

GOVT. POSTGRADUATE COLLEGE, GUNA

Affiliated to Jiwaji University, Gwalior (M.P.)

Phone No.: 07542-251641

Email : hegpgcgun@mp.gov.in

Website : <https://highereducation.mp.gov.in/?orgid=179>



Bachelor of Science Subject: Physics

Program Specific Outcomes

1. This course would provide the opportunity to the students to understand the basic laws of physics and make them able to understand the significance of various physical phenomena.
2. It inspires to carryout experiments to understand the laws and concepts of physics.
3. It makes them able to apply the theories learnt and the skills required to solve real time problems.
4. It allows them to analyse the wide range of problem-solving skills both analytically and technically.



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I Year / Certificate Course

COURSE TITLE	COURSE LEARNING OUTCOMES
THERMODYNAMICS AND STATISTICAL PHYSICS S1-PHYS-1T <i>Major-I</i>	<ol style="list-style-type: none">1. The course would enable students to understand the basic physics of heat and temperature in relation to energy, work, radiation and matter.2. Students are expected to learn that how laws of thermodynamics are used in a heat engine to transform heat into work.3. This course will also develop an understanding of the various concepts of statistics and the methods to apply them in thermodynamics.4. Students will understand the importance of studying statistical mechanics with the behaviour of particles under classical and quantum conditions.
MECHANICS AND GENERAL PROPERTIES OF MATTER S1-PHYS-2T <i>Major-II / Minor / Open Elective</i>	<ol style="list-style-type: none">1. Students will acquire the knowledge of basic mathematical methods to solve the various problems in Physics.2. The course would empower students to develop the idea about the behaviour of physical bodies.3. It will provide the basic concepts related to the motion of all objects around us in daily life.4. Students would be able to build foundation to various applied field in science and technology especially in the field of mechanical engineering.5. Students will be able to understand the relativistic effect and the relation between energy and mass.
THERMODYNAMICS AND STATISTICAL PHYSICS LAB (PRACTICAL) S1-PHYS-1P <i>Major-I (Practical)</i>	<ol style="list-style-type: none">1. Students would gain practical knowledge about heat and radiation by performing various experiments.2. Students will acquire knowledge about the different forms of distribution of subatomic particles in the system using statistical methods.3. Students will be able to use various thermodynamical instruments in daily life.
MECHANICS AND GENERAL PROPERTIES OF MATTER LAB (PRACTICAL) S1-PHYS-2P <i>Major-II / Minor / Open Elective (Practical)</i>	<ol style="list-style-type: none">1. Students would acquire basic practical knowledge related to mechanics through the experiments.2. Students will be familiar with various measurement devices by which they can measure various physical quantities with accuracy.3. Students will develop the concept related to the mechanics and properties of matter.

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II Year / Diploma Course

COURSE TITLE	COURSE LEARNING OUTCOMES
WAVES AND OPTICS S2-PHYS-1T <i>Major-I</i>	<i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Develop an understanding of various aspects of harmonic oscillations and waves specially superposition of collinear and perpendicular harmonic oscillations2. Explain several phenomena of daily life that can be explained as wave phenomena3. Understand various optical phenomena, principles, workings and applications4. Use the principles of wave motion and explain the physics of polarisation, interference and diffraction
ELECTRICITY MAGNETISM AND ELECTROMAGNETIC THEORY S2-PHYS-2T <i>Major-II / Minor / Open Elective</i>	<i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Understand the basic concepts of electricity and magnetism and their applications2. Apply various network theorems and their applications in electronics, electrical circuit analysis, and electrical machines3. Understand the construction and working of ballistic galvanometer and cathode ray oscilloscope4. Understand the concept of electromagnetic wave and their reflection from a plane surface
WAVES AND OPTICS LAB (PRACTICAL) S2-PHYS-1P <i>Major-I (Practical)</i>	<i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Study waves and their superposition using cathode ray oscilloscope2. Explain various optical properties like interface, diffraction and polarization3. Use various optical instruments like telescope, grating, spectrometer, polarimeter, etc. in daily life
ELECTRICITY MAGNETISM AND EMT LAB (PRACTICAL) S2-PHYS-2P <i>Major-II / Minor / Open Elective (Practical)</i>	<i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Verify various laws in electricity and magnetism such as Lenz's law, Faraday's law2. Understand the construction, working and uses of various measuring instruments3. Verify various network theorems, using simple electronic circuits

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III Year

COURSE TITLE	COURSE LEARNING OUTCOMES
QUANTUM MECHANICS AND SPECTROSCOPY BSC1Y344 <i>Paper-I</i>	<ol style="list-style-type: none">1. This course will provide a basic knowledge of Quantum Mechanics with genesis of this theory, establishment of various postulates.2. Various applications like potential well, potential step, one dimensional harmonic oscillator, hydrogen atom problem will enrich the knowledge of Quantum Mechanics and serve as a base for PG course.3. Further enrichment in the base for PG course will be obtained by concepts of atomic and molecular spectroscopy and their applications.4. Knowledge of Nuclear Physics and elementary Particle Physics will serve as fourth pillar for the foundation of PG course.
SOLID STATE PHYSICS AND ELECTRONIC DEVICES BSC1Y345 <i>Paper-II</i>	<ol style="list-style-type: none">1. Solid State Physics provides knowledge of crystal structure, properties and applications in details.2. Semiconductor Theory lays foundations to understand electrical properties of matter.3. Application of semiconductors with help of diodes, transistors, amplifiers, oscillators will be obtained sufficiently.4. A glimpse of latest technology viz. Nanotechnology will be obtained to get a glimpse of current study in Physics.
PRACTICAL LAB (PRACTICAL) BSC1Y344(P) <i>(Practical)</i>	<ol style="list-style-type: none">1. This lab course will provide students sound knowledge of electronic instruments.2. Students will be able to plot various characteristics of diodes, BJT and FET.3. Student will be able to handle instruments like CRO, RF Oscillator power supply etc.

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Master of Science in Physics

Program Specific Outcomes

Upon completion of M.Sc. Physics program, students will be able to-

1. Master analytic and critical thinking skills through acquired knowledge in major branches of Physics
2. Gain intellectual curiosity and know how to continue to learn not only areas that are relevant to Physics, but also that are important to society
3. Equip students for seeking suitable careers in Physics
4. Perform basic, applied and collaborative research
5. Enhance pedagogical and scientific writing skills through modern methods
6. Become socially and environmentally responsible citizens
7. Kindle entrepreneurial skills and lifelong learning



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I Semester

COURSE TITLE	COURSE LEARNING OUTCOMES
METHODS IN MATHEMATICAL PHYSICS MSC069	After the completion of the course, students should be able to- 1. Learn about Gradient, Divergence and Curl in orthogonal curvilinear and their typical applications in Physics 2. Learn about special type of matrices that are relevant in Physics and then learn about tensors 3. Study different ways of solving second order differential equations and familiarize with singular points
CLASSICAL MECHANICS MSC070	After the completion of the course, students should be able to- 1. Understand the Lagrangian and Hamiltonian approaches in Classical Mechanics 2. Understand the classical background of Quantum Mechanics and familiarize with Poisson Brackets and Hamilton -Jacobi equation 3. Comprehend basic ideas about nonlinear equations and chaos
ELECTROMAGNETISM AND LASER OPTICS MSC071	After the completion of the course, students should be able to- 1. Learn the fundamental interactions of electricity and magnetism, both as separate phenomena and as a singular electromagnetic force 2. Learn the basic non-linear optics 3. Have a clear understanding of Maxwell's equations and electromagnetic boundary conditions
SEMICONDUCTOR ELECTRONICS MSC072	After the completion of the course, students should be able to- 1. Learn about semiconductor transistor as amplifier and oscillator 2. Learn about basic operational amplifier circuits 3. Study application of OP-AMP as amplifiers
GENERAL PHYSICS BASED PRACTICAL (PRACTICAL) MSC073	At the end of the lab work, a student will be able to- 1. Determine the band gap of semiconductor by four prob method 2. Measurement of Hall Coefficient of given semiconductor 3. Understand the basics of optical measurements 4. Determine forbidden gap of a diode by plotting reverse saturation current as a function of temperature
ELECTRONICS BASED PRACTICAL (PRACTICAL) MSC074	At the end of the lab work, a student will be able to- 1. Have practical understanding of the characteristics of various diodes, transistors, Op-Amp, designing concepts of logic gates and digital circuit 2. Design & Study of Regulated Power supply 3. Study of Transistor Amplifiers in CE, CB, and CC modes

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II Semester

COURSE TITLE	COURSE LEARNING OUTCOMES
CLASSICAL ELECTRODYNAMICS, PLASMA AND ANTENNAE PHYSICS MSC2044	After the completion of the course, students should be able to- <ol style="list-style-type: none"> Learn about Maxwell's equations and have a grasp of the idea of Electrostatics and Magnetostatics along with time varying fields Have a grasp of the idea of electromagnetic wave propagation through wave guides and transmission lines Extend their understanding of special theory of relativity by including the Relativistic Electrodynamics
NON-RELATIVISTIC QUANTUM MECHANICS-I MSC2045	After the completion of the course, students should be able to- <ol style="list-style-type: none"> Understand Schrödinger and Heisenberg's formulations and their applications Understand linear vector spaces, Hilbert space, concepts of basis and operators and bra and ket notation Learn theory of angular momentum and spin matrices, orbital angular momentum and perturbation theory
CONDENSED MATTER PHYSICS -I MSC2046	After the completion of the course, students should be able to- <ol style="list-style-type: none"> Have a basic knowledge of crystal systems and spatial symmetries Know Bloch's theorem, energy bands and fundamental principles of semiconductors Have a clear understanding of semiconductors doping, type and other properties
DIGITAL ELECTRONICS, NUMERICAL ANALYSIS AND COMPUTER PROGRAMMING MSC2047	After the completion of the course, students should be able to- <ol style="list-style-type: none"> Get a wide knowledge of numerical methods in Computational Physics that can be used to solve many problems which does not have an analytic solution Understand Digital Electronics basics using logic gates and working of major digital devices like flip flops, multivibrators etc. Understand scientific computing, error analysis using C language
PRACTICAL-GENERAL LAB (PRACTICAL) MSC2048	At the end of the lab work, a student will be able to- <ol style="list-style-type: none"> The students will gain practical knowledge in utilizing spectrometer for various uses, practical handling of Lasers and their applications Understand the basics of optical measurements
PRACTICAL-ELECTRONICS LAB (PRACTICAL) MSC2334	At the end of the lab work, a student will be able to- <ol style="list-style-type: none"> Study of counters: Ripple, Mode 3, Mode 5 counters Study of Shift Register Study of A/D Converter

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QUANTUM MECHANICS-II MSCC054301	<i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Have basic knowledge about advanced techniques like approximation methods for time-independent problems like the WKB approximation2. Learn perturbation theory and interaction of an atom with the electromagnetic field3. Study Relativistic Quantum Mechanics using Dirac equation, Dirac matrices etc.
ATOMIC MOLECULAR PHYSICS AND NUCLEAR INSTRUMENTATION MSCC054302	<i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Know about different atom model and atomic systems, coupling schemes and their interactions with magnetic and electric fields2. Apply the principle of Raman spectroscopy and its applications3. Gain ability to apply the techniques of microwave and infrared spectroscopy to elucidate the structure of molecules
CONDENSED MATTER PHYSICS-II MSCC054303	<i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Study various crystal imperfections atomic diffusion and different kind of crystal bindings2. Understand different type of excitations in solid such as plasmons, polaritons magnons and their importance3. Know the fundamentals of dielectric and ferroelectric properties of materials
MICROWAVE AND OPTICAL COMMUNICATION MSCC054304	<i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Know about microwave linear beam tubes, microwave crossed beam tubes etc.2. Understand microwave transistor and tunnel diodes, Microwave FET and charged coupled devices3. Understand transmission lines and microwave measurements
PRACTICAL-I GENERAL PHYSICS (PRACTICAL) MSCC054307	<i>At the end of the lab work, a student will be able to-</i> <ol style="list-style-type: none">1. Study of R-C circuit.2. Perform & determine the values by using Fabry-Perot interferometer, Ultrasonic diffractometer, GM Counter, Planck's constant and Stefan's constant apparatus
PRACTICAL-II ELECTRONICS PHYSICS (PRACTICAL) MSCC054308	<i>At the end of the lab work, a student will be able to-</i> <p>Perform & learn through real-time data by using Practical set ups such as Operational Amplifiers, Power Supply</p>

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IV Semester

COURSE TITLE	COURSE LEARNING OUTCOMES
NUCLEAR PHYSICS MSSC054401	<i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Have a basic knowledge of nuclear size, shape, binding energy etc.2. Understand characteristics of nuclear force in detail3. Gain knowledge about various nuclear models and associated potentials4. Acquire knowledge about nuclear decay processes and their outcomes
INSTRUMENTATION AND COSMIC RAYS MSSC054402	<i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Have knowledge about various electronic devices and their components2. Understand X-Ray spectroscopy and crystal growth techniques3. Explain the working of detectors, realize the importance of Cosmic rays and its effects on earth
STATISTICAL MECHANICS MSSC054403	<i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Learn the fundamental differences between classical and quantum statistics and their distribution laws2. Grasp the basis of ensemble approach in statistical mechanics to a range of situations3. Apply the principles of statistical mechanics to selected problems
INTEGRATED ELECTRONICS MSSC054404	<i>After the completion of the course, students should be able to-</i> <ol style="list-style-type: none">1. Understand materials for integrated systems and integrated fabrication technology2. Learn growth methods of thin films, lithography and other procedures for integrated fabrication technology3. Grasp about Microelectromechanical Systems and nanoelectromechanical systems

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COURSE TITLE	COURSE LEARNING OUTCOMES
GENERAL PHYSICS LAB (PRACTICAL) MSSC054407	At the end of the lab work, a student will be able to- Learn Hall effect in semiconductor, learn photoconductivity of CdS material, measurement of magnetic susceptibility of solids
ELECTRONICS LAB (PRACTICAL) MSSC054408	At the end of the lab work, a student will be able to- Perform & learn through real-time data by using Practical set ups such as Amplifiers, Flip Flops, Multiplexers, Microwave Trainer

(Dr. Piyush Kumar Parashar)

HOD

Department of Physics

(Dr. Niranjan Shrotriya)

CO-ORDINATOR, IQAC

Govt. Postgraduate College,
Guna (M.P.)

(Dr. B.K. Tiwari)

PRINCIPAL

Govt. Postgraduate College,
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