# Chaudhary Ranbir Singh University, Jind

(Established by the State Legislature Act 28 of 2014 and recognised U/S 2f & 12-B by UGC Act 1956)

## Scheme of Examination

**For**

## Post Graduate Programme

## M.Sc. PHYSICS

**as per NEP 2020**
**Curriculum and Credit Framework for Postgraduate Programme**

**With Multiple Entry-Exit, Internship and CBCS-LOCF**
**With effect from the session 2024-25 (in phased manner)**

DEPARTMENT OF PHYSICS

CHAUDHARY RANBIR SINGH UNIVERSITY, JIND
HARYANA, INDIA

## Programme Learning Outcomes (PLOs) for PG Programmes as per NEP-2020

| PLOs | Master Degree in Physics |
|---|---|
| | **After the completion of Master degree in Physics the student will be able to:** |
| PLO-1: Knowledge and Understanding | Demonstrate the fundamental and advanced knowledge of the subject and understanding of recent developments and issues, including methods and techniques, related to the Physics. |
| PLO-2: General Skills | Acquire the general skills required for performing and accomplishing the tasks as expected to be done by a skilled professional in the fields of Physics. |
| PLO-3: Technical/ Professional Skills | Demonstrate the learning of advanced cognitive technical/professional skills required for completing the specialized tasks related to the profession and for conducting and analyzing the relevant research tasks in different domains of the Physics. |
| PLO-4: Communication Skills | Effectively communicate the attained skills of the Physics in well-structured and productive manner to the society at large. |
| PLO-5: Application of Knowledge and Skills | Apply the acquired knowledge and skills to the problems in the subject area, and to identify and analyze the issues where the attained knowledge and skills can be applied by carrying out research investigations to formulate evidence-based solutions to complex and unpredictable problems associated with the field of Physics or otherwise. |
| PLO-6: Critical thinking and Research Aptitude | Attain the capability of critical thinking in intra/inter-disciplinary areas of the Physics enabling to formulate, synthesize, and articulate issues for designing of research proposals, testing hypotheses, and drawing inferences based on the analysis. |
| PLO-7: Constitutional, Humanistic, Moral Values and Ethics | Know constitutional, humanistic, moral and ethical values, and intellectual property rights to become a scholar/professional with ingrained values in expanding knowledge for the society, and to avoid unethical practices such as fabrication, falsification or misrepresentation of data or committing plagiarism. |
| PLO-8: Capabilities/qualities and mindset | To exercise personal responsibility for the outputs of own work as well as of group/team and for managing complex and challenging work(s) that requires new/strategic approaches. |
| PLO-9: Employability and job-ready skills | Attain the knowledge and skills required for increasing employment potential, adapting to the future work and responding to the rapidly changing demands of the employers/industry/society with time. |

# Chaudhary Ranbir Singh University, Jind

**Scheme of Examination for Postgraduate Programme (MSc. PHYSICS)**
**as per NEP 2020 Curriculum and Credit Framework for Postgraduate Programmes**
**(CBCS LOCF) with effect from the session 2024-25 (in phased manner)**
**Framework-2**
**Scheme-P**

| Semester | Course Type | Course Code | Nomenclature of course | Theory (T)/ Practical (P) | Credits | | Contact hours per week L: Lecture P: Practical T: Tutorial | | | | Internal Assessment Marks | End Term Examination Marks | Total Marks | Examination hours |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Total | L | T | P | Total | | | | |
| 1 | CC-1 | 24-PHY-101 | Mathematical Physics | T | 4 | 26 | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | CC-2 | 24-PHY-102 | Classical Mechanics | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | CC-3 | 24-PHY-103 | Quantum Mechanics -I | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | CC-4 | 24-PHY-104 | Electronic - I | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | PC-1 | 24-PHY-105 | Practical: General Physics -I | P | 4 | | 0 | 0 | 8 | 8 | 30 | 70 | 100 | 4 |
| | PC-2 | 24-PHY-106 | Practical: Electronics -I | P | 4 | | 0 | 0 | 8 | 8 | 30 | 70 | 100 | 4 |
| | SEMINAR | 24-PHY-107 | Seminar | S | 2 | | 0 | 0 | 0 | 2 | 0 | 50 | 50 | 1 |
| 2 | CC-5 | 24-PHY-201 | Nuclear and Particle Physics | T | 4 | 26 | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | CC-6 | 24-PHY-202 | Solid State Physics | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |

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| | CC-7 | 24-PHY-203 | Quantum Mechanics -II | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | CC-8 | 24-PHY-204 | Electronic -II | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | PC-3 | 24-PHY-205 | Practical: General Physics -II | P | 4 | | 0 | 0 | 8 | 8 | 30 | 70 | 100 | 4 |
| | PC-4 | 24-PHY-206 | Practical: Electronics -II | P | 4 | | 0 | 0 | 8 | 8 | 30 | 70 | 100 | 4 |
| | CHM | 24-CHM-201 | Constitutional, Human and Moral Values, and IPR | T | 2 | | 2 | 0 | 0 | 2 | 15 | 35 | 50 | 3 |
| | Internship | 24-INT-200 | An internship course of 4 Credits of 4-6 weeks duration during summer vacation after II$^{nd}$ semester is to be completed by every student. Internship can be either for enhancing the employability or for developing the research aptitude. | | | | | | | | 50 | 50 | 100 | |
| 3 | CC-9 | 24-PHY-301 | Electrodynamics and Wave Propagation | T | 4 | 26 | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | CC-10 | 24-PHY-302 | Statistical Mechanics | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | DEC-1$^{\$}$ *(One Course is to be opted out of 24-PHY-303 to 24-PHY-304)* | 24-PHY-303 | Radiation Physics-I | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | | 24-PHY-304 | Nuclear physics-I | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | DEC-2$^{\$}$ *(One Course is to be opted out of 24-PHY-305* | 24-PHY-305 | Computational Physics-I | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | | 24-PHY-306 | Material Science-I | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *to 24-PHY-306)* | | | | | | | | | | | | | | |
| | PC-5 | 24-PHY-307 | Practical: Material Science-I<br>Or<br>Practical: Computational Physics-I | P | 4 | | 0 | 0 | 8 | 8 | 30 | 70 | 100 | 4 |
| | PC-6 | 24-PHY-308 | Practical: Radiation Physics-I<br>Or<br>Practical: Nuclear Physics-I | P | 4 | | 0 | 0 | 8 | 8 | 30 | 70 | 100 | 4 |
| | OEC | 24-OEC-339 | Sources of Energy | T | 2 | | 2 | 0 | 0 | 2 | 15 | 35 | 50 | 3 |
| 4 | CC-11 | 24-PHY-401 | Physics of Nano-materials | T | 4 | 26 | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | CC-12 | 24-PHY-402 | Atomic and Molecular Physics | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | DEC-3 *(One Course is to be opted out of 24-PHY-403 to 24-PHY-404)* | 24-PHY-403 | Nuclear physics-II | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | | 24-PHY-404 | Radiation Physics-II | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | DEC-4 *(One Course is to be opted out of 24-PHY-405 to 24-PHY-406)* | 24-PHY-405 | Computational Physics-II | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | | 24-PHY-406 | Material Science-II | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PC-7 | 24-PHY-407 | Practical: Material Science-II<br>Or<br>Practical: Computational Physics-II | P | 4 | | 0 | 0 | 8 | 8 | 30 | 70 | 100 | 4 |
| | PC-8 | 24-PHY-408 | Practical: Radiation Physics-II<br>Or<br>Practical: Nuclear Physics-II | P | 4 | | 0 | 0 | 8 | 8 | 30 | 70 | 100 | 4 |
| | EEC | 24-PHY-409 | Space Science and Sensors | T | 2 | | 2 | 0 | 0 | 2 | 15 | 35 | 50 | 3 |
| | OR | | | | | | | | | | | | | |
| | CC-12 | 24-PHY-402 | Atomic and Molecular Physics | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | DEC-3 *(One Course is to be opted out of 24-PHY-403 to 24-PHY-404)* | 24-PHY-403 | Nuclear physics-II | T | 4 | 26 | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | | 24-PHY-404 | Radiation Physics-II | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | DEC-4 *(One Course is to be opted out of 24-PHY-405 to 24-PHY-406)* | 24-PHY-405 | Computational Physics-II | T | 4 | | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 24-PHY-406 | Material Science-II | T | 4 | 4 | 0 | 0 | 4 | 30 | 70 | 100 | 3 |
| | EEC | 24-PHY-409 | Space Science and Sensors | T | 2 | 1 | 0 | 2 | 3 | 15 | 35 | 50 | 3 |
| | Dissertation/Project work | 24-PHY-410 | Dissertation* | D | 12 | 0 | 0 | 0 | 12 | 0 | 300 | 300 | |

*Total number of students' dissertation/project work offered will be maximum four per faculty member per year, and allotment will be made on the basis of merit cum preference of the students.

[$]Two discipline elective courses (DECs) will be allotted to students, one each from the courses of DEC1 and DEC2, in third semester. The allotment will be on the basis of their preference cum percentage of marks in the First Semester examination of M. Sc. Physics. In semester four, students have to study advanced courses of the same DECs which were allotted in third semester.

**General guidelines**:

1. If a course is being taught by two or more teachers, they should coordinate among themselves the coverage of course material as well as the internal assessment of the students to maintain uniformity.
2. Each theory course in a semester has been designed for a period 60 lectures. The total number of actual lectures delivered may vary at most by 10 %.
3. The books indicated as references are suggestive of the level of coverage. However, any other standard book may be followed.
4. In specialization courses, new specializations may be added to the list from time to time keeping in view the expertise available in the Department and/or the emergence of new frontier areas of specialization.
5. New experiments in the Laboratory Courses may be added from time to time.