Iligan Institute of Technology
of the Mindanao State University
Quality Education for a better Mindanao

MASTER OF PHYSICS

Rationale

Consistent with the mandate of the Commission of Higher Education (CHED) as Center-of-Excellence (COE) of Physics outside of Luzon and as a DOST-PCASTRD accredited institution in Physics, the Department of Physics of MSU-IIT recognizes its special responsibility to continually improve the quality of physics research and instructional delivery system of physics in the country specially in Southern Philippines. Recognized by CHED as COE by virtue of CHED Resolution No. 021-98, the Institute is proud of its role as premier institution producing a generation of brilliant physics graduates who are now holding teaching and research positions in universities of the country.

The existing Master of Science in Physics (MS) program at MSU-IIT is designed for those who intend to proceed to the Ph.D. Physics program or engage in teaching advanced physics courses or do research both in the academe and Industry. Faced with stringent requirements that the MS Physics program demands only very few students can be admitted into this program since there are only few Bachelor of Science (BS) Physics graduates in the country.

The present overwhelming need is to address the cause of deteriorating quality of tertiary physics education in the country. The implementation of Master of Physics (MOP) program in the Philippine's Center-of-Excellence in Physics responses to the call of the Commission on Higher Education with its Higher Education Development Project to improve and upgrade the academic qualifications of the university and college physics instructors. MOP program enables engineering and allied science degree holders to enroll in a regular master's degree program designed for those teaching physics in the tertiary level. Quality physics instruction and advanced research facilities of the Department of Physics uphold the MOP program of the Institute by introducing students to the challenge and excitement of understanding the broad principles of physics.

Objectives

- To provide an effective learning environment for students thereby equipping them to be responsive to the manpower needs of the country.
- To produce highly competent graduates with solid and rigorous training in advanced physics courses for tertiary instruction.

Admission Requirements

i.) Possession of a bachelor's degree in engineering, mathematics, chemistry, or physics education or, if not a graduate of any of these, a GPA of 2.0 (or its equivalent) or better in the following undergraduate courses: General Physics (10 units), Calculus (10 units), and Differential Equations (3 units).

ii.) Pass the entrance examination in general physics and mathematics. Two (2) letters of recommendation from former professor and immediate supervisor attesting to the applicant's intellectual capacity for advanced studies.

iii.) Compliance of the School of Graduate Studies and the Institute admission requirements.

iv.) Submission of a certified true copy of official Transcript of Records.

Degree Requirements

	Units
Core Courses	21
Discipline Related-Courses	9
Special Project	6
TOTAL	**36**

Delivery Mode

a. Full time student during summer
b. Weekend lectures
c. Equivalent number of hours compressed in few days. The lecture venue maybe inside or outside MSU-IIT campus.

MASTER OF PHYSICS (MOP)

(LIST OF COURSES BY SEMESTER)

First Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
Phys 290.1	Mathematical Physics I	3				
Phys 220.1	Theoretical Mechanics I	3				
	Total	6				

First Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
Phys 230.1	Electromagnetism I	3				
Phys 240.1	Modern Physics I	3				
	Total	6				

First Year, Summer

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
Phys 230.2	Electromagnetism I	3				
Phys 240.2	Modern Physics I	3				
	Total	6				

Second Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
Phys 232.1	Electronics I (Elective)	2				
Phys 236.1	Electronics Lab (Elective)	1				
Physics Elective		3				
	Total	6				

Second Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
Phys 242.1	Quantum Mechanics I	3				
Physics Elective		3				
	Total	6				

Second Year, Summer

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
Phys 299.1	Special Project	6				
	Total	6				

TOTAL NUMBER OF UNITS: 36

Note:

1. One (1) hour is allotted for every unit of lecture courses.
2. Three (3) hours is allotted for every unit of laboratory courses.

CATALOGUE OF COURSES

PHYS 220.1 THEORETICAL MECHANICS I

Newtonian mechanics of particles and systems of particles, vector analysis, conservation of energy, conservative forces, central forces, Gravitation, special relativity and the covariant formulation.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Math 151 and Phys 41

PHYS 230.1 ELECTROMAGNETISM I

A rigorous treatment of classical electromagnetism using vector analysis and partial differential equations, electric fields and potentials, solutions of Laplace's and Poisson's equations, dielectric materials, magnetostatics, magnetic materials, circuit analysis.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Phys 41 and Phys 290.1

PHYS 232.1 ELECTRONICS (ELECTIVE)

Circuit analysis and Instrumentation

Credit : 2 units (2 hours lecture)

PHYS 236.1 ELECTRONICS LABORATORY (ELECTIVE)

Laboratory course to accompany Phys 232.1

Credit : 1 unit (3 hours laboratory)

PHYS 240.1 MODERN PHYSICS I

Historical and experimental foundation of relativity, relativistic mechanics, early atomic theories, Planck's radiation law, photoelectric effect, the Rutherford atom, Bohr theory and its triumphs, generalizations and difficulties, de Broglie hypothesis and its consequences. Wave mechanics and the Schroedinger equation, applications to one-dimensional systems.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Phys 41 and Phys 290.1

PHYS 230.2 ELECTROMAGNETISM II

Maxwell's equations and their applications, electromagnetic waves, reflection and refraction, wave guides, resonant, cavities, antennas, special relativity and the formulation of electrodynamics.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Phys 230.1

PHYS 240.2 MODERN PHYSICS II

Continuation of Phys 240.1: Topics include Schroedinger theory and its application to atomic and molecular physics, solids, nuclei and elementary particles.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Phys 240.1

PHYS 242.1 QUANTUM MECHANICS I

Wave Functions, Schroedinger Equation (time-dependent and time-independent), The Uncertainty Principle, Schroedinger Equation in spherical coordinates, Hydrogen atom, System of particles, Solids, and Quantum Statistical Mechanics.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Phys 230.2 and Physics 240.2

PHYS 248.1 ADVANCED LABORATORY I (ELECTIVE)

Conduct different experiments using the advanced apparatuses of the four existing laboratories of the department (Material Science Laboratory, High Energy Physics Laboratory, Computational Physics laboratory, and Photonics Laboratory).

Credit : 3 units (9 hours lab)
Prerequisite(s) : Phys 230.2 and Physics 240.2

PHYS 258.1 ADVANCED LABORATORY II (ELECTIVE)

Continuation of Phys 248.1.

Credit : 3 units (9 hours lab)
Prerequisite(s) : Phys 230.2 and Physics 240.2

PHYS 260.1 THERMAL AND STATISTICAL PHYSICS I (ELECTIVE)

Thermodynamic systems, equations of state, laws of thermodynamics, phase changes, entropy, kinetic theory of gases, distribution of molecular velocities, molecular transport phenomena, Maxwell-Boltzmann statistics, and introduction to statistical mechanics.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Phys 220.1 and Physics 240.2

PHYS 290.1 MATHEMATICAL PHYSICS I

Selected topics in linear ordinary and partial differential equations: self-adjoint and eigenvalue problems, Green's functions, Sturm-Liouville theory, Fourier series and eigenfunction expansions, orthogonal functions, integral equations, vector spaces and matrix theory.

Credit : 3 units (3 hours lecture)

PHYS 295.1 SPECIAL TOPICS I (ELECTIVE)

A course on selected advanced topics not covered in formal courses; course content is variable and depends on the expertise of the instructor.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Instructor's consent

PHYS 299.1 SPECIAL PROJECT

Credit : 6 units