Department of Physics,
Victoria Institution (College)

Programme Educational Objective (PEO) and Outcome

PEO1•

The Physics syllabus framed under the National Education Policy (NEP) 2020 is designed to promote conceptual under-standing, critical thinking, and analytical skills while reducing reliance on rote memorisation. The curriculum emphasises experiential learning through laboratory work, problem-based learning, projects, and interdisciplinary approaches. It encourages students to explore fundamental principles of Physics alongside emerging areas such as computational physics, materials science, and other various topics.

PEO2•

In alignment with NEP2020, the Physics programme supports flexibility, multiple exit options, and skill-oriented learning, enabling students to pursue Physics at varying levels of depth according to their interests and career goals. The syllabus integrates theoretical knowledge with practical applications, mathematical modelling, and technological tools, fostering curiosity, innovation, and scientific temper. Overall, the NEP-aligned Physics syllabus aims at the holistic development of learners by strengthening intellectual, ethical, and professional competencies, preparing them for higher education, research, industry, and societal contributions. Under the framework of the National Education Policy (NEP) 2020, **Course Outcomes (COs)** define the specific and measurable competencies that students are expected to attain at the completion of an individual course. **Programme Outcomes (POs)**, on the other hand, represent the broader knowledge, skills, and abilities that learners should possess upon successful completion of an academic programme. The attainment of these Programme Outcomes is achieved through the successful fulfilment of the Course Outcomes, as each course contributes cumulatively to the overall goals of the programme. The syllabus of Physics Major and Minor has been designed in a way the student gets a strong foundation in the subject and gains an in-depth knowledge.

Programme Outcome

PO1•

Graduates will acquire a strong foundation in core areas of Physics such as classical mechanics, electromagnetism, quantum mechanics, and statistical physics. They will be able to critically analyse physical concepts, principles, and theoretical frameworks. The programme enables students to interpret physical phenomena using appropriate laws and models. This analytical understanding supports further learning, research, and interdisciplinary applications of Physics.

PO2•

Students will be trained to identify and analyse real-world physical problems using fundamental principles of Physics. They will develop the ability to formulate mathematical models and equations to represent physical systems. The programme emphasises logical reasoning, approximation techniques, and solution methods. These skills enable students to arrive at meaningful and acceptable solutions applicable to science, engineering, and technology.

PO3•

The programme provides hands-on laboratory training to develop experimental, observational, and analytical skills. Students will learn to design experiments, collect data, and analyse results using scientific reasoning. Emphasis is placed on error analysis, instrumentation, and safety practices. These laboratory skills enhance problem-solving ability and promote a research-oriented mindset.

PO4•

Graduates will develop effective written and oral communication skills through laboratory reports, seminars, presentations, and group discussions. They will be able to communicate scientific ideas, experimental results, and technical information clearly and logically. The programme encourages interaction with peers, teachers, and interdisciplinary audiences. These skills prepare students for academic, professional, and societal engagement.

PO5•

Students will gain exposure to emerging areas in Physics along with mathematical and computational tools. The programme promotes collaborative learning and interdisciplinary problem-solving. Learners will apply modern techniques such as data analysis, simulations, and computational methods to physical problems. This prepares graduates to con-tribute innovative solutions in industry, research institutions, and academia.

PO6•
The curriculum is designed to strengthen conceptual understanding and problem-solving skills required for competitive examinations. Students are prepared for national and international exams such as JAM, NET, GATE, and other entrance or recruitment tests. This enables graduates to pursue higher studies and secure employment in scientific and technical fields.

PO7•
Promotes research aptitude through projects, internships, and inquiry-based learning. Encourages continuous learning to keep pace with advancements in Physics and allied disciplines.

PO8•
Apply Physics knowledge in interdisciplinary and applied domains. Enables students to apply Physics principles in interdisciplinary area

Programme Specific Outcome

Programme: One year Certificate course with Physics Major

PSO1:Students will learn how to solve differential equations and how to use vector algebra and vector calculus, which are essential for further studies. They will gain a deep understanding of dynamics of particle or system of particles under different potentials, central forces, Gravitation etc. Students will be also able to apply the laws of electrostatics and magnetostatics for the symmetric system. They will also get familiar with the microscopic descriptions as well as the macroscopic description of gases. This one year certificate course helps the students to grow a strong understanding of the basics of the subject.

PSO2:Students will develop the proficiency in using precision instruments, and handle errors in measured data, learn to determine physical properties of matter, able to safely handle electrical components and circuits and to do experiments related to thermal physics.

PSO3: Students will acquire knowledge of basic programming skill using Python and gnuPlot for data visualisation which are necessary to solve problems numerically, scientific writing using LaTeX. This will help them to learn advance computation in future.

Programme: Two year Diploma course with Physics Major

Programme outcome after the completion of the first year is identical with one year Certificate course with Physics Major(PSO1-PSO3). After the completion of the second year,

PSO4:Students will gain profound knowledge in solving differential equations (including damped and forced oscillation, wave equations with boundary conditions), series expansion of functions, LVS, matrices and tensors, probability distribution function.

PSO5:Students will learn fundamentals of wave optics, basic quantum mechanics and its 1d applications, electrostatics and magnetostatics, em wave propagation, mechanics in non-inertial frame, rotational dynamics, Lagrangian and Hamiltonian formulation and special theory of relativity.

PSO6:Students will develop the skill of doing numerical methods using numPy and matplotlib. Further they will learn to do basic projects using Arduino/data analysis and visualization using Pandas and seaborn. This will help them to explore areas like machine learning, AI or microcontroller prototyping.

PSO7:Students will develop the skill of handling optical instruments, electrical circuits, designing experimental set ups related to em induction, tunnel diode, determination of e/m, Planck's constant, determination of elastic constants etc.

Programme: Three year Degree course with Physics Major

Program outcome after the completion of the first two years is identical with two year Diploma course with Physics Major (PSO1-PSO7). After the completion of the third year,

PSO8: Students will develop detailed knowledge of electrical components like diodes, transistors, amplifiers, OPAMP and their applications in different circuits as well as digital circuits including data processing circuits, sequential circuits, registers, counters etc.

PSO9:Students will learn quantum mechanics in vector space notation, angular momentum algebra, H-like atoms, many electron atoms and fundamentals of atomic, nuclear and particle physics including nuclear reactions, radioactive decay, molecular spectroscopy, splitting of spectral lines, elementary particles and quark structure.

PSO10: Students will acquire knowledge of kinetic theory of gas including transport phenomena, conduction of heat, thermodynamic potentials and thermodynamic relations, phase transitions, classical and quantum statistical mechanics, fundamentals of solid state physics.

PSO11: Students will develop the skill of doing basic experiments related to design electrical circuits using analog and digital components, experiments related to thermal physics and solid state physics. Further they will also learn to solve 2nd order ODEs and transient equations numerically using scipy.

Thus they will be familiar with all the basic branches of physics which is essential for advanced courses of physics.

Programme: Four year Degree course (Honours) with Physics Major

Programme outcome after the completion of the first three years is identical with three year Degree course with Physics Major (PSO1-PSO11). After the completion of the fourth year,

PSO12:Students will learn the use of advanced level mathematics in physics.
PSO13:Students will learn advanced level of classical mechanics, including the covariant formulation of special theory of relativity.
PSO14: Students will acquire a comprehensive knowledge of advanced quantum mechanics, including approximation methods and scattering.
PSO15:Students will learn the covariant formulation of electrodynamics, and plasma physics.
PSO16:Students will acquire a very substantial amount of knowledge on statistical mechanics and solid state physics, right at the level of joining a Ph.D. programme.
PSO17:Students will learn the physics of semiconductor devices and advanced electronics, which will be helpful for those going into experimental research.
PSO18:Students will get acquainted with enough advanced level practicals.
Thus they will be ready to enter the one-year PG programme of any reputed university.

Programme: Four year Degree course (Honours with Research) with Physics Major

Programme outcome after the completion of the first three years is identical with three year Degree course with Physics Major (PSO1-PSO11),and identical with the 7th semester of the four year Degree (Honours) course (PSO12-PSO15). After the completion of the 8th semester,

PSO16:Students will have a proper understanding of research methodology and ethical norms, which are an absolute must if they go for research.

PSO17:Students will be introduced to some proper research, including writing and presenting the results.
Thus they will be ready to enter the Ph.D. programme of any reputed university/institute. They may also opt for one-year PG courses.

Course Outcomes (COs)

PHS-DSCC-1-1 : Basic Physics I
(Credits:04,Theory-03, Practical-01)

Course learning outcome (COs):
Students will be able

CO1: to learn plotting and series expansion of functions, basic ideas of calculus (limit, continuity and differentiability of functions, finding extremes), partial derivatives.

CO2: to learn how to solve first order linear and second order linear homogenous (with constant coefficients) differential equations.

CO3 : to recapitulate basic vector algebra and to learn vector calculus, divergence theorem and Stoke's theorem.

CO4: to have an idea of various orthogonal coordinates, to learn to deal with vector calculus and particle dynamics in different coordinate system.

CO5: to recapitulate the basics of classical mechanics, to solve simple problems of classical mechanics.

CO6: to learn about the conservative forces, force as a gradient of a scalar potential, to gain insight on the one dimensional motion from potential energy curve.

CO7: to learn about the dynamics of a system of particles, concept of the reduced mass for two body problems, the centre of mass, momentun and energy of the system of particles.

CO8: to learn about the properties of the central force field, equations of motion and trajectories of the particle moving under the central force field, Gravitation as an example, Kepler's law, gravtational potential calculation in different cases using Gauss' law.

CO9: to learn two body collision and scattering..

CO10:to acquire knowledge of compressible and incompressible fluids, continuity equations, Stoke's law and Euler's equation, Bernoulli's theorem.

CO11: to learn basic measurement techniques using slide calipers, screw gauge, sextant etc., to determine moment of inertia, modulus of rigidity and viscosity, estimation of errors.

COs - POs Mapping
Course Code : PHS-DSCC-1-1

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√		√	√		√	√
CO2	√	√		√	√		√	√
CO3	√	√		√	√		√	√
CO4	√	√		√	√		√	√
CO5	√	√		√	√		√	√
CO6	√	√		√	√		√	√
CO7	√	√		√	√		√	√
CO8	√	√		√	√		√	√
CO9	√	√		√	√		√	√
CO10	√	√		√	√		√	√
CO11	√	√	√	√	√		√	√

Course Outcomes (COs)

PHS-SEC-1-1 : Introduction to Computer Programming and Graph Plotting
(Credits:04,Theory-0, Practical-04)

Course learning outcome (COs):
Students will be able

CO1: to learn plotting of functions in 2d, polar and parametric plots, data fitting using GNUplot..

CO2: to learn basic programming using Python (Basic mathematical and logical operations, conditional statements, loops, data types).

COs - POs Mapping
Course Code : PHS-SEC-1-1

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√			√	√	√	√
CO2	√	√			√	√	√	√

Course Outcomes (COs)

PHS-DSCC-2-1 : Basic Physics II
(Credits:04,Theory-03, Practical-01)

Course learning outcome (COs):
Students will be able

CO1: to learn about electrostatic fields, potential, flux and charge distributions, integral form of Gauss' law and its applications, electric dipoles, electrostatic energy of charged system, conductors and capacitance, dynamics of charged particles in simultaneous electric and magnetic field.

CO2: to acquire knowledge of magnetostatics. Biot-Savart's law and its applications. Ampere's circuital law with applications, magnetic dipoles.

CO3 : to learn molecular kinetic theory of ideal gas, relation between the macroscopic and microscopic variables, Maxwell's velocity distribution.

CO4: to acquire knowledge of thermodynamic variables, thermodynamic equilibrium, state functions, concept of work and energy, thermodynamic process, specific heats, laws of thermodynamics, entropy.

CO5: to learn to handle electrical apparatus and components, to measure current and resistances in the circuit, to measure expansion coefficients etc.

COs - POs Mapping
Course Code : PHS-DSCC-2-1

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√		√	√		√	√
CO2	√	√		√	√		√	√
CO3	√	√		√	√		√	√
CO4	√	√		√	√		√	√
CO5	√	√	√	√	√		√	√

Course Outcomes (COs)

PHS-SEC-2-1 : Scientific Writing Skills (Latex)
(Credits:04,Theory-0, Practical-04)

Course learning outcome (COs):
Students will be able

CO1: to learn prepare various types of LATEX documents containing lists, tables, figures, mathematical expressions etc.

COs - POs Mapping
Course Code : PHS-SEC-2-1

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√					√	√

Course Outcomes (COs)

PHS-DSCC-3-1 : Waves and Optics
(Credits:04,Theory-03, Practical-01)

Course learning outcome (COs):
Students will be able

CO1: to learn to construct and solve differential equations of harmonic oscillators (damped and forced), calculate their energies, to learn resonance, power dissipation and quality factor, superposition of harmonic oscillations and Lissajous' figure.

CO2: to gain knowledge of wave equation, travelling and standing waves, solution of vibrating strings, modes of vibration, energy of vibrating string, plucked and struck string.

CO3 : to learn laws of reflection and refraction of light at plane and curved surfaces, Interference of light, division of amplitudes and division of wavefront, fringes of equal width and equal inclination, Newton's ring, Michelson interferometer and Fabry-Perot interferometer, Diffraction using single slit, double slit and grating, resolving power, Fresnel's half period and zone plate.

CO4: to build the concept of polarisation of electromagnetic waves, double refraction, ordinary and extra ordinary ray, phase retardation plates, production and analysis of polarised light.

CO5: to learn to deal with optical instruments, to study the variation of refractive index, to determine the wavelength of sodium light, to study grating, specific rotation using polarimeter, Melde's experiment.

COs - POs Mapping
Course Code : PHS-DSCC-3-1

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√		√	√		√	√
CO2	√	√		√	√		√	√
CO3	√	√		√	√		√	√
CO4	√	√		√	√		√	√
CO5	√	√	√	√	√		√	√

Course Outcomes (COs)

PHS-DSCC-3-2 : Mathematical Physics-I
(Credits:04,Theory-03, Practical-01)

Course learning outcome (COs):
Students will be able

CO1: to get the idea of convergence of power series, different types of convergence tests.

CO2: to learn Fourier series expansion and its complex representation., Fourier Integral theorem, Fourier transform with examples and applications.

CO3 : to learn to solve partial differential equation using the method of separation of variables, Laplace equation, wave equation and diffusion equation.

CO4: to acquire the knowledge of probability of discrete events and uncorrelated events, Probability Distribution Function, Binomial, Gaussian and Poisson distribution, 1-d random walk.

CO5: to learn Dirac-delta function, beta and gamma functions, error functions.

CO6: to learn approximation in numerical computation, numerical solution in algebraic equation, numerical integration and solution of ordinary differential equations to solve system of algebraic equations, curve fitting.

CO7: to learn to use NumPy and its applications in matrix operations and numerical computations, to use matplotlib for graph p,otting.

COs - POs Mapping
Course Code : PHS-DSCC-3-2

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√		√	√		√	√
CO2	√	√		√	√		√	√
CO3	√	√		√	√		√	√
CO4	√	√		√	√		√	√
CO5	√	√		√	√		√	√
CO6	√	√		√	√	√	√	√
CO7	√	√		√	√	√	√	√

Course Outcomes (COs)

PHS-SEC-3-1 : Arduino
(Credits:04,Theory-01, Practical-03)

Course learning outcome (COs):
Students will be able

CO1: to gain skill of handling Arduino and do some basic projects.

COs - POs Mapping
Course Code : PHS-SEC-3-1

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√	√	√	√	√	√	√

Course Outcomes (COs)

PHS-DSCC-4-1 : Modern Physics
(Credits:04,Theory-03, Practical-01)

Course learning outcome (COs):
Students will be able

CO1: to learn the development of Quantum mechanics starting from the problems of classical framework.

CO2: to learn the basics of Quantum mechanics.

CO3 : to learn the Schrödinger equation and applications to simple problems.

COs - POs Mapping
Course Code : PHS-DSCC-4-1

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√	√	√	√		√	√
CO2	√	√	√	√	√		√	√
CO3	√	√	√	√	√		√	√

Course Outcomes (COs)

PHS-DSCC-4-2 : Electromagnetism
(Credits:04,Theory-03, Practical-01)

Course learning outcome (COs):

Students will be able

CO1: to learn about the image method used in electrostatics.

CO2 : to learn about the properties of magnetic field inside matter.

CO3: to learn the development of Maxwell's equation.

COs - POs Mapping
Course Code : PHS-DSCC-4-2

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√	√	√	√		√	√
CO2	√	√	√	√	√		√	√
CO3	√	√	√	√	√		√	√

Course Outcomes (COs)

PHS-DSCC-4-3 : Mathematical Physics II
(Credits:04,Theory-03, Practical-01)

Course learning outcome (COs):

Students will be able

CO1 : to learn the basics of Linear vector space.

CO2 : to learn the techniques of solving 2nd order differential equations using power series.

CO3 : to learn the properties of matrices and solving eigenvalue problems.

CO4 : to acquire the basic knowledge of cartesian tensors.

COs - POs Mapping
Course Code : PHS-DSCC-4-3

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√		√	√	√	√	√
CO2	√	√		√	√	√	√	√
CO3	√	√		√	√	√	√	√
CO4	√	√		√	√	√	√	√

Course Outcomes (COs)

PHS-DSCC-4-4 : Classical Mechanics and Special theory of Relativity
(Credits:04,Theory-03, Practical-01)

Course learning outcome (COs):

Students will be able

CO1 : to learn the variational calculus.

CO2 : to learn the Lagrangian and Hamiltonian formulation.

CO3 : to learn the foundation of Special Relativity.

COs - POs Mapping
Course Code : PHS-DSCC-4-4

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√	√	√	√		√	√
CO2	√	√	√	√	√		√	√
CO3	√	√	√	√	√		√	√

Course Outcomes (COs)

PHS-DSCC-5-1 : Electronics I
(Credits:04,Theory-03, Practical-01)

Course learning outcome (COs):

Students will be able

CO1 : to learn the basics of circuits and network.

CO2 : to acquire the knowledge of diodes, transistors and FETs.

CO3 : to learn the properties of Operational amplifiers.

CO4 : to learn the basic properties of Oscillators.

COs - POs Mapping
Course Code : PHS-DSCC-5-1

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√	√	√	√		√	√
CO2	√	√	√	√	√		√	√
CO3	√	√	√	√	√		√	√
CO4	√	√	√	√	√		√	√

Course Outcomes (COs)

PHS-DSCC-5-2 : Nuclear and Particle Physics
(Credits:04,Theory-03, Tutorial-01)

Course learning outcome (COs):

Students will be able

CO1 : to learn the basic properties of Nucleus.

CO2 : to learn the details of nuclear reactions.

CO3 : to learn the basic idea of fundamental particles and their interactions.

CO4 : to acquire a basic knowledge about nuclear fusion in stars.

COs - POs Mapping
Course Code : PHS-DSCC-5-2

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√		√	√		√	√
CO2	√	√		√	√		√	√
CO3	√	√		√	√		√	√
CO4	√	√		√	√		√	√

Course Outcomes (COs)

PHS-DSCC-5-3 : Quantum Mechanics
(Credits:04,Theory-03, Practical-01)

Course learning outcome (COs):
Students will be able

CO1 : to learn the Dirac's bracket formulation of QM.

CO2 : to learn the application of Schrodinger equation in 2 and 3 dimensions.

CO3 : to acquire the idea of bosons and fermions and their statistics.

COs - POs Mapping
Course Code : PHS-DSCC-5-3

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√		√	√	√	√	√
CO2	√	√		√	√	√	√	√
CO3	√	√		√	√	√	√	√

Course Outcomes (COs)

PHS-DSCC-5-4 : Thermal Physics and Statistical Mechanics
(Credits:04,Theory-03, Practical-01)

Course learning outcome (COs):
Students will be able

CO1 : to learn about the thermodynamic potentials and Maxwell's relations.

CO2 : to learn the thermodynamics of phase transition and Black body radiation.

CO3 : to gain the basic formalism of classical statistical mechanics.

COs - POs Mapping
Course Code : PHS-DSCC-5-4

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√	√	√	√		√	√
CO2	√	√	√	√	√		√	√
CO3	√	√	√	√	√		√	√

Course Outcomes (COs)

PHS-DSCC-6-1 : Electronics II
(Credits: 04,Theory-03, Practical-01)

Course learning outcome (COs):

Students will be able

CO1 : to learn the Number System , binary algebra and their application to different logic gates.

CO2 : to acquire a knowledge of Sequential circuits , Registers and Counters.

COs - POs Mapping
Course Code : PHS-DSCC-6-1

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√	√	√	√		√	√
CO2	√	√	√	√	√		√	√

Course Outcomes (COs)

PHS-DSCC-6-2 : Solid State Physics
(Credits: 04,Theory-03, Practical-01)

Course learning outcome (COs):

Students will be able

CO1 : to learn the basic formalism of crystal structure.

CO2 : to gain a basic understanding of band structure of solids.

CO3 : to learn the dielectric and magnetic properties of solids.

COs - POs Mapping
Course Code : PHS-DSCC-6-2

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√	√	√	√		√	√
CO2	√	√	√	√	√		√	√
CO3	√	√	√	√	√		√	√

Course Outcomes (COs)

PHS-DSCC-6-3 : Atomic, Molecular, and Laser Physics
(Credits: 04,Theory-03, Tutorial-01)

Course learning outcome (COs):
Students will be able

CO1 : to learn the characteristics of Zeeman effect.

CO2 : to learn the properties of many-electron atoms.

CO3 : to learn the basic properties of molecular spectra.

CO4 : to learn the properties of Lasers ; idea of spontaneous and stimulated emission and derivation of Einstein's A and B coefficients.

CO5 : to learn the basics of optical fibres and its different properties.

COs - POs Mapping
Course Code : PHS-DSCC-6-3

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√		√	√		√	√
CO2	√	√		√	√		√	√
CO3	√	√		√	√		√	√
CO4	√	√		√	√		√	√
CO5	√	√		√	√		√	√

Course Outcomes (COs)

PHS-DSCC-7-1:Mathematical Methods III
(Credits: 04,Theory-03,Tutorial-01)

Course learning outcome (COs):
Students will be able

CO1: to learn about the application of Group Theory in physics.

CO2: to learn about the complex analysis technique.

CO3: to learn about homogeneous and inhomogeneous differential equations and integral transforms.

CO4: to learn about some statistical tools necessary for physics.

COs - POs Mapping
Course Code : PHS-DSCC-7-1

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√		√	√		√	√
CO2	√	√		√	√		√	√
CO3	√	√		√	√		√	√
CO4	√	√		√	√		√	√

Course Outcomes (COs)

PHS-DSCC-7-2:Advanced Classical Mechanics
(Credits: 04,Theory-03,Tutorial-01)

Course learning outcome (COs):
Students will be able

CO1: to learn about the Lagrangian formulation and small oscillation.

CO2: to learn about the canonical transformations.

CO3:to learn about fluid dynamics and classical fields.

CO4: to learn the 4-vector notation of Special Relativity

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CO5: to have an introductory idea about nonlinear dynamics.

Commented [A1]:

COs - POs Mapping
Course Code : PHS-DSCC-7-2

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√		√	√		√	√
CO2	√	√		√	√		√	√
CO3	√	√		√	√		√	√
CO4	√	√		√	√		√	√
CO5	√	√		√	√		√	√

Course Outcomes (COs)

PHS-DSCC-7-3: Advanced Quantum Mechanics I
(Credits:04,Theory-03,Tutorial-01)

Course learning outcome (COs):
Students will be able

CO1:to learn about the solution of one-dimensional problems.

CO2:to learn various approximation methods used in quantum mechanics.

CO3:to have an introductory idea on quantum computation and foundation of quantum mechanics.

COs - POs Mapping
Course Code : PHS-DSCC-7-3

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√		√	√		√	√
CO2	√	√		√	√		√	√
CO3	√	√		√	√		√	√

Course Outcomes (COs)

PHS-DSCC-7-4: Mathematical Physics I
(Credits:04,Theory-03,Tutorial-01)

Course learning outcome (COs):
Students will be able

CO1:to learn about Maxwell's equation and their solutions.

CO2:to learn about accelerated charges and radiation including radiation reaction.

CO3:to have an elementary idea on Plasma Physics and its applications.

COs - POs Mapping
Course Code : PHS-DSCC-7-4

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√		√	√		√	√
CO2	√	√		√	√		√	√
CO3	√	√		√	√		√	√

Course Outcomes (COs)

PHS-DSCC-7-5: General Laboratory I
(Credits: 04, Theory-0, Practicals-04)

Course learning outcome (COs):
Students will be able

CO1: to perform some advanced level experiments in physics.

COs - POs Mapping
Course Code : PHS-DSCC-7-5

POs\ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√	√	√	√		√	√

Course Outcomes (COs)

PHS-DSCC-8-1: Advanced Quantum Mechanics II
(Credits: 04, Theory-03, Tutorial-01)

Course learning outcome (COs):
Students will be able

CO1:to learn about scattering theory.

CO2:to learn about the role of symmetries in quantum mechanics.

CO3: to learn time-dependent perturbation theory.

COs - POs Mapping
Course Code : PHS-DSCC-8-1

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√		√	√		√	√
CO2	√	√		√	√		√	√
CO3	√	√		√	√		√	√

Course Outcomes (COs)

PHS-DSCC-8-2: Advanced Statistical Mechanics
(Credits: 04, Theory-03, Tutorial-01)

Course learning outcome (COs):
Students will be able

CO1:to learn about canonical and grand canonical ensemble and classical non-ideal gas.

CO2:to learn about quantum statistical mechanics.

CO3:to learn about phase transition and critical phenomena.

CO4:to learn about magnetism in solids.

CO5:to learn about stochastic process.

COs - POs Mapping
Course Code : PHS-DSCC-8-2

POs\ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√		√	√		√	√
CO2	√	√		√	√		√	√
CO3	√	√		√	√		√	√
CO4	√	√		√	√		√	√
CO5	√	√		√	√		√	√

Course Outcomes (COs)

PHS-DSCC-8-3: Electronics and Instrumentation
(Credits: 04, Theory-03, Tutorial-01)

Course learning outcome (COs):
Students will be able

CO1: to learn about filters and digital MOS circuits.

CO2:to learn about physics of semi-conductors.

CO3: to get acquainted with several semiconductor-based devices needed in cutting-edge research.

COs - POs Mapping
Course Code : PHS-DSCC-8-3

POs\ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√	√	√	√		√	√
CO2	√	√	√	√	√		√	√
CO3	√	√	√	√	√		√	√

Course Outcomes (COs)

PHS-DSCC-8-4: Advanced Solid State Physics
(Credits: 04, Theory-03, Tutorial-01)

Course learning outcome (COs):
Students will be able

CO1:to learn about crystal structure, band theory of solids, and lattice dynamics.

CO2:to learn about dielectric properties of solids.

CO3:to learn about magnetic resonances.

CO4:to have an introductory notion about superconductivity.

COs - POs Mapping
Course Code : PHS-DSCC-8-4

POs\ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√		√	√		√	√
CO2	√	√		√	√		√	√
CO3	√	√		√	√		√	√
CO4	√	√		√	√		√	√
CO9	√	√		√	√		√	√

Course Outcomes (COs)

PHS-DSCC-8-5:General Laboratory II
(Credits:04, Theory-0, Practical-04)

Course learning outcome (COs):
Students will be able

CO1:to perform some advanced level experiments in physics.

CO2: to perform high-level computer simulations of some interesting physics problems.

COs - POs Mapping
Course Code : PHS-DSCC-8-5

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√	√	√	√	√	√	√
CO2	√	√	√	√	√	√	√	√

Course Outcomes (COs)

PHS-DSCC-8-1R and PHS-DSCC-8-2R:
Research Methodologies I and II
(Credits:04,Theory-03,Viva-01)

Course learning outcome (COs):
Students will be able

CO1:to have an idea of research in physics, and different types of research.

CO2:to learn about literature survey, information retrieval, scientific writing, and communication.

CO3:to learn about ethics in research and possible malpractices.

CO4:to learn some important statistical tools necessary for data handling and processing.

COs - POs Mapping
Course Code : PHS-DSCC-8-1R and PHS-DSCC-8-2R

POs\ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√	√	√	√	√	√	√
CO2	√	√	√	√	√	√	√	√
CO3	√	√	√	√	√	√	√	√
CO4	√	√	√	√	√	√	√	√

Course Outcomes (COs)

PHS-DSCC-8-3R and PHS-DSCC-8-4R:
Research Internship and Research Project
(Credits: Project 04 and 08)

Course learning outcome (COs):
Students will be able

CO1:to have an experience of actual research including data collection, analysis, presentation of results, and writing dissertations.

COs - POs Mapping
Course Code : PHS-DSCC-8-3R and PHS-DSCC-8-4R

POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	√	√	√	√	√	√	√	√