

Vidyasagar College for Women

Department of Physics PO & CO Manual (CCF 2022)



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PROGRAMME OUTCOMES (PO), PROGRAM SPECIFIC OUTCOMES (PSO) and COURSE OUTCOMES (CO): PO-PSO-CO

Programme: 4 Year B.Sc. Major (Honours) in Physics (CCF 2022) under University of Calcutta Inception of CCF 2022 Curriculum: 2023

Duration of the Course: 4 year comprising of 8 Semesters

• Program Outcomes (PO) of Physics Major under CCF 2022:

4 Year B.Sc.(Hons.) (Bachelor of Science) Programme **in Physics** offers theoretical as well as practical knowledge about different subject areas of basic sciences including Physics as Core subject with 2 minor subjects from *Mathematics* and *Chemistry* or *Electronics*. This programme is most beneficial for students who have a strong interest and background in Science and Mathematics. A well planned study programme is followed for holistic development of the students under the Course and Curriculum Framework **CCF 2022** under University of Calcutta.

• Following are the various Programme Outcomes (PO) of 4 Year UG Physics Major (Honours) under CCF 2022:

Sl. No	Program Outcome
PO 1	Understanding dynamics of nature and acquire strong foundation of
	physics and mathematics for a successful career in academia and industry
PO 2	Ability to use modern techniques, sophisticated instruments, and to handle
	different types of electrical and electronic circuits and optical instruments
PO 3	Develop laboratory skill and utilize Cognitive idea of experimentation in
	day to day experiences with the theoretical knowledge acquired
PO 4	Cognitive development of Mathematical & physical Problem-Solving
	Skill and computational acumen to develop Simulation Based Learning
	Skill
PO 5	Identify, formulate and analyze complex scientific problems reaching
	substantiated conclusions
PO 6	Develop communication ability by designing and writing scientific
	documentation for effective presentations as the foundation of Higher
	studies and Research

• B.Sc. Physics Major (Honours) Program Specific Outcome (PSO):

- PSO 1: Providing deep knowledge in Physics so that students are able to analyse and apply the knowledge of Physics in an innovative, dynamic and challenging environment for design and development of new products (Understand, Apply)
- PSO 2: Making students capable to solve practical, design and analysis problems to complete the challenge to fabricate, test and develop the products with more innovative technologies (Analyse, Understand and Apply)
- PSO 3: Design solutions for complex Physics problems and design systems that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations (Understand and apply).
- Course Outcomes (CO):

Following are the various Course Outcomes (CO) of 4 Year UG Physics Major (Honours) and Physics Minor courses under CCF 2022:

Semester-1 (CCF 2022)

Course Code	Course Name	Course Outcomes
PHSM-DSCC-1-1-TH MPHS-DSCC-1-1-TH	Basic Physics-I (Theory) (Level 100) Basic Physics I (Theory)	CO 1: Recapitulate functions, calculus and how to solve differential equations. Understand partial differential equations which are integral part of any branch of physics. (Remember, Understand, Apply)
	(Level 100)	CO 2: Recourse Vector algebra and understand divergence, gradient and curl and their physical interpretation which are very important for theories of electricity and magnetism to be taught later. (Remember, Understand)
		CO 3: Recall Newtonian Mechanics to describe motion of objects, planetary motions, gravitation etc. and understand the motion of objects in different frame of references, study central force and its application. (Remember, Understand, Apply)
		CO 4: Understand the dynamics of rotating objects i.e. rigid bodies, angular velocity, the moment of inertia and related examples involving the centrifugal force and coriolis force. (Understand)
		CO 5: Develop the problem-solving capability for dynamical motion. (Apply, Analyse)
PHSM-DSCC-1-1-P	Basic Physics-I (Practical)	CO 1: Experimentally determine various physical quantities e.g, moment of inertia of a bar about the axis passing through its center of gravity, elastic constants of a material, and (Apply,
MPHS-DSCC-1-1-P	Basic Physics-I (Practical)	Analyse) CO 2: Determine physical quantity like acceleration due to gravity. (Apply)
PHSM-SEC-1 (Practical)	Introduction to COMPUTER PROGRAMMING and GRAPH Plotting	CO 1: Learn basics of programming in Python and plotting data using gnuplot. (Understand, Apply)
		CO 2: Foundation of application of computational technique in problem solving. (Apply)

Semester-2 (CCF 2022)

Course Code	Course Name	Course Outcomes				
PHSM-DSCC-2-TH MPHS-DSCC-2-TH	Basic Physics-II (Level 100)	CO 1: Recall and comprehend basic concepts of electrical charges and currents and their properties. (Remember, Understand)				
		CO 2: Understand the concept of conductors, dielectrics, inductance and capacitance, and electrical image charge. (Remember, Understand)				
		CO 3: Gather knowledge on the nature of magnetic materials, study magnetostatics. (Remember, Undertsand)				
		CO 4: Identify and develop problem solving skill in electrostatics and magnetostatics by analysing the problem. (Analyse, Apply)				
		CO 5: Understand electromagnetic induction and Faraday's law and its applications. (Understand, Apply)				
		CO 6: Study kinetic theory of gases, thermodynamics and various laws and its application on practical devices like heat engine, refrigerator. (Understand, Apply)				
PHSM-DSCC-2-P MPHS-DSCC-2-P	Basic Physics-II (Practical)	CO 1: Familiarise various electrical components and learn electrical circuits to measure current, voltage using classic instruments like potentiometer, Carey-Foster bridge, ammeter, voltmeter. (Understand, Apply)				
		CO 2: Apply theoretical concepts of thermodynamics to practical measurements of thermodynamic parameters of gases. (Apply)				
		CO 3: Measure the pressure coefficient of expansion of solid and gas. (Apply)				
PHSM-SEC-2 (Project & Practical)	Scientific Writing Skills (LaTeX)	CO 1: Introduce the students with the scientific document preparation system using a free state-of-the art publishing software. (Understand)				
		CO 2: Develop the skill of writing research article, project report using LaTeX. (Apply)				

Semester-3 (CCF 2022)

Course Code	Course Name	Course Outcomes				
PHSM-DSCC-3-TH	Waves and Optics (Theory) (Level 200)	CO 1: Learn and understand various types of waves and their propagation, superposition of waves and solve wave equations for different types of vibrations. (Remember, Undertsand, Apply)				
		CO 2: Basic understanding of physical optics. (Understand)				
		CO 3: Provide a knowledge of various optical phenomena, for example interference, diffraction, and optical instruments. (Understand)				
PHSM-DSCC-3-P	Waves and Optics (Practical) (Level 200)	CO 1: Gain expertise in handling sophisticated optical instruments. (Understand, Apply)				
		CO 2: Analyse wave phenomena and verify laws of optics. (Analyse, Apply)				
		CO 3: Determine wavelength of light through interference and diffraction techniques. (Apply)				
PHSM-DSCC-4-TH	Mathematical Physics I (Theory) (Level 200)	CO 1: Understand how to expand a function in a Fourier series. (Understand, Apply)				
		CO 2: Solving differential equation using power law expansion (so called Frobenius method). learn about various special functions i.e. Legendre, Bessel functions, generating functions and their properties. (
		CO 3: Study Fourier integral and its properties and application to signal analysis and also in quantum mechanics. (Understand, Apply)				
		CO 4: Application of probability and various distribution functions in physics. (Apply)				
		CO 5: Learn to solve partial differential equation and apply for various physical systems. (Understand, Apply)				
		CO 6: Understand numerical analysis and study various numerical techniques in solving mathematical problems numerically. (Understand)				
PHSM-DSCC-4-P	Mathematical Physics I (Practical) (Level 200)	CO 1: Introduce various packages e.g <i>numpy</i> , <i>scipy</i> , <i>matplotlib</i> in Python. (Understand)				

		CO2: Using the add-on packages in Python to solve various numerical problems and plot results graphically. (Apply)
PHSM-SEC-3	Arduino	CO 1: Introduce Arduino environment and its applications. (Understand, Apply)
(Project & Practical)	(Technical skill)	CO 2: Understanding Arduino programming with c++. (Understand)
		CO 3: Able to design smart systems applications. (Apply)
		CO 4: The students will be able to demonstrate real life applications using Arduino IDE and
		Arduino UNO R3 Board. This course will help the students to gain hands on training on
		software-hardware interfacing techniques. (Understand, Apply)

• Mapping/Co-relation Program Outcome (PO) & Course Outcome (CO)

Semester	Paper/Course Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
SEM-1	PHSM-DSCC-1-1						
	Basic Physics (Level 100)	 ✓ 	 ✓ 	 ✓ 	\checkmark	 ✓ 	
	PHSM-SEC-1						
	Introduction to COMPUTER				\checkmark		
	PROGRAMMING and GRAPH						
	Plotting						
SEM-2	PHSM-DSCC-2-2						
	Basic Physics (Level 100)	✓	✓	✓	✓	✓	
	PHSM-SEC-2						
	Scientific Writing Skills (LaTeX)				✓		✓
	PHSM-DSCC-3-3						
	Waves and Optics (Level 200)	 ✓ 	 ✓ 	 ✓ 			
SEM-3	PHSM-DSCC-3-4						
	Mathematical Methods I (Level 200)	\checkmark			\checkmark		
	PHSM-SEC-3						
	Arduino			 ✓ 	\checkmark		