
21OEL286	Forensic Science	3 0 0	3
21OEL287	Introduction to solar Physics	3 0 0	3
21OEL288	Recycling Recovery and Treatment Methods for Wastes	3 0 0	3
21OEL289	Acting and Dramatic Presentation	2 0 2	3
21OEL290	Computerised Accounting	2 0 2	3
21OEL291	Kerala Mural Art and Painting	2 0 2	3
21OEL292	Painting	2 0 2	3
21OEL293	Reporting Rural Issues	3 0 0	3
21OEL294	A Study of Traditional Indian Paintings	1 0 2	3
21OEL297	History And Philosophy of Science	3 0 0	3
21OEL298	Eu History of Science and Technology	4 0 0	3

## LANGUAGES

### Paper I

Course Code	Course Title	L T P	Cr	ES
21HIN101	Hindi I	1 0 2	2	B
21KAN101	Kannada I	1 0 2	2	B
21MAL101	Malayalam I	1 0 2	2	B
21SAN101	Sanskrit I	1 0 2	2	B
21TAM101	Tamil I	1 0 2	2	B

### Paper II

Course Code	Course Title	L T P	Cr	ES
21HIN111	Hindi II	1 0 2	2	B
21KAN111	Kannada II	1 0 2	2	B
21MAL111	Malayalam II	1 0 2	2	B
21SAN111	Sanskrit II	1 0 2	2	B
21TAM111	Tamil II	1 0 2	2	B

\* **Two Open Elective** courses are to be taken by each student, one each at the **4th and the 5th** semesters, from the list of Open electives offered by the School.

@ Students undertaking and registering for a Live-in-Lab project, can be exempted from registering for an Open Elective course in the fifth semester.

### **Evaluation Pattern**

#### **50:50 (Internal: External) (All Theory Courses)**

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

#### **80:20 (Internal: External) (Lab courses and Lab based Courses having 1 Theory hour)**

Assessment	Internal	External
*Continuous Assessment (CA)	80	
End Semester		20

#### **70:30(Internal: External) (Lab based courses having 2 Theory hours/ Theory and Tutorial)**

##### **Theory- 60 Marks; Lab- 40 Marks**

Assessment	Internal	External
Periodical 1	10	
Periodical 2	10	
*Continuous Assessment (Theory) (CAT)	10	
Continuous Assessment (Lab) (CAL)	40	
End Semester		30



**65:35 (Internal: External) (Lab based courses having 3 Theory hours/ Theory and Tutorial)**

**Theory- 70 Marks; Lab- 30 Marks**

Assessment	Internal	External
Periodical 1	10	
Periodical 2	10	
*Continuous Assessment (Theory) (CAT)	15	
Continuous Assessment (Lab) (CAL)	30	
End Semester		35

\*CA – Can be Quizzes, Assignment, Projects, and Reports

Letter Grade	Grade Point	Grade Description
O	10.00	Outstanding
A+	9.50	Excellent
A	9.00	Very Good
B+	8.00	Good
B	7.00	Above Average
C	6.00	Average
P	5.00	Pass
F	0.00	Fail

Grades O to P indicate successful completion of the course

$$CGPA = \frac{\sum(C_i \times Gr_i)}{\sum C_i}$$

Where

$C_i$  = Credit for the  $i^{\text{th}}$  course in any semester  $Gr_i$  = Grade point for the  $i^{\text{th}}$  course

Cr. = Credits for the Course Gr. =  
GradeObtained