

SYLLABUS

For

M. Sc.

in

PHYSICS



(Effective from the academic session 2020 – 2022 and onwards)

DEPARTMENT OF PHYSICS

THE UNIVERSITY OF BURDWAN

THE UNIVERSITY OF BURDWAN
SYLLABUS FOR
EFFECTIVE FROM 2020 – 2022 SESSION



Course Structure in Physics

1 credit = 1 hour/week for theory; 2 hours/week for practical

Duration of examination for a course of 4 credits will be 2 hours for theory papers and 4 hours for practical papers.

SEMESTER – I (TOTAL MARKS 300) (CREDIT 24)

Course				Marks			Credit
Course code	Type	T/P	Name	I.A	E.T	Total	
MSPH101	Core	T	Mathematical Methods	10	40	50	4
MSPH102	Core	T	Classical Mechanics, General Relativity & Astrophysics	10	20 20	50	4
MSPH103	Core	T	Quantum Mechanics	10	40	50	4
MSPH104	Core	T	Classical Electrodynamics	10	40	50	4
MSPH105	Core	P	Practical-I	10	40	50	4
MSPH106	Core	P	Practical-II	10	40	50	4
				Total credit			24

I.A.: Internal Assessment, E.T.: End Term

SEMESTER – II (TOTAL MARKS 300) (CREDIT 24)

Course				Marks			Credit
Course code	Type	T/P	Name	I.A	E.T	Total	
MSPH201	Core	T	Atomic Spectroscopy & Laser physics	10	20 20	50	4
MSPH202	Core	T	Solid State Physics	10	40	50	4
MSPH203	Core	T	Nuclear & Particle Physics	10	40	50	4
MSPH204	Core	T	Electronics	10	40	50	4
MSPH205	Core	P	Practical-I	10	40	50	4
MSPH206	Core	P	Practical-II	10	40	50	4
				Total credit			24

SEMESTER – III (TOTAL MARKS 300) (CREDIT 24)

Course				Marks			Credit
Course code	Type	T/P	Name	I.A	E.T	Total	
MSPH301	Core	T	Statistical Mechanics	10	40	50	4
MSPH302	Core	T	Group Theory & Nonlinear dynamics	10	20 20	50	4
MSPH303	Core	P	Advanced General Practical	10	40	50	4
MSPH304 Or MSWM304	GE	T	MSPH304: Condensed Matter & Nano Physics MSWM304: May be opted from SWAYAM	5	20	25	2
MSPH305	DE	T	MSPH305-1: Advanced Electronics-I MSPH305-2: Laser Physics-I MSPH305-3: Materials Science-I MSPH305-4: Condensed Matter Physics-I MSPH305-5: Nuclear & Particle Physics-I MSPH305-6: Astrophysics & Cosmology-I	10	40	50	4
MSPH306	DE	T	MSPH306-1: Applied Electronics MSPH306-2: Advanced Solid State Physics MSPH306-3: Materials Physics MSPH306-4: Selected Topics in Nuclear & Particle Physics MSPH306-5: Lasers and Laser Spectroscopy MSPH306-6: Special Topics in General Relativity and Astrophysics MSPH306-7: Relativistic Quantum Mechanics & Quantum Field Theory MSPH306-8: May be opted from SWAYAM	10	40	50	4
MSPH307	Core	P	Community Engagement Activities (CE)	5	20	25	2
				Total credit			24

DE: Discipline-centric Elective; GE: Generic Elective

STUDENTS HAVE TO CHOOSE EITHER ‘ADVANCED ELECTRONICS-I’ OR ‘LASER PHYSICS-I’ OR ‘MATERIALS SCIENCE-I’ OR ‘CONDENSED MATTER PHYSICS-I’ OR ‘NUCLEAR & PARTICLE PHYSICS-I’ OR ‘ASTROPHYSICS & COSMOLOGY-I’ IN MSPH305

The following are the options for students for MSPH306 As per their choice in MSPH305:

Opted as DE (MSPH305)	DO NOT OPT FOR
Advanced Electronics-I	MSPH306-1: Applied Electronics
Laser Physics-I	MSPH306-5: Lasers & Laser Spectroscopy
Materials Science-I	MSPH306-3: Materials Physics
Condensed Matter Physics-I	MSPH306-2: Advanced Solid State Physics
Nuclear & Particle Physics-I	MSPH306-4: Selected Topics in Nuclear & Particle Physics
Astrophysics & Cosmology-I	MSPH306-6: Special topics in General Relativity and Astrophysics

SEMESTER – IV (TOTAL MARKS 300) (CREDIT 24)

Course				Marks			Credit
Course code	Type	T/P	Name	I.A	E.T	Total	
MSPH401	Core	T	Molecular Spectroscopy	10	40	50	4
MSPH402	Core	T	Advanced Quantum Mechanics & Computational Physics	10	20 20	50	4
MSPH403	Core	P	Advanced General Practical	10	40	50	4
MSPH404	DE	T	MSPH404-1: Advanced Electronics-II MSPH404-2: Laser Physics-II MSPH404-3: Materials Science-II MSPH404-4: Condensed Matter Physics-II MSPH404-5: Nuclear & Particle Physics-II MSPH404-6: Astrophysics & Cosmology-II	10	40	50	4
MSPH405	DE	T	MSPH405-1: Advanced Electronics-III MSPH405-2: Laser Physics-III MSPH405-3: Materials Science-III MSPH405-4: Condensed Matter Physics-III MSPH405-5: Nuclear & Particle Physics-III MSPH405-6: Astrophysics & Cosmology-III	10	40	50	4
MSPH406	Core	P	Term paper/ Project	10	40	50	4
				Total credit			24

The following are the options for students for Discipline-centric Electives in Semester-IV as per their choice in Semester-III:

Opted in Semester-III	Option to be offered in Semester-IV
Advanced Electronics-I	Advanced Electronics-II & Advanced Electronics-III
Laser Physics-I	Laser Physics-II & Laser Physics-III
Materials Science-I	Materials Science-II & Materials Science-III
Condensed Matter Physics-I	Condensed Matter Physics-II & Condensed Matter Physics-III
Nuclear & Particle Physics-I	Nuclear & Particle Physics-II & Nuclear & Particle Physics-III
Astrophysics & Cosmology-I	Astrophysics & Cosmology-II & Astrophysics & Cosmology-III

6. A. K. Raychaudhuri, S. Banerji and A. Banerjee General Relativity, Astrophysics and Cosmology – (Springer-Verla, 1992)
7. J. V. Narlikar –Introduction to Cosmology (Cambridge Univ, Press, 2003).
8. S. Weinberg- Gravitation and Cosmology: Principles and Applications of the General Theory of Relativity (Wiley, 1972).
9. V. B. Bhatia - Textbook of astronomy and astrophysics with elements of cosmology, Narosa publishing house, (2001).
10. E. W. Kolb and M. S. Turner - The Early Universe –(Addison-Wesley Reading, 1990)

LEARNING OUTCOMES

Astrophysics & Cosmology-III is a Discipline-centric Elective (DE) course in Semester-IV. The students who have opted this course have to study advanced topics on Cosmology and its application to understand the physics of large scale universe specially, expanding universe, standard model of universe, early history of the universe as well as observational aspects of the cosmology. The students can develop their concept and basic understanding from the course and make their mind set to fit with the global competitiveness such that one can go for higher doctoral study.

Paper: MPHYS0406

Project/Term Paper

The project work or term paper in experimental/theoretical area should be designed in such a way that it acts as a bridge between pass out PG students and PhD incumbents.

LEARNING OUTCOME

From various experimental/theoretical term papers in different disciplines, the students will gain experience in research. They will understand the research methodology and will help them in their future research career.