De La Salle University

MASTER IN PHYSICS

Master in Physics aims to hone the skills of college physics teachers and produce graduates who have concrete understanding of the fundamental physical principles and techniques, with a capacity for quantitative and technical analysis. It is hoped that this will enable the graduates of the program to be critical thinkers able to conduct intelligent valuation of text and materials that they use in physical teaching. It is further hoped that graduates of the program understand the scope of applicability of physical theories and laws are able to relate physical theories and concepts to practical situations. Graduates of the program are also expected to incorporate findings in physics education research to enhance physics teaching effectiveness.

Program Requirements

Advance Academic Writing	(6 units)
Basic Courses	15 units
Major Courses	18 units
Cognate/Elective Courses *	3 units
Comprehensive Examination	0 unit
Total	**36 units**

Course Description

Advance Academic Writing Courses:

Advanced Technical Reading and Writing I (ENG501M)
3 units
The first part of an intensive English academic reading and writing course, focuses on the review of basic reading and writing skills and their application in the preparation of short academic papers such as definitions and descriptions, and non-prose forms. It emphasizes the mastery of active reading strategies, the effective use of rhetorical and organizational features of academic writing, and proper documentation.

Advanced Technical Reading and Writing II (ENG502M)
3 units
The second part of the intensive English academic reading and writing course, focuses on the writing of data commentary and the various parts of a research report, with emphasis on the different rhetorical moves and the linguistic features that realize these moves. The course continues to emphasize the observance of integrity in writing and research.

Remedial Course:

Calculus for Physics (PHY500M)
3 units
Differentiation; product and sum rules of derivatives; geometric interpretation of derivatives; derivatives of trigonometric, logarithmic and exponential functions; integration; sum rules of integration; integration as anti-differentiation; geometrical interpretation of integrals; power rule and integrals of trigonometric and exponential functions; integration by parts; multiple integration.

Basic Courses:

History and Philosophy of Science (PHY551M)
3 units
Ancient and Medieval Science. The Scientific Revolution. The Industrial Revolution. Rationalism and Empiricism. The Workings of Science. Theory and Experiment. Confirmation and Acceptance. Ontological and Epistemological Status of Theories and Theoretical Entities. Scientific Changes. Science and Culture.

Teaching of College Physics (PHY557M)
3 units
Learning Theories. Test Construction. Results and Implications from Physics Education Researches. Reforms in Physics Education.

Mathematical Methods for Physics (PHY501M)
3 units
Vector algebra. Vector differentiation and integration. Second derivatives of vectors. Gauss' and Strokes' Theorems. Matrices and determinants. Tensor algebra.

Newtonian Mechanics (PHY503M)
3 units
Rectilinear motions. Projectile and circular motions. Newton's Laws. Forces. Gravity. Work and Energy. Impulse and Momentum. Torque. Rotational motion.

Seminar in Physics (PHY559M)
3 units
Attendance in physics seminar and colloquia. Presentation and submission of an expository paper in physics.

Major Courses:

Basic Classical Mechanics (PHY505M)
3 units
Lagrangian and Hamiltonian formulations. Central Forces. Harmonic Oscillators. Non-imertial Frames. Dynamics of Rigid Bodies.

Basic Electricity and Magnetism (PHY507M)
3 units
Maxwell Equations. Electrostatics in vacuum. Boundary value problems and special techniques. Magnetostatics. Electrodynamics.

Basic Statistical Mechanics (PHY515M)
3 units
Temperature. Ideal gases. Gas processes. The Second Law. Heat engines. Introduction to statistical methods. Statistical description of systems of particles. Statistical thermodynamics.

Basic Wave Mechanics and Optics (PHY519M)
3 units
Mechanical waves; electromagnetism waves; reflection; refraction; interference; diffraction; polarization; lasers.

Basic Modern Physics (PHY509M)
3 units
Special relativity; particle properties of waves; wave properties of particles; atomic structure; quantum mechanics.

Physics Laboratory I: Mechanics (PHY510M)
1 unit
Measurement and significant figures; errors; graphs and equations; uniform acceleration; projectile motion; composition of concurrent forces; coefficient of friction; Atwood's machine; centripetal force; conservation of mechanical energy; conservation of linear momentum.

Physics Laboratory II: Thermodynamics & Electricity (PHY511M)
1 unit
Coefficient of linear expansion; specific heat of solids; heat of fusion; hear of vaporization; mechanical equivalent of heat; using the multimeter; electric field; Ohm's Law; resistors in series and parallel; Kirchhoff's Rules; emf, terminal voltage and internal resistance; construction of voltmeter and ammeter.

Physics Laboratory III: Optics and Modern Physics (PHY512M)
1 unit
Standing waves, resonance; reflection and refraction; Image formation with mirrors; converging lens; light and color diffraction; photoelectric effect; e/m; radioactivity.

Cognate / Elective Courses:

Advanced Modern Physics (PHY521M)
3 units
Quantum mechanics of the hydrogen atom; many-electron atoms; molecules; the solid state; nuclear structure; nuclear transformations; elementary particles.

Experimental Methods in Physics (PHY693M)
3 units
A course on the basic experimental techniques in physics and practical work on vacuum systems.

General Relativity (PHY647M)
3 units
Manifolds, modern differential geometry and tensor analysis; basic principles of general relativity; Einstein's field equations and their mathematical properties; exact solutions; linearized theory; variational principles and conservation laws; equations of motion; gravitational waves; and experimental tests.

Comprehensive Examination:

Each student should have a minimum grade of **50%** percentile score in all four areas: mechanics, electricity and magnetism, thermodynamics and statistical mechanics, and modern physics to pass the written comprehensive examination.