Programme Specific Outcomes	**MSc (Honors)Physics** **PSO1:**
Course Outcomes	**PHM701: CONDENSED MATTER PHYSICS** **CO1:** Explain the significance and value of condensed matter physics, both scientifically and in the wider community. **CO2:** The subject treats functional materials from an experimental viewpoint, solid state theory and properties. **CO3:** Critically analyse and evaluate experimental strategies, and decide which is most appropriate for answering specific questions. **CO4:** Apply key analysis techniques to typical problems encountered in the field. **CO5:** Gain and apply discipline-specific knowledge, including self-directed research into the scientific literature. **CO6:** The subject will be useful to gain an understanding of the interplay between classical - and quantum mechanical phenomena, and how microscopic/atomic processes acting between many atoms/molecules produces the typical properties of different solid state matter. **CO7:** The subject is aimed at giving the basic knowledge for accomplishment of a master thesis in condensed matter physics.
Course Outcomes	**PHM702: STATISTICAL MECHANICS** **CO1:** Explain the significance and value of condensed matter physics, both scientifically and in the wider community. **CO2:** Explain statistical physics and thermodynamics as logical consequences of the postulates of statistical mechanics **CO3:** Define and discuss the concepts of microstate and macrostate of a model system. **CO4:** Understand the quantum mechanical formulation of statistical mechanics. **CO5:** Apply the machinery of statistical mechanics to the calculation of macroscopic properties resulting from microscopic models of magnetic and crystalline systems. **CO6:** Identify and solve problems in statistical mechanics using ensemble theory **CO7:** Apply techniques from statistical mechanics to a range of situations. **CO8:** Discuss the concept and role of indistinguishability in the theory of gases; know the results expected from classical considerations and when these should be recovered. **CO9:** Define the Fermi-Dirac and Bose-Einstein distributions; state where they are applicable; understand how they differ and show when they reduce to the Boltsman distribution **CO10:** apply the Fermi-Dirac distribution to the calculation of thermal properties of elctrons in metals. **CO11:** apply the Bose-Einstein distribution to the calculation of properties of black body radiation. **CO12:** Discuss current research topics in statistical mechanics

Course Outcomes	**PHM703: ADVANCED QUANTUM MECHANICS** **CO1:** Develop knowledge and understanding of the concept that quantum states live in a vector space. **CO2:** Develop a knowledge and understanding of the meaning of measurement. **CO3:** Elate this abstract formulation to wave and matrix mechanics. **CO4:** Develop a knowledge and understanding of perturbation theory, level splitting, and radiative transitions. **CO5:** Develop a knowledge and understanding of the relation between conservation laws and symmetries. **CO6:** Develop a knowledge and understanding of the role of angular momentum in atomic and nuclear physics. **CO7:** Develop a knowledge and understanding of the scattering matrix and partial wave analysis. **CO8:** Solve quantum mechanics problems. **CO9:** Use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanations.
Course Outcomes	**PHM704: NUCLEAR AND PARTICLE PHYSICS** **CO1:** Demonstrate knowledge of fundamental aspects of the structure of the nucleus, radioactive decay, nuclear reactions and the interaction of radiation and matter. **CO2:** Discuss nuclear and radiation physics connection with other physics disciplines – solid state, elementary particle physics, radiochemistry, astronomy. **CO3:** Discuss nuclear and radiation physics applications in medical diagnostics and therapy, energetics, geology, archaeology. **CO4:** Describe experimental techniques used (or developed) for nuclear physics purposes (logic circuits, gamma cameras, semiconductor detectors) and discuss their influence on development of new technologies. **CO5:** Explore an application of nuclear and/or radiation physics and communicate their understanding to a group of their peers in a short presentation.
Course Outcomes	**PHM705: MATHEMATICAL PHYSICS** **CO1:** Demonstrate a detailed physical and mathematical understanding of a variety of systems and processes in a range of advanced topics in physics. **CO2:** Apply the concepts and theories of a range of advanced topics in physics. **CO3:** Demonstrate specialised analytical skills and techniques necessary to carry out advanced calculations in a range of advanced topics in physics. **CO4:** Approach and solve new problems in a range of advanced topics in physics.

	CO5: Demonstrate an understanding of the close relationship between scientific research and the development of new knowledge in a global context. **CO6:** Undertake independent research in a physical or mathematical field.
Course Outcomes	**PHM706 : 'C' AND DATA STRUCTURES** **CO1:** Competently program in C/C++ in the OO paradigm. **CO2:** Manage memory usage in C/C++ programs. **CO3:** Explain fundamental computing algorithms. **CO4:** Analyse algorithms and identify key algorithmic strategies. **CO5:** Demonstrate familiarity with fundamental software engineering practices. **CO6:** Demonstrate knowledge of programming language design issues. **CO7:** Demonstrate professional writing skills at an introductory level. **CO8:** Demonstrate knowledge of ethical concepts in the context of software production. **CO9:** Work competently in a group to learn software concepts. **CO10:** Use abstract data types to help solve programming problems.
Course Outcomes	**PHM707: COMPUTER SYSTEMS ARCHITECTURE**
Course Outcomes	**PHM708: LABORATORY**
Course Outcomes	**PHM802: NEURAL NETWORKS** **CO1:** Learn basic neural network architecture. **CO2:** Learn basic learning algorithms. **CO3:** Understand data pre and post processing. **CO4:** Learn training, verification and validation of neural network models. **CO5:** Design Engineering applications that can learn using neural networks.
Course Outcomes	**PHM803: PHYSICS AT NANOSCALE**
Course Outcomes	**PHM804: MICROWAVE TECHNIQUES** **CO1:** Examine characteristics of guided waves with the transmission line theory. **CO2:** Analyse and design common transmission lines and waveguides.

	CO3: Analyse RF sub-systems with microwave network analysis. **CO4:** Calculate impedance matching and tuning network for transmission lines and waveguides. **CO5:** Explain operation of active devices with small-signal approximation model. **CO6:** Examine characteristics of amplifiers, oscillators, and mixers. **CO7:** Explain different types of nonlinear distortion in RF components with small-signal approximation model. **CO8:** Discuss how RF components constitute RF transmitters and receivers. **CO9:** Design and simulate transmission lines and waveguides using full-wave electromagnetic simulation package.
Course Outcomes	**PHM805: LASER PHYSICS & APPLICATIONS** **CO1:** Absorption and spontaneous and stimulated emission in two level system, the effects of homogeneous and inhomogeneous line broadening, and the conditions for laser amplification. **CO2:** Operations of the Fabry-Perot cavity including mode separation and line-widths, laser gain conditions, gain clamping in both homogeneous and inhomogeneous line broadened media. **CO3:** The four-level laser system, the simple homogeneous laser and its output behaviour and optimal operating conditions. **CO4:** Spectral properties of a single longitudinal mode, mode locked laser operation, schemes for active and passive mode locking in real laser system. **CO5:** Operations and basic properties of the most common laser types, He-Ne, Argon-ion, and carbon-dioxide, ruby, titanium sapphire, neodymium YAG and glass, knowledge of other main laser types. **CO6:** Matrix optics of the laser cavity and stability conditions. **CO7:** Basics of Gaussian beam in laser cavity and optical properties of laser output, design of stable laser cavities using Gaussian beam optics, the ABCD law for Gaussian beams.
Course Outcomes	**PHM806: DESIGN AND ANALYSIS OF ALGORITHMS**
Course Outcomes	**PHM807: SOFTWARE ENGINEERING**
Course Outcomes	**PHM808: ANALOG INTEGRATED CIRCUITS**
Course Outcomes	**PHM809: LABORATORY**
Course Outcomes	**PHM810: OPERATING SYSTEMS**

Course Outcomes	**PHM811: QUANTUM COMPUTING**
Course Outcomes	**PHM001: BASIC RES. METH., SC.COMPUT.& ANAL.**
Course Outcomes	**PHM002: PRE-DISSERTATION**
Course Outcomes	**PHM901: DISSERTATION**
Course Outcomes	**PHM902: OPTO ELECTRONICS**
Course Outcomes	**PHM903: PLASMA PHYSICS**
Course Outcomes	**PHM904: COMPUTER NETWORKS**
Course Outcomes	**PHM905: DIGITAL SIGNAL PROCESSING**
Course Outcomes	**PHM906: OPERATING SYSTEMS**
Course Outcomes	**PHM907: ACOUSTICS**
Course Outcomes	**PHM908: ASTROPHYSICS & GENERAL RELATIVITY**
Course Outcomes	**PHM909: NONLINEAR DYNAMICS**
Course Outcomes	**PHM910: COMPLEX SYSTEMS AND NETWORKS**
Course Outcomes	**PHM911: VLSI DESIGN TECHNIQUES**
Course Outcomes	**PHM912: STATISTICAL MECHANICS**
Course Outcomes	**PHM913: BIOPHYSICS**
Course Outcomes	**PHM914: INTRODUCTION TO EMBEDDED SYSTEMS**
Course Outcomes	**PHM915: LASER PHYSICS AND APPLICATIONS**
Course Outcomes	**PHM916: GENERAL RELATIVITY**
Course Outcomes	**PHM917: QUANTUM FIELD THEORY**
Course Outcomes	**PHM918: STRING THEORY AND M-THEORY**

Course Outcomes	**PHM951: DISSERTATION I**
Course Outcomes	**PHM952: DISSERTATION II**
Course Outcomes	**PHM953: SELF STUDY COURSE**
Course Outcomes	**PHM954: ADV. SCIENTIFIC METHODOLOGY & ANAL.**
Course Outcomes	**PHM955: NANOTECHNOLOGY**
Course Outcomes	**PHM956: QUANTUM COMPUTING**
Course Outcomes	**PHM957: INFORMATION CENTRIC SYSTEMS DESIGN**
Course Outcomes	**PHM958: OPERATING SYSTEMS**
Course Outcomes	**PHM959: COMPUTER NETWORKS**
Course Outcomes	**PHM960: INTELLIGENT INFORMATION PROCESSING**
Course Outcomes	**PHM961: MEDIA PROCESSING**
Course Outcomes	**PHM962: EXPERIMENTAL TECHNQ.& DATA ANAL**
Course Outcomes	**PHM964: QUANTUM SYSTEM MODELING**
Course Outcomes	**PHM965: QUANTUM FIELD THEORY**
Course Outcomes	**PHM966: STRING THEORY AND M-THEORY**