Shikshak Sanchalit Shikshan Sanstha's

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(AFFILIATED TO UNIVERSITY OF MUMBAI)

DEPARTMENT OF PHYSICS

Year (2024-2025)

NEP-2020 and Outcome-Based Education (OBE) compliant version of " Attainment of Course Outcomes (COs) and Programme Specific Outcomes (PSOs)" for a Department of Physics. It incorporates the principles of experiential learning, multidisciplinary education, skill enhancement, ICT integration, research orientation, and continuous assessment, as emphasized in the NEP 2020 framework.

Attainment of Course Outcomes (COs) and Programme Specific Outcomes (PSOs)

The Department of Physics adopts an Outcome-Based Education (OBE) approach aligned with the National Education Policy (NEP) 2020 to ensure the effective attainment of Course Outcomes (COs) and Programme Specific Outcomes (PSOs). The teaching-learning process emphasizes conceptual understanding, experiential learning, laboratory skills, critical thinking, research aptitude, digital literacy, and employability.

Strategies Adopted for CO and PSO Attainment

- Fundamental concepts are reinforced through interactive classroom teaching, tutorial sessions, problem-solving exercises, and laboratory practice, resulting in enhanced student interest and improved conceptual understanding.
- Experiential learning is promoted through hands-on laboratory experiments, electronic circuit design, model-based demonstrations, project-based learning, and ICT-enabled teaching methodologies, enabling students to correlate theoretical concepts with practical applications.

- Students develop proficiency in handling scientific instruments such as spectrometers, optical benches, oscilloscopes, function generators, multimeters, Vernier calipers, micrometer screw gauges, and other laboratory equipment, thereby improving experimental skills and scientific accuracy.
- Continuous laboratory practice, demonstrations, and faculty mentoring help minimize experimental errors, enhance analytical abilities, and build confidence in conducting experiments independently.
- Faculty members provide personalized academic mentoring, remedial coaching, career guidance, and counseling for higher education, competitive examinations, entrepreneurship, internships, and placement opportunities in accordance with NEP 2020 objectives.
- Innovative teaching practices, including ICT-enabled classrooms, virtual laboratories, simulation software, multimedia presentations, flipped learning, and inquiry-based learning, improve student engagement and facilitate the attainment of higher-order cognitive skills.
- Continuous assessment is carried out through internal examinations, practical examinations, assignments, seminars, quizzes, laboratory records, viva-voce, project work, and student presentations. Both direct and indirect assessment methods are employed to evaluate the attainment of Course Outcomes and Programme Specific Outcomes.
- Educational visits to research laboratories, industries, observatories, and scientific organizations, in outreach programmes, workshops, conferences, science exhibitions, cultural events, NSS, NCC, and sports activities, provide multidisciplinary exposure and promote holistic development.

Methods and Tools Used for Course Outcome Attainment

Sr. No.	Method of CO Attainment	Laboratory Equipment / Teaching Tools
1	Experiential learning through electronic circuit design and project-based activities	Printed Circuit Boards (PCB), Breadboards, Resistors, Capacitors, Diodes, Transistors, ICs, Multivibrator and Timer Circuits, Electronic Projects, Arduino-based experimental kits, ICT-enabled teaching tools
2	Experimental training in Electronics	Cathode Ray Oscilloscope (CRO)/Digital Storage Oscilloscope (DSO), Function Generator, Digital Multimeter, Frequency Meter, Regulated Power Supply, Ammeter, Voltmeter
3	Laboratory experiments in	Kater's Pendulum, Flywheel Apparatus, Vernier

	Mechanics	Calipers, Micrometer Screw Gauge, Spherometer, Travelling Microscope, Meter Scale, Metal Bobs
4	Experimental training in Optics	Spectrometer, Optical Bench, Convex and Concave Lenses, Prisms, Diffraction Grating, Polarizer, Calcite Crystal, Biprism, Laser Source, Optical Slits
5	ICT-enabled and Digital Learning-**planning**	Virtual Laboratories, Simulation Software, Smart Classroom, Learning Management System (LMS), SWAYAM, NPTEL, E-content, Multimedia Presentations

Assessment Tools for CO and PSO Attainment

Direct Assessment Methods

- Internal Tests and Semester-End Examinations
- Practical Examinations and Viva-Voce
- Laboratory Records and Assignments
- Seminars, Projects, and Presentations
- Problem-Solving Exercises and Quizzes

Indirect Assessment Methods

- Student Feedback
- Course Exit Survey
- Alumni Feedback
- Employer Feedback
- Placement and Higher Education Progression
- Participation in Research, Extension, and Outreach Activities

Outcome

Through the effective implementation of NEP 2020 principles, the Department of Physics has achieved significant improvement in students' conceptual understanding, practical competence, scientific attitude, digital proficiency, employability, research orientation, and progression to higher education. The attainment of Course Outcomes (COs) and Programme Specific Outcomes (PSOs) is periodically reviewed by the Department and IQAC