Curriculum and Credit Framework

for

Undergraduate Programmes in Physics with Multiple Entry and Multiple Exit

As per NEP-2020

Syllabus for
Four Year Undergraduate Programme (FYUGP)
B.Sc. Hons/B.Sc. Hons with Research
in
PHYSICS
W.E.F. 2025-2026



Department of Physics

Gurukula Kangri (Deemed to be University)
Haridwar-249 404 (Uttarakhand)

Gurukula Kangri (Deemed to be University), Haridwar

Four Year Undergraduate Programme B.Sc. Hons/ B.Sc. Hons with Research (Physics)

Program Structure (w.e.f. 2025-26)

Year	Semester	Course	Title of the Course	L	T	P	Total Credits
Year 01	1 Sem.	**BPH25 - MJ101**	Mechanics and Properties of Matter	3	-	-	3
		BPH25 - MJ151	Lab Course –Mechanics and Properties of Matter	-	-	1	1
		BPH25 - MI101	Mechanics and Properties of Matter	3	-	-	3
		VOC-1	Vocational -1 **(as part of the minor)***				4
		BPH25 - MI151	Lab Course –Mechanics and Properties of Matter	-	-	1	1
		BPH25 – MD101	Evolution of Science (for disciplines other than Physics)	3	-	-	3
		AEC - 1	English				4
		VAC - 1	Digital and Technological Solutions				2
		VAC - 2	Professional Ethics and Gender Studies	-	-	-	2
		BPH25 - SE101/ BPH25 - SE102	Electrical circuits and Network Skills / Electrical Wiring and Maintenance	1	-	-	1
		BPH25 - SE151/ BPH25 - SE152	Lab Course – Electrical circuits and Network Skills / Lab Course- Electrical Wiring and Maintenance	-	-	2	2
			Total of Semester 1				**22**
	2nd Sem.	**BPH25 – MJ201**	Electricity and Magnetism	3	-	-	3
		BPH25 – MJ251	Lab Course -Electricity and Magnetism	-	-	1	1
		BPH25 – MI201	Electricity and Magnetism	3	-	-	3
		BPH25 – MI251	Lab Course -Electricity and Magnetism	-	-	1	1
		VOC-2	Vocational -2 **(as part of the minor)***				4
		BPH25 – MD201	Materials Today (for disciplines other than Physics)	3	-	-	3
		AEC - 2	MIL (Hindi/Sanskrit)				4
		VAC - 3	Understanding India/Online course				2
		VAC - 4	Environmental Science/Online course				2
		BPH25 – SE201	Basic Instrumentation Skills	1	-	-	1
		BPH25 – SE251	Lab Course – Basic Instrumentation Skills	-	-	2	2
			Total of Semester 2				**22**
	Grand Total (Semester 1 and 2)						**44**

Students on exit shall be awarded Undergraduate Certificate (in Physics) after securing the requisite 44 credits in Sem. 1 and 2 provided they secure 4 credits in work based vocational courses (as part of the minor) offered during summer term or internship/ apprenticeship in addition to 6 credits from skill based courses earned during 1st and 2nd Semester

***can be chosen as part of the minor**

Year	Semester	Course	Title of the Course	L	T	P	Total Credits
Year 02	3rd Sem.	**BPH25 – MJ301**	Waves and Optics	4	-	-	4
		BPH25 – MJ351	Lab Course- Waves and Optics	-	-	4	4
		BPH25 – MI301	Waves and Optics	4	-		4
		VOC-3	Vocational -3 **(as part of the minor)***				4
		BPH25 – MD301/ BPH25 – MD302	The Universe / Atmosphere of the Earth	3	-	-	3
		VAC - 5	Health & Wellness, Yoga Education, Sports, and Fitness				2
		BPH25 – SE301/ BPH25 – SE302	Computational Physics Skills / Renewable Energy and Energy harvesting	1		-	1
		BPH25 – SE351/ BPH25 – SE352	Computational Physics Skills / Renewable Energy and Energy harvesting	-		2	2
		VAC – 6/ BPHOC–VA301	Panchmahayajna/ Online course				2
			Total of Semester 3				**22**
	4th Sem.	**BPH25 – MJ401**	Mathematical Physics-I	4	-	-	4
		BPH25 – MJ402	Thermal Physics	4	-	-	4
		BPH25 – MJ403	Elements of Modern Physics	4	-	-	4
		BPH25 – MJ452	Lab Course – Thermal Physics & Modern Physics	-	-	4	4
		BPH25 – MI451	Lab Course – Waves and Optics		-	4	4
		BPH25 –CE471	Community engagement (NCC/NSS/Adult Education/Student mentoring/NGO/Govt. institutions, etc.) **OR**				2
		BPHOC–MJ401	Online course **OR**				
		BPH25–IN471	Internship				
			Total of Semester 4				**22**
	Grand Total (Semester 1 to 4)						**88**
Students on exit shall be awarded Undergraduate Diploma (in Physics) after securing the requisite 88 credits on completion of Sem. 4 provided they secure additional 4 credit in skill based vocational course (as part of the minor) offered during 1st year or 2nd year summer term or internship/ apprenticeship in addition to 6 credits from skill based courses earned during 1st and 2nd Semester.							
Year 03	5th Sem.	**BPH25 – MJ501**	Computational Physics and Programming	4	-	-	4
		BPH25 – MJ502	Quantum Mechanics-I	4	-	-	4
		BPH25 – MJ503	Statistical Mechanics	4	-	-	4
		BPH25 – MI501	Thermal Physics	4	-	-	4
		BPH25 – MJ551	Lab Course- Computational Physics and Programming	-	-	4	4
		BPH25–IN571	Internship				2
			Total of Semester 5				**22**
	6th Sem.	**BPH25 – MJ601**	Electromagnetic Theory	4	-	-	4
		BPH25 – MJ602	Solid State Physics	4	-	-	4
		BPH25 – MJ603	General Electronics	4	-	-	4
		BPH25 – MJ653	Lab Course – General Electronics	-	-	4	4
		BPH25 – MI651	Lab Course – Thermal Physics & Modern Physics	-	-	4	4
		BPH25–PR671	**Minor** Project **OR**				2
		BPHOC–MJ601	Online Course				
			Total of Semester 6				**22**
	Grand Total (Semester 1 to 6)						**132**
Students on exit shall be awarded B.Sc. (Physics) after securing the requisite 132 credits on completion of Semester 6.							

Year	Semester	Course	Title of the Course	L	T	P	Total Credits
Year 4	7th Sem.	**BPH25 – MJ701**	Advanced Mathematical Physics	4	-	-	4
		BPH25 – MJ702	Classical Mechanics	4	-	-	4
		BPH25 – MJ703	Quantum Mechanics-II	4	-	-	4
		BPH25 – MJ704	Physics and Vedic Thought	2	-	-	2
		BPH25 – MJ751	Lab Course - Advanced Physics-I	-	-	4	4
		BPH25 – MI701	Elements of Modern Physics	4	-	-	4
			Total of Semester 7				**22**
	8th Sem.	**BPH25 – MJ801**	Electronic Devices and Circuits	4			4
		BPH25 – MJ802	Minor Research Project (Development of Research proposal, Review of related literature) **OR**				2
		BPHOC–MJ802	Online course				
		BPH25 – MJ851	Lab Course – Electronic Devices and Circuits (with Minor Project on Circuit Design)	-	-	4	4
		BPH25 – MI801	Solid State Physics	4	-	-	4
		DSE-I Courses (Select Any One)					
		BPH25 – DE811	Nuclear and Particle Physics	4	-	-	4
		BPH25 – DE812	Plasma Physics	4	-	-	4
		BPH25 – DE813	Physics of Devices and Instruments	4	-	-	4
		DSE-II Courses (Select Any One)					
		BPH25 – DE821	Astronomy and Astrophysics	4	-	-	4
		BPH25 – DE822	Nanomaterials and Applications	4	-	-	4
		BPH25 – DE823	Physics of The Earth	4	-	-	4
			Total of Semester 8				**22**
	Grand Total (Semester 1 to 8)						**176**
Students on exit shall be awarded B.Sc. Hons (Physics) (4 years) after securing the requisite 176 credits on completion of Sem. 8.							
Year 4	7th Sem.	**BPH25 – MJ701**	Advanced Mathematical Physics	4	-	-	4
		BPH25 – MJ702	Classical Mechanics	4	-	-	4
		BPH25 – MJ703	Quantum Mechanics-II	4	-	-	4
		BPH25 – MJ704	Physics and Vedic Thought	2	-	-	2
		BPHOC – MJ761	Research Ethics and Methodology (Online Course)				2
		BPH25 – MI701	Elements of Modern Physics	4	-	-	4
		BPH25 – MJ752	Lab Course - Advanced Physics-II	-	-	2	2
			Total of Semester 7				**22**
	8th Sem.	**BPH25 – MJ801/** BPHOC-MJ801	Electronic Devices and Circuits/ Online Course	4		-	4
		BPH25 – MJ852/ BPHOC-MJ802	Lab Course- Electronic Devices and Circuits/ Online Course	-	-	2	2
		BPH25 – MI801/ BPHOC-MI801	Solid State Physics / Online Course	4	-	-	4
		BPH25 – DI871	Dissertation (Collection of Data, Analysis and Preparation of Report)				12
			Total of Semester 8				**22**
	Grand Total (Semester 1 to 8)						**176**
Students on exit shall be awarded B.Sc. Hons (Physics)/ B.Sc. Honours with Research (4 years) after securing the requisite 176 credits on completion of Sem. 8							

Note: Minimum one course of 2 credits per year or 6 credits (for 3 years UG) / 8 credits for 4 year UG Programme shall be opted by a student through SWAYAM platform.

Abbreviations used:

MJ = Major Course

1. MI= Minor Course
2. MD/GE = Multidisciplinary Course/ Generic Elective Course
3. AE = Ability Enhancement Course
4. SE = Skill Enhancement Course
5. VA = Value Added Course
6. VC= Vocational Course
7. VAD= Value Added Course
8. DS = Discipline Specific Elective
9. OC= Online Course
10. DI= Dissertation
11. PR= Project
12. LO = Learning Outcome
13. L = Lectures
14. T = Theory Class
15. P = Practical Class
16. H = Hours

List of Major Courses:

Semester	Course Code	Course Title	Credit
I	BPH25-MJ101	Mechanics and Properties of Matter	3
	BPH25-MJ151	**Lab Course-Mechanics and Properties of Matter**	1
II	BPH25-MJ201	Electricity and Magnetism	3
	BPH25-MJ251	**Lab Course- Electricity and Magnetism**	1
III	BPH25-MJ301	Waves and Optics	4
	BPH25-MJ351	**Lab Course- Waves and Optics**	4
IV	BPH25-MJ401	Mathematical Physics I	4
	BPH25-MJ402	Thermal Physics	4
	BPH25-MJ403	Elements of Modern Physics	4
	BPH25-MJ452	**Lab Course- Thermal Physics & Modern Physics**	4
V	BPH25-MJ501	Computational Physics and Programming	4
	BPH25-MJ502	Quantum Mechanics-I	4
	BPH25-MJ503	Statistical Mechanics	4
	BPH25-MJ551	**Lab Course- Computational Physics and Programming**	4
VI	BPH25-MJ601	Electromagnetic Theory	4
	BPH25-MJ602	Solid State Physics-I	4
	BPH25-MJ603	General Electronics	4
	BPH25-MJ653	**Lab Course- General Electronics**	4
VII	BPH25-MJ701	Advanced Mathematical Physics	4
	BPH25-MJ702	Classical Mechanics	4
	BPH25-MJ703	Quantum Mechanics-II	4
	BPH25-MJ751	**Lab Course- Advanced Physics-I**	4
	BPH25-MJ752	**Lab Course- Advanced Physics-II**	
	BPH25-MJ801	Electronic Devices and Circuits	4
	BPH25-MJ851	**Lab Course-** Electronic and Circuits Method with Minor Project	4
	BPH25-MJ852	**Lab Course-** Electronic Devices and Circuits without Minor Project	2

List of Skill Enhancement Courses (SEC):

Semester	Course Code	Course Title	Credit
Anyone to be chosen			
I	**BPH25 - SE101**	Electrical Circuits and Network Skills	3
	BPH25 - SE102	Electrical Wiring and Maintenance	3
II	**BPH25 – SE201**	Basic Instrumentation Skills	3
Anyone to be chosen			
III	**BPH25 – SE301**	Computational Physics Skills	3
	BPH25 – SE302	Renewable Energy and Energy Harvesting	3

List of Multidisciplinary/Generic Elective Courses (MD/GE):

Semester	Course Code	Course Title	Credit
Anyone to be chosen			
I SEM.	**BPH25 – MD101**	Evolution of Science	3
	BPH25 – MD102	Introduction to Communication Technology	3
Anyone to be chosen			
II SEM.	**BPH25 – MD201**	Materials Today	3
	BPH25 – MD202	Digital and Space Technologies	3
Anyone to be chosen			
III SEM.	**BPH25 – MD301**	The Universe	3
	BPH25 – MD302	Atmosphere of the Earth and Climate Change	3

List of Minor Courses (MI):

Semester	Course Code	Course Title	Credit
I SEM.	**BPH25-MI101** **BPH25-MI151**	**Mechanics and Properties of Matter** **Lab Course-Mechanics and Properties of Matter**	3 1
II SEM.	**BPH25-MI201** **BPH25-MI251**	Electricity and Magnetism **Lab Course-** Electricity and Magnetism	3 1
III SEM.	**BPH25-MI301**	Waves and Optics	4
IV SEM.	**BPH25-MI451**	**Lab Course-**Waves and Optics	4
V SEM.	**BPH25-MI501**	Thermal Physics	4
VI SEM.	**BPH25-MI651**	**Lab Course--** Thermal Physics	4
VII SEM.	**BPH25-MI701**	Elements of Modern Physics	4
VIII SEM.	**BPH25-MI801**	Solid State Physics	4

List of Discipline Specific Elective (DSE) Major Courses:

Semester	Course Code	Course Title	Credit
VIII SEM.	**Group I** (In lieu of Dissertation, any one to be chosen**)**		
	BPH25 – DE811	Nuclear and Particle Physics	4
	BPH25 – DE812	Plasma Physics	4
	BPH25 – DE813	Physics of Devices and Instruments	4
	Group II (In lieu of Dissertation, any one to be chosen**)**		
	BPH25 – DE821	Astronomy and Astrophysics	4
	BPH25 – DE822	Nanomaterials and Applications	4
	BPH25 – DE823	Physics of The Earth	4

List of Major/ Core Courses:

1. MJ - 1: Mechanics and Properties of Matter
2. MJ - 2: Electricity and Magnetism
3. MJ - 3: Waves and Optics
4. MJ - 4: Lab Course - Waves and Optics
5. MJ - 5: Mathematical Physics
6. MJ - 6: Thermal Physics
7. MJ - 7: Elements of Modern Physics
8. MJ - 8: Lab Course - Thermal Physics & Modern Physics
9. MJ - 9: Computational Physics and Programming
10. MJ - 10: Quantum Mechanics-I
11. MJ - 11: Statistical Mechanics
12. MJ - 12: Lab Course- Computational Physics and Programming
13. MJ - 13: Electromagnetic Theory
14. MJ - 14: Solid State Physics
15. MJ - 15: General Electronics
16. MJ - 16: Lab Course - General Electronics
17. MJ - 17: Advanced Mathematical Physics
18. MJ - 18: Classical Mechanics
19. MJ - 19: Lab Course –Advanced Physics
20. MJ - 20: Electronic Devices and Circuits
21. MJ - 21: Quantum Mechanics-II
22. MJ - 22: Atomic and Molecular Physics
23. MJ - 23: Lab Course –Electronic Devices and Circuits

List of Multidisciplinary (MD)/Generic Elective (GE) Courses:

1. MD - 1: Evolution of Science/ Introduction to Communication Technology
2. MD - 2: Materials Today/ Digital and Space Technologies
3. MD - 3: The Universe / Atmosphere of the Earth and Climate Change

List of Skill Enhancement Courses (SEC):

1. SE - 1: Electrical circuits and Network Skills / Electrical Wiring and Maintenance
2. SE - 2: Basic Instrumentation Skills/ Computational Physics Skills
3. SE - 3: Computational Physics Skills / Renewable Energy and Energy harvesting

List of Minor Courses:

1. MI - 1: Vocational -1/ Mechanics and Properties of Matter
2. MI - 2: Vocational -2 / Electricity and Magnetism
3. MI - 3: Vocational -3/ Waves and Optics
4. MI - 4: Lab. Course: Waves and Optics
5. MI - 5: Thermal Physics
6. MI - 6: Lab Course: Thermal Physics
7. MI - 7: Elements of Modern Physics
8. MI - 8: Solid State Physics

Scheme of the Practical Examination

Instructions:

i. Minimum experiments as per syllabus should be done (otherwise the student will not be allowed to sit for the semester examination)

ii. Knowledge of the experiment: Student knowledge is judged based on the performance of the handling equipment & recognizing suitable devices used in the experiment. Questions must be asked to test basic knowledge of concerned experiment only.

Marks allotment for practical (Semester Exam)

Item	**Allotment of Marks s**	**Allotment of Marks**
Objective	4	2
Formula	4	2
Diagram/circuit, Experimental set up	8	4
Observations	10	5
Calculations	05	03
Result & Accuracy	4	2
Viva- Voce and Knowledge of the experiment	20	10
Practical Record	5	2
Total	**60**	**30**

Suggested Continuous Evaluation Methods (MM-40):

Continuous internal evaluation shall be based on attendance of student in Lab and presentation of practical in the record file. The marks shall be as follows (proportionate marks for MM 20):

Record File- M.M.-15 marks (02 Marks for each Practical); Viva-voce based on each practical-15 Marks

Attendance-M.M. 10 Marks for 75% and more than 75% attendance, no marks shall be given below 75.

NOTE: Evaluation sheet shall be prepared for each student for record:

Exp.N0.	Date of Allotment	Evaluation Date of Checked	Marks in Vivo-voce	Marks for practical record	Name of teacher	Signature

Distribution of marks for Dissertation Major Project/Minor Project/Communication engagement @ shall be as follows:

S.N.	**Item**	**Max. Marks**	**Max. Marks**
1	Report Evaluation/Project Design	40	20
2	Viva-voce/Presentation	20	10
3	Seminar (Internal)*	20	10
4	Diary (Periodic Assessment)**	20	10
	Total	**100**	**50**

Note:

1. Marks in the Project/ Dissertation shall be awarded jointly by the external and internal examiners after viva-voce examination.
2. *There shall be a seminar on dissertation/project work of the candidate to be evaluated by a Departmental Committee chaired by H.O.D.

3.**The supervisor will assess the student's work periodically and the marks shall be awarded for diary.

4. @ For Major/Minor Project/Proportion Marks shall be given Communication engagement.