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

MASTER OF MATHEMATICS

Introduction

More than ten years of implementation of the Master of Science in Mathematics (MS MATH) program reveals that many applicants seeking for admission to the program have inadequate preparation for graduate mathematics. These applicants have either Bachelor's degree from related disciplines and who decide to pursue a degree in mathematics because of their present occupation such as teaching tertiary mathematics or applicants with degree in a mathematics curriculum who has insufficient mathematics components towards a standard MS Math program. Admitted to the MS Mathematics program under conditional status, these type of applicants are required to undertake a one or two semesters of undergraduate advance mathematics coursework, many are not able to acquire the necessary maturity to tackle mathematics courses in the MS Math curriculum. Having no other options provided by the Mathematics Department, the student would either stay another year of transition courses or leave the MS Math program. To prevent wastage in educating the prospective tertiary mathematics teachers and to make graduate offerings more flexible, the Mathematics Department designed a masteral degree curriculum that provides advanced training for teaching tertiary mathematics which can also be used by students as a qualifying degree for MS Math.

Objectives

1. To provide training in Mathematics concepts for high school or tertiary teaching up to the level of calculus;
2. To serve as post baccalaureate qualifying degree for a standard MS Mathematics curriculum.

Admission Requirement

An applicant for the Master of Mathematics program must have:

1. A baccalaureate degree in mathematics, science, science education, engineering or other related disciplines with at least 24 units of Mathematics including the standard calculus sequence;
2. an undergraduate GPA of at least 2.0;
3. Two letters of recommendation from two former professors attesting to the applicant's intellectual capacity for advance studies; and
4. Must comply with the general admission requirements of the university and the MSU-IIT Graduate School.

Degree Requirement

Core Courses	18 units
Major Courses/Electives	12
Seminar Course	3
Comprehensive Examination	
Special Project	3
Total	36 unit

MASTER OF MATHEMATICS (MOM)

(LISTOF COURSES BY SEMESTER)

First Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Pre-requisite(s)
			Lec	Lab	Total	
Math 208	Advanced Calculus I	3				
Math 225.1	Fund. of Abstract Algebra I	3				
	Math Elective	3				
	Total	9				

First Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Pre-requisite(s)
			Lec	Lab	Total	
Math 209	Advanced Calculus II	3				Math 208
Math 225.2	Fund. of Abstract Algebra II	3				Math 225.1
Math 221.1	Fund. of Linear Algebra I	3				
	Total	9				

First Year, Summer

Course No.	Course Title	Units	Hrs/Wk			Pre-requisite(s)
			Lec	Lab	Total	
Math 210	Advanced Calculus III	3				Math 209
	Math Elective	3				
	Total	6				

Second Year, First Semester

Course No.	Course Title	Units	Hrs/Wk			Pre-requisite(s)
			Lec	Lab	Total	
Math 297	Seminar on Selected Topics	3				
Math230/ Stat 201	Statistical Methods	3				
	Total	6				

Second Year, Second Semester

Course No.	Course Title	Units	Hrs/Wk			Pre-requisite(s)
			Lec	Lab	Total	
	Math elective	3				
Math 299	Special Project	3				
	Total	6				

TOTAL NUMBER OF UNITS: 36

CATALOGUE OF COURSES

MATH 201 LOGIC AND SET THEORY

Sets; relations, mappings; equivalence, order; cardinals, ordinals, transfinite arithmetic; axiom of choice and its equivalents; the generalized continuum hypothesis.

Credits : 3 units
Prerequisite(s) : Undergraduate set theory or consent of Instructor

MATH 204 TRANSFORMATION GEOMETRY

Euclidean Geometry is studied using transformations. Topics: properties of transformations, translations and halfturns,reflections, congruence, the product of 2 reflections , even isometries,plane isometries,equation for isometries,frieze groups wallpaper groups , tessellation's, similarities on the plane, affine transformations , transformation in R3 , space and symmetry.

Credits : 3 units

MATH 205 GEOMETRIC STRUCTURES

Axiomatic and intuitive studies of geometries, Euclidean Geometry, Non-Euclidean geometries, projective geometries, Hilbert's Axioms.

Credits : 3 units

MATH 206 ELEMENTARY NUMBER THEORY

Peano's Axoims, properties of the natural numbers, the system of integers as a well-ordered integral domain, Euclidean Algorithm, unique factorization theorem, prime numbers, congruences, residue class rings, quadratic reciprocity. Others topics.

Credits : 3 units

MATH 208 ADVANCED CALCULUS I

Topics: set and functions, topology of Rn: compact sets, the Bolzano-Weierstrass Theorem, Heine-Borel Theorem; Monotone Sequence Property of R, Cauchy sequences; continuity, uniform continuity, properties of continuous functions, limits of functions, discontinuities; differentiation of real-valued Theorem and L'Hospital's rule, Taylor's Theorem; integration of functions of R2, properties of integrals, change of variables, the Fundamental Theorem of Calculus, improper integrals.

Credits : 3 units

MATH 209 ADVANCED CALCULUS II

Contents: Continuation of Math 208. Topics: infinite series of constant terms , convergence tests , rearrangement of series ,double series ; sequence and series of functions , uniform convergence ,Weierstrass test , uniform convergence theorem for the Riemann integral , a continuous nowhere monotone function , a continuous nowhere differentiable function ,Tietze's Extension Theorem , power series , integrals with parameters , the Gamma function , Fourier series ; differentiation of vector-valued functions , local approximation ,the Mean-Value Theorem , The Inverse Function Theorem , The Implicit Function Theorem,functional dependence.

Credits : 3 units
Prerequisite(s) : Math 208

MATH 210 ADVANCED CALCULUS III

Contents: Derivatives of set functions , change of variables for multiple integrals ; curves and arc lenght,surface and surface area , integration over curves and surfaces ; differential forms , integration of differential forms , the theorems of Green , Gauss , Stokes ,exact forms and the Poincare Lemma ; introduction to numerical methods: locating zeroes , fixed point methods, extremal problems , approximation.

Credits : 3 units
Prerequisite(s) : Math 209

MATH 221.1 FUNDAMENTALS OF LINEAR ALGEBRA I

Matrices & system of linear equations, real vector spaces, linear transformation and matrices, determinants, eigenvalues and eigenvectors.

Credits : 3 units
Prerequisite(s) : Undergraduate calculus courses or consent of instructor

MATH 221.2 FUNDAMENTALS OF LINEAR ALGEBRA II

Linear functional, bilinear and quadratic forms, canonical forms, dual spaces, product spaces, orthogonal and unitary transformations, spectral theorem.

Credits : 3 units
Prerequisite(s) : Math 221.1

MATH 225.1 FUNDAMENTALS OF ABSTRACT ALGEBRA I

Binary operations, groups, subgroups, mapping, permutations, groups of permutations, cyclic groups, homomorphisms, isomorphisms, automorphisms,

Cayley's theorem, direct products, cosets, groups of cosets, normal subgroups, factor groups, simple groups, Sylow's theorems.

Credits : 3 units
Prerequisite(s) : Undergraduate calculus courses & Math 201

MATH 225.2 FUNDAMENTALS OF ABSTRACT ALGEBRA II

Rings, subrings, fields, integral domains, fermat's theorem, homomorphisms of rings, ideals, quotient rings, field of quotient of an integral domain, maximal and prime ideals, prime fields, rings of polynomials, factorization of polynomials over a field, unique factorization domain, Euclidean domains extension fields, geometric construction and splitting fields, Galois theory.

Credits : 3 units
Prerequisite(s) : Math 225.1

MATH 212 REAL ANALYSIS I

The real number system; lebesque measure and integration; differentiation; metric spaces and topological vector spaces; Stone-Weirstrass theorem.

Credits : 3 units

MATH 214 INTRODUCTION TO NUMERICAL ANALYSIS

Solution of linear systems; least square approximations, non-linear algebraic equations interpolations and quadrature.

Credits : 3 units
Prerequisite(s) : Linear Algebra I and consent of instructor

MATH 216 COMPLEX ANALYSIS I

The comples number system; complex integration and differentiation; Cauchy's theorems; analytic functions and harmonic functions; conformal mappings; infinite series; singularities; residue theory.

Credits : 3 units
Prerequisite(s) : Undergraduate complex analysis or consent of instructor.

MATH 223 LINEAR PROGRAMMING

The simplex method; duality; geometry of linear programs; dual simplex method; parametric programming; integer programming; network analysis
including PERT-CPM; algorithms for linear programming; decomposition and upper-bound technique.

Credits : 3 units
Prerequisite(s) : Linear algebra

MATH 230 STATISTICAL METHODS

This is a survey course in basic statistical methods which includes broad topics on frequency distribution; measures of central tendency, dispersion, kurtosis, skewness, association and relationship; sampling and theoretical distributions, estimation; tests of hypothesis; one-way ANOVA and some non-parametric methods.

Credits : 3 units

MATH 231 PROBABILITY THEORY

Probability spaces; probability distributions; Random variables; independence; conditional expectation; weak and strong laws of large numbers; moment generating functions; central limit theorem.

Credits : 3 units
Prerequisite(s) : Real Analysis or consent of instructor

MATH 250 MODERN GEOMETRY

Skewfields and fields; permutation groups; classical projective planes; dual spaces and homogeneous coordinates; cross ratio; polarities; conics; elementary properties of projective and affine planes; duality principles; coordination of projective and affine planes.

Credits : 3 units
Prerequisite(s) : Linear Algebra I

MATH 251 ORDINARY DIFFERENTIAL EQUATIONS

Existence, uniqueness, and dependence theorems; linear systems; stability of non-linear systems; perturbation of periodic solutions; Poincare-Bendixson theory; equations in banach space.

Credits : 3 units
Prerequisite(s) : Linear Algebra I & Real Analysis I or consent of instructor

MATH 261 TOPOLOGY I

Topological spaces; continuous functions, product spaces and quotient spaces; convergence structures (nets and filters); separation axioms and countability properties; connectedness; metrizable spaces.

Credits : 3 units
Prerequisite(s) : Undergraduate courses in set theory/and advanced calculus, or consent of instructor.

MATH 270 COMBINATORIAL MATHEMATICS

Permutations and combinations; generating functions; principles of inclusiond and exclusion; recurrence relations; matrices of zeros and ones; partition function.

Credits : 3 units
Prerequisite(s) : Modern Algebra I and instructor's consent

MATH 275 GRAPH THEORY

Graphs and associated matrices; oriented graphs and kernels; domination and independence; matching theory; groups and graphs.

Credits : 3 units
Prerequisite(s) : Linear Algebra I and Modern algebra I

MATH 297 SEMINAR: SPECIAL TOPICS

This is a seminar on topics of mathematical disciplines not included among those specified in mathematics course numbered 288 to 296 above. This course may be repeated provided course contents are different.

Credits : 3 units

MATH 298 INDEPENDENT STUDY

Credits : 3 units
Prerequisite(s) : Adviser’s consent

MATH 299 SPECIAL PROJECT

Credits : 3 units