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

MASTER OF SCIENCE IN PHYSICS

Admission Requirements

1. Possession of a BS Physics degree from a reputable institution or, for non-physics majors, a GPA of 2.5 or better in at least 15 units in the following advanced undergraduate courses:

   Mechanics
   Electromagnetic Theory
   Quantum Mechanics
   Statistical Physics and Thermodynamics
   Differential Equations/Mathematical Physics

2. Passing the entrance exam in any three of the five areas listed above.

3. Submission of a certified true copy of Official Transcript of Records.

MASTER OF SCIENCES IN PHYSICS (MS PHYS)

(LIST OF COURSES BY SEMESTER, THESIS OPTION)

First Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
Phys 221	Classical Mechanics I	3				
Phys 231	Classical Electrodynamics I	3				
Phys 241	Quantum Mechanics I	3				
	Total	9				

First Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
Phys 232	Classical Electrodynamics II	3				
Phys 242	Quantum Mechanics II	3				
Phys 261	Statistical Mechanics I	3				
	Total	9				

Second Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
Phys 295	Graduate Laboratory I	2				
Physics Elective		6				
	Total	8				

Second Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
Phys 296	Graduate Seminar	2				
Physics Elective		3				
Phys 300	Masteral Thesis	6				
	Total	11				

TOTAL NUMBER OF UNITS: 37

MASTER OF SCIENCE IN PHYSICS (MS PHYS)

(LIST OF COURSES BY SEMESTER, NON-THESIS OPTION)

First Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
Phys 221	Classical Mechanics I	3				
Phys 231	Classical Electrodynamics I	3				
Phys 241	Quantum Mechanics I	3				
	Total	9				

First Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
Phys 232	Classical Electrodynamics II	3				
Phys 242	Quantum Mechanics I	3				
Phys 261	Statistical Mechanics I	3				
	Total	9				

Second Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
Phys 210	Graduate Laboratory I	2				
Physics Elective		6				
	Total	8				

Second Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Prerequisite(s)
			Lec	Lab	Total	
Phys 295	Graduate Seminar	2				
Physics Elective		9				
	Total	11				

TOTAL NUMBER OF UNITS: 37

In the non-thesis option, the curriculum consists of 37 units course work including Phys 210. The M.S. Physics degree will be awarded upon obtaining a passing grade in the Comprehensive Examination to be given by the Graduate Committee

CATALOGUE OF COURSES

PHYS 210 GRADUATE LABORATORY I

An advanced course in experimental physics which deals with the laboratory techniques required in actual research development work.

PHYS 211 GRADUATE LABORATORY II

Laboratory course for Computational Physics Class hours: 6 hours laboratory

Credit : 2 units (6 hours laboratory)

PHYS 221 CLASSICAL MECHANICS I

An advanced course in Newtonian and relativistic mechanics: particle and rigid body motions, Lagrangian-Hamiltonian formulation, relativistic covariant formulation.

Credit : 3 units (3 hours lecture)

PHYS 222 CLASSICAL MECHANICS II

Continuation of Physics 221: canonical transformations, Hamilton-Jacobi theory, small oscillations, Lagrangian-Hamiltonian formulation of continuous systems and fields.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Physics 221

PHYS 231 CLASSICAL ELECTRODYNAMICS I

An advanced course in electricity and magnetism; electrostatics and magnetostatics in vacuum and material media, Maxwell' equations, electromagnetic waves, wave guides,resonant cavities, radiations.

Credit : 3 units (3 hours lecture)

PHYS 232 CLASSICAL ELECTRODYNAMICS II

Continuation of Physics 231: radiating systems, radiation by moving charges, breamsstrahlung, multipole fields, relativistic dynamics of charges, classical electron theory, magnetohydrodynamics.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Physics 231

PHYS 241 QUANTUM MECHANICS I

An advanced course in quantum theory and its applications: historical and experimental background, Schrodinger equation, stationary states, stationary perturbation, Hilbert-space formulation, observables and operator theory, angular momentum, central potentials.

Credit : 3 units (3 hours lecture)

PHYS 242 QUANTUM MECHANICS II

Continuation of Physics 241: symmetry and conservation of laws, identical particles, spin, non-stationary perturbation, scattering theory, semi-classical theory of radiation, applications to atoms, molecules and nuclei.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Physics 241

PHYS 243 ADVANCED QUANTUM MECHANICS I

An introduction to relativistic quantum mechanics: the relativistic equations, their solutions and interpretations.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Physics 242

PHYS 244 ADVANCED QUANTUM MECHANICS II

An introduction to quantum fields: classical field theory, quantization of fields, interacting fields, quantum electrodynamics.

Credit : 3 units (3 hours lecture)

PHYS 253 ATOMIC AND MOLECULAR PHYSICS

Quantum theory of angular momentum, one-electron and multi-electron atoms, Pauli principle, radiative transitions, selection rules, molecular rotations and vibrations, group theory and symmetry, line widths.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Physics 242

PHYS 255 SOLID STATE PHYSICS

An advanced course in the quantum theory of solids: lattice structure, quantization of lattice vibration, thermal properties, free-electron theory, electron-phonon interaction, electron-electron interaction, super conductivity.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Physics 242

PHYS 261 STATISTICAL MECHANICS I

Statistical methods, equilibrium statistical thermodynamics, partition functions, equi-partition theorem, ideal gases, quantum statistics and applications to non-interacting particles and degenerate systems.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Physic 241

PHYS 262 STATISTICAL MECHANICS II

Continuation of Physics 261: systems of interacting particles, transport theory, irreversible processes, fluctuations.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Physics 261

PHYS 263 COMPUTATIONAL PHYSICS I

Numerical methods; introduction to linear and dynamic programming; ordinary and partial differential equations; matrix operations; boundary value and eigenvalue problems.

Credit : 3 units (3 hours lecture)

PHYS 264 COMPUTATIONAL PHYSICS II

Principles of simulation and modeling; statistical description of data; modeling of data; minimization and maximization of functions; Monte Carlo method.

Credit : 3 units (3 hours lecture)

PHYS 265 ADVANCED COMPUTATIONAL PHYSICS

Selected advanced topics of current interest in computational physics

Credit : 3 units (3 hours lecture)

PHYS 271 NUCLEAR PHYSICS I

A quantum approach to nuclear physics: properties of nuclei, radioactivity, nuclear models, isospin formalism, fission and fusion, electromagnetic and nuclear interactions, beta decay.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Physics 242

PHYS 275 ELEMENTARY PARTICLE PHYSICS I

A course on the properties and interactions of the fundamental particles.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Physics 243

PHYS 276 EXPERIMENTAL METHODS OF ELEMENTARY PARTICLE PHYSICS

Advanced laboratory techniques and instrumentation of elementary particle physics.

Credit : 3 units (3 hours lecture)

PHYS 285 GENERAL THEORY OF RELATIVITY I

An introduction to the Einsteinian theory of gravitation: special relativity, principle of equivalence, tensor analysis, Einstein's field equations, Schwarzschild solution, post-Newtonian approximation, gravitational radiation, experimental tests.

Prerequisite(s) : Physics 222, 232

PHYS 286 GENERAL THEORY OF RELATIVITY II

Continuation of Physics 285: relativistic astrophysics, gravitational collapse, spacetime singularities, differential geometry, tetrad formalism, symmetric spaces, cosmology.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Physics 285

PHYS 291 MATHEMATICAL PHYSICS I

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

Credit : 3 units (3 hours lecture)

PHYS 292 MATHEMATICAL PHYSICS II

Hilbert spaces, operator algebras and representation theory.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Physics 291

PHYS 293 MATHEMATICAL PHYSICS III

Discrete and continuous groups, group representation, differential geometry, Lie groups and Lie algebras, rotation group, Lorentz group, unitary groups, special functions.

Credit : 3 units (3 hours lecture)
Prerequisite(s) : Physics 291

PHYS 295 GRADUATE SEMINAR

A seminar course on recent developments in physics. Students will be required to discuss current research results and implications.

Credit : 2 units, repetitive credit

PHYS 296 SPECIAL TOPICS I

A course on selected advanced topics not covered in formal courses; course content variable.

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

PHYS 297 SPECIAL TOPICS II

Continuation of Physics 296.

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

PHYS 298 SPECIAL TOPICS IN EXPERIMENTAL PHYSICS

Advanced laboratory techniques and instrumentation in a specialized area of experimental physics that is not covered in the other courses.

Credit : 2-3 units

PHYS 300 MASTERAL THESIS

Credit : 6 units