

# Department of Physics

## Application of Outcome Based Education (OBE) in the PG and UG programs of Physics

**PG**

**Course Outcomes (COs) & Program Outcomes (POs) for Postgraduate Program in Physics**  
Netaji Subhas University  
Pokhari, Jamshedpur  
M.Sc. Physics  
Effective from Academic Session 2018-2020

**Vision of the Physics Department**  
*To imbibe the spirit of understanding the Nature in greater depths and enjoy its application for the societal satisfaction to greater heights.*

**Mission of the Physics Department**  
*To educate the basics, enjoy the conceptual applications, empower the research temperament and elevate the societal responsibility of the learners.*

**Program Outcomes (POs)**

**PO1. Fundamental Knowledge**  
Develop a strong foundation in core areas of physics, including classical mechanics, quantum mechanics, electromagnetism, statistical mechanics, condensed matter physics, and nuclear physics.

**PO2. Analytical and Problem-Solving Skills**  
Enhance mathematical, analytical, and logical reasoning to solve complex problems in physics using theoretical models and computational techniques.

**PO3. Experimental and Computational Proficiency**  
Gain expertise in advanced laboratory techniques, instrumentation, and computational tools, including numerical methods and simulations for solving real-world physics problems.

**PO4. Research and Innovation**  
Develop research aptitude by engaging in literature review, experimentation, data analysis, and scientific inquiry, leading to innovative solutions in physics and interdisciplinary areas.

**PO5. Application of Physics in Technology and Industry**  
Apply physics principles in material science, electronics, photonics, nanotechnology, medical physics, renewable energy, space research, and other applied fields.

**PO6. Communication and Scientific Reporting**  
Develop the ability to communicate scientific ideas effectively through research papers, reports, presentations, and discussions.

**PO7. Ethics and Professional Responsibility**  
Understand and uphold scientific integrity, ethical research practices, and environmental sustainability in scientific and industrial applications.

**PO8. Lifelong Learning and Adaptability**  
Cultivate a mindset for continuous learning and skill enhancement to stay updated with emerging trends in physics and technology.

**PO9. Interdisciplinary Approach**  
Apply physics concepts in cross-disciplinary domains such as computational sciences, bio-physics, atmospheric sciences, plasma physics, and material science.

**PO10. Employability, Entrepreneurship, and Higher Studies**  
Prepare students for careers in academia, research institutes, R&D labs, industries, government sectors, and startups, and equip them for higher studies like Ph.D. programs.

**Program Specific Outcomes (PSOs) for M.Sc. Physics**

**PSO1: Advanced Theoretical and Experimental Physics**  
Develop a deep understanding of core physics concepts such as Quantum Mechanics, Electrodynamics, Statistical Mechanics, and Condensed Matter Physics, along with proficiency in experimental techniques.

**PSO2: Computational methods, computational techniques, and simulation tools to solve complex physics problems and analyze real-world phenomena.**

**PSO3: Research and Innovation in Physics**  
Gain expertise in scientific research methodologies, data analysis, and critical thinking to contribute to innovative research and interdisciplinary applications.

**PSO4: Applications of Physics in Industry and Technology**  
Utilize physics principles in materials science, electronics, nanotechnology, renewable energy, space science, and medical physics to address technological and societal challenges.

**PSO5: Scientific Communication and Ethics**  
Develop effective scientific communication skills through research papers, reports, and presentations while adhering to ethical research practices and professional integrity.

**PG**

**UG PHYSICS HONS**

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**Mission of the Physics Department**  
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**Program Outcomes (POs)**

**PO1: Scientific Knowledge**  
Develop a fundamental and applied understanding of physics concepts, including classical mechanics, electromagnetism, quantum mechanics, statistical mechanics, and solid-state physics.

**PO2: Problem-Solving & Analytical Skills**  
Analyze physical problems, apply mathematical models, and develop solutions using logical reasoning and computational tools.

**PO3: Experimental and Laboratory Proficiency**  
Conduct physics experiments, interpret data, and use scientific instruments with precision and accuracy.

**PO4: Research & Innovation**  
Engage in scientific research, understand recent developments in physics, and contribute to knowledge creation through project-based learning.

**PO5: Application of Technology**  
Utilize computational and simulation techniques for modeling physical systems and analyzing experimental data.

**PO6: Environmental & Social Awareness**  
Understand the environmental impact of physics applications, energy conservation, and sustainable development in line with global challenges.

**PO7: Ethics & Professionalism**  
Develop a sense of professional ethics, responsibility, and scientific integrity in research and practical applications.

**PO8: Effective Communication**  
Communicate scientific ideas effectively through oral, written, and graphical means for diverse audiences.

**PO9: Teamwork & Leadership**  
Work effectively in multidisciplinary teams, contribute to collaborative projects, and develop leadership skills.

**PO10: Lifelong Learning**  
Engage in continuous learning and professional development in physics and interdisciplinary fields through higher studies, research, and self-driven exploration.

**Program Specific Outcomes (PSOs)**

**PSO1 - Master Fundamental Physics Concepts**  
Gain in-depth knowledge of core physics principles and their applications in real-world scenarios.

**PSO2 - Develop Computational and Analytical Skills**  
Use mathematical and computational tools (e.g., Python, MATLAB, LAMMPS) to analyze and simulate physical systems.

**PSO3 - Conduct Experimental Research**  
Perform advanced physics experiments, including spectroscopy, optics, electronics, and materials science, with hands-on laboratory experience.

**PSO4 - Apply Physics in Industry & Research**  
Utilize physics concepts in industrial applications, including materials science, semiconductor technology, plasma physics, and environmental physics.

**PSO5 - Engage in Multidisciplinary Applications**  
Integrate knowledge of physics with emerging fields such as nanotechnology, computational physics, biophysics, and sustainable energy.

**PSO6 - Prepare for Higher Studies & Careers**  
Develop skills necessary for higher education, competitive exams (e.g., JAM, GATE, NET), and careers in research, teaching, and technology-driven industries.