MIT-WPU
॥ विश्वशान्तिर्ध्रुवं ध्रुवा ॥

# FACULTY OF SCIENCE AND HEALTH SCIENCE


2024 - 25

# B.Sc. Physics (Computational Physics)

## Programme Structure

mitwpu.edu.in

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|---|---|
| **Division** | Faculty of Science & Health Science |
| **School Name** | School of Science & Environmental Studies |
| **Department Name** | Department of Physics |
| **Programme Name** | B.Sc. Physics (Computational Physics) |

## Credit Distribution

| Course Type | Description |
|---|---|
| Programme Core | Courses dealing with foundations, depth and breadth of the major in which a student is admitted at MIT-WPU |
| Programme Electives | Open electives under the Programme allow students to specialise in a particular area connected to their major. |
| University Core | Courses that reflect the core MITWPU values and the mission of Life Transformation of students. |
| University Electives | Multidisciplinary courses across the faculties at MIT-WPU and outside the Programme core. |

| Semester | Course Type | Course Name / Course Title | Total Credits |
|---|---|---|---|
| I | University Core | Effective Communication | 1 |
| I | University Core | Critical Thinking | 1 |
| I | University Core | Environment and Sustainability | 1 |
| I | University Core | Foundations of Peace | 2 |
| I | University Core | Yoga - I | 1 |
| I | University Core | SLDP | 1 |
| I | Programme Foundation | Mechanics and Properties of Matter | 2 |
| I | Programme Foundation | Chemistry | 3 |
| I | Programme Foundation | Mathematics | 3 |
| I | Programme Foundation | Physics of Materials | 3 |
| I | Programme Foundation | Fundamentals of Programming 1 | 2 |
| I | Programme Foundation | Physics Lab 1 | 1 |
| I | Programme Foundation | Programming Lab 1 | 1 |

| Semester | Course Type | Course Name / Course Title | Total Credits |
|---|---|---|---|
| II | University Core | Advanced Excel | 1 |
| II | University Core | Financial Literacy | 1 |
| II | University Core | Yoga - II | 1 |
| II | University Core | Co-creation | 1 |
| II | University Core | Indian Constitution | 1 |
| II | University Core | IKS(General) | 2 |
| II | University Core | Sports | 1 |
| II | Programme Foundation | Heat & Thermodynamics | 2 |
| II | Programme Foundation | Electricity and Magnetism | 2 |
| II | Programme Major | Mathematical Methods in Physics 1 | 3 |
| II | Programme Foundation | Fundamentals of Programming 2 | 2 |
| II | Programme Foundation | Electronics | 2 |
| II | Programme Foundation | Physics Lab 2 | 1 |
| II | Programme Foundation | Programming Lab 2 | 1 |
| III | University Core | Research Innovation Design Entrepreneurship (RIDE) | 1 |
| III | University Core | Spiritual & Cultural Heritage; Indian Experience | 2 |
| III | University Electives | UE - I | 3 |
| III | University Electives | UE-II | 3 |
| III | Programme Capstone Project/Problem Based Learning/Seminar and Internships | Project Based Learning - I | 1 |
| III | Programme Major | Classical Mechanics with Fluid Mechanics | 3 |
| III | Programme Major | Mathematical Methods in Physics 2 | 3 |
| III | Programme Major | Atomic and Molecular Physics | 3 |
| III | Programme Foundation | Physics Lab 3 | 1 |
| III | Programme Foundation | Biology for Physicists | 2 |

| Semester | Course Type | Course Name / Course Title | Total Credits |
|---|---|---|---|
| IV | University Electives | UE-III | 3 |
| IV | University Core | Rural Immersion | 1 |
| IV | Programme Capstone Project/Problem Based Learning/Seminar and Internships | Project Based Learning - II | 1 |
| IV | University Core | Life Transformation Skills | 1 |
| IV | Programme Major | Computational Physics 1 | 2 |
| IV | Programme Major | Quantum Mechanics | 3 |
| IV | Programme Major | Electrodynamics | 3 |
| IV | Programme Major | Digital Electronics | 3 |
| IV | Programme Foundation | Statistics | 2 |
| IV | Programme Foundation | Physics Lab 4 | 1 |
| IV | Programme Foundation | Computational physics lab 1 | 1 |
| V | University Core | Managing Conflicts Peacefully: Tools and Techniques | 2 |
| V | Programme Capstone Project/Problem Based Learning/Seminar and Internships | Project Based Learning - III | 1 |
| V | Programme Electives | Programme Elective | 4 |
| V | Programme Major | Computational Physics 2 | 3 |
| V | Programme Major | Introduction to GPU & Parallel programming | 3 |
| V | Programme Major | Computational physics lab 2 | 2 |
| V | Programme Major | Nuclear and Particle Physics | 3 |
| V | Programme Major | Mathematical Methods in Physics 3 | 3 |
| V | Programme Major | GPU & Parallel Programming lab | 1 |

| Semester | Course Type | Course Name / Course Title | Total Credits |
|---|---|---|---|
| VI | Programme Capstone Project/Problem Based Learning/Seminar and Internships | Project Based Learning - IV | 1 |
| VI | University Core | National Academic Immersion | 2 |
| VI | Programme Electives | Programme Elective | 4 |
| VI | Programme Foundation | IKS - Ancient Indian Astronomy | 2 |
| VI | Programme Major | Quantum Computing | 3 |
| VI | Programme Major | Introduction to Artificial Intelligence and Machine Learning | 3 |
| VI | Programme Major | Statistical Mechanics | 3 |
| VI | Programme Major | Quantum Computing lab | 1 |
| VI | Programme Capstone Project/Problem Based Learning/Seminar and Internships | AI and ML lab | 2 |
| VII | Programme Electives | Programme Elective | 4 |
| VII | Programme Capstone Project/Problem Based Learning/Seminar and Internships | Computational Physics 4 | 2 |
| VII | Programme Capstone Project/Problem Based Learning/Seminar and Internships | Project 2 | 10 |
| VII | Programme Capstone Project/Problem Based Learning/Seminar and Internships | Research Methods in Physics | 2 |

| Semester | Course Type | Course Name / Course Title | Total Credits |
|---|---|---|---|
| VIII | Programme Electives | Programme Elective | 4 |
| VIII | Programme Capstone Project/Problem Based Learning/Seminar and Internships | Internship | 12 |

## Electives List

| Semester | Programme Electives | Course Name / Course Title | Total Credits |
|---|---|---|---|
| V | Programme Elective - I | Internet of Things | 4 |
| V | Programme Elective - I | Basics of Astronomy and Astrophysics | 4 |
| V | Programme Elective - I | Laser Physics | 4 |
| VI | Programme Elective - II | Computer Graphics | 4 |
| VI | Programme Elective - II | Observational Astrophysics | 4 |
| VI | Programme Elective - II | Photonics | 4 |
| VII | Programme Elective - III | Blockchain technology | 4 |
| VII | Programme Elective - III | Radiative Processes, Fluids and Plasmas | 4 |
| VII | Programme Elective - III | Laser Manufacturing | 4 |
| VIII | Programme Elective - IV | Data Analytics | 4 |
| VIII | Programme Elective - IV | Solar and Stellar Physics | 4 |
| VIII | Programme Elective - IV | Laser Applications | 4 |

*Modifications to the programmes and courses are contingent upon adherence to university guidelines and procedures. Any proposed changes must undergo a thorough review process, including consultation with relevant academic departments, approval from the appropriate administrative bodies, and compliance with accreditation standards.

Additionally, consideration will be given to feedback from students, faculty, and other stakeholders to ensure that modifications align with the overall educational objectives and mission of the university. The implementation of any approved changes will be communicated transparently to the university community, and appropriate measures will be taken to facilitate a smooth transition for all affected parties.