

UNIVERSITY GRADUATE STUDIES PROGRAM
SILLIMAN UNIVERSITY
DUMAGUETE CITY

Master of Science in Mathematics

Introduction

The Master of Science in Mathematics (MS Math) program is intended for students who wish to go into tertiary level mathematics teaching or mathematics research. This program is also for teachers who wish to upgrade their teaching proficiency in mathematics. As for researchers, it is hoped that the curriculum can provide answers to mathematical problems involved in science and technology. The main thrust of this program is on the theory and applications of mathematics. It is designed to sustain its ongoing programs, viz., the Master of Arts in Teaching Mathematics and the Bachelor of Science in Mathematics; and the development of its faculty.

Objectives of the MS Math Program

The objectives of the proposed MS Math program are:

1. To equip the prospective tertiary mathematics teacher or researcher a thorough knowledge on the theory and applications of mathematics;
2. To provide students a forum to discuss current developments in tertiary level math teaching and mathematics research;
3. To upgrade and expose students and researchers tools needed in the development of their field of interest in mathematics.

The MS Math Curriculum

I.	Basic Courses (9 units)	Units
	Math 102 Mathematical Analysis	3
	Math 103 Foundations of Mathematics	3
	Math 118 Calculus in \mathbb{R}^3	3
II.	Major Courses (15 units)	
	Math 113 Linear Algebra	3
	Math 120 Number Theory	3
	Math 124 Complex Variables	3
	Math 131 Abstract Algebra I	3

	Math 147 Advanced Calculus I	3
III.	Cognates(6 units)	
	Math 122 Mathematical Statistics	3
	Math 126 Independent Study	3
	Math 132 Abstract Algebra II	3
	Math 134 Mathematical Modeling	3
	Math 140 Math Seminar	3
	Math 142 Graph Theory	3
	Math 144 Topological Spaces	3
	Math 148 Advanced Calculus II	3
	Math 151 Numerical Analysis	3
	Math 155 Real Analysis	3
IV.	Math 250 Thesis Writing	6 units

Program of Study

First Semester (1ST Year)

Math 102	Mathematical Analysis	3
Math 103	Foundations of Mathematics	3
Math 118	Calculus in \mathbb{R}^3	3
Math 120	Number Theory	<u>3</u>
		12

Second Semester (1st Year)

Math 113	Linear Algebra	3
Math 124	Complex Variables	3
Math 131	Abstract Algebra I	3
Math 147	Advanced Calculus I	<u>3</u>
		12

Summer/First Semester (2nd Year)

Cognate Course	3
Cognate Course	3
Comprehensive Exam on Major Subjects	<u>6</u>
	6

Second Semester (2nd Year)

Thesis Writing	6
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Comprehensive Examinations

An MS Mathematics student who has earned all the required academic subjects may apply for comprehensive examinations. The Candidate must obtain a rating of at least 60% in order to qualify for thesis writing. If a student fails to meet this requirement, he/she needs to retake the subject or subjects he/she has deficiencies with.

Thesis Writing

1. The candidate submits a title to the Mathematics Graduate Programs Coordinator for approval;
2. Once the candidate has secured the approval of the title he/she intends to work as his/her thesis, an adviser is then assigned by the Coordinator to work with the candidate;
3. The following schedule of activities will then submitted to the Graduate Studies Office for approval: a) Date of Colloquium; b) Date of Pre-orals; and c) Date of Final Defense;

Admission Requirements

In addition to the University requirements for admission, MS Math applicants for admission must have passed the MS Math Admission Exam.

Graduation Requirements

- a. Curricular requirements
- b. No grade below 3.0 in all MS Math academic subjects
- c. Bound copies of Thesis
- d. Official Rating with a passing mark of the comprehensive examination
- e. Endorsement of the Faculty and the Chairman of the Mathematics Department.

Course Descriptions

Math 102 Mathematical Analysis (3 units)

Straight Lines, Functions and graphs, limits and continuity, concepts of derivatives of algebraic functions, differentials, maxima and minima problems, antiderivatives, definite integral.

Math 103 Foundations of Mathematics (3 units)

Early development on the foundations of mathematics, schools of thought on the origin and nature of mathematics, mathematical systems, Zermelo–Fraenkel Set Theory, relations, functions, and orderings, natural numbers, finite, countable, and uncountable sets, cardinal numbers, ordinal numbers, Alephs, Axiom of Choice.

Math 113 Linear Algebra (3 units)

Matrices, Properties of Matrix operations, Inverse of a matrix, Positive definite matrices, Square root of a matrix, Determinants, Cramer's Rule, Vectors and Vector spaces, Subspaces, Linear independence/dependence, Basis and Dimensions, Rank of a matrix, Linear transformations, Eigenvalues and eigenvectors.

Math 118 Calculus in \mathbb{R}^3 (3 units)

Sequences and infinite series of constant terms, power series, vectors in the plane and parametric equations, vectors in three-dimensional space and solid analytic geometry, differential calculus of functions of more than one variable, directional derivatives, gradients, application of partial derivatives, multiple integration, vector fields and line integrals.

Math 120 Number Theory (3 units)

Divisibility, Diophantine, Equations, Prime Numbers, Congruences, Multiplicative functions, Solutions to equations involving congruences, sums of squares, primitive roots, Quadratic reciprocity.

Math 122 Mathematical Statistics (3 units)

Distribution of Random Variables, Conditional Probability and Stochastic Dependence, Special Distributions, Distributions of Functions of Random Variables, Limiting Distributions, Estimations and Statistical Hypotheses, Nonparametric Methods, Sufficient statistics, Normal Distribution Theory.

Math 124 Complex Analysis (3 units)

Complex numbers and geometrical representation, Point sets, sequences, and mappings, Analytic Functions, Elementary Functions, Integration, Contour Integration, Simple Closed Contours, Cauchy Integral Theorems, Morera's Theorem, Cauchy's Inequality, Liouville's Theorem, Power Series, Calculus of Residues, Conformal Representation.

Math 126 Independent Study (3 units)

Topics in this course depend mainly on student's line of interest. Out of various researchers that the student had read analyzed and synthesized, the student chooses a topic and pursues it in preparation for his master's thesis.

Math 131 Abstract Algebra 1 (3 units)

Groups, Subgroups, Cyclic groups, Cosets, Homomorphisms, isomorphism, Cayley's Theorem, Factor Groups, Sylow Theorems, Rings, Fields Integral Domains, Rings of Polynomials, Polynomials over a field, Factor rings, Ideals.

Math 132 Abstract Algebra II (3 units)

Rings: integral domains, quaternions as a division ring, homomorphisms, ideals, factor rings, fields. Fields: Axioms and elementary theorems, finite fields, solutions of polynomial equations, field extensions. PR Math 131

Math 134 Mathematical Modeling (3 units)

Graphs of functions as models, modeling process, modeling using proportionality, model fitting, models requiring optimization, experimental modeling, dimensional analysis and similitudes, simulation modeling, modeling using calculus, interactive dynamic systems.

Math 140 Math Seminar (3 units)

Investigation on current topics in mathematics such as those in journals, research presentations in conventions and conferences, etc.

Math 142 Graph Theory (3 units)

Basic concepts, Cyclomatic number, Trees and Arborescences, Paths, centres and diameters, Flow problems, Degrees and Demi-degrees, Matching, Stability number, Kernels and Grundy functions, Chromatic number, Perfect graphs.

Math 144 Topological Spaces (3 units)

Sets and relations, functions, cardinality, order, topology of the line and plane, topological spaces, bases and subbases, continuity and topological equivalence, metric and normed spaces, countability, separation axioms, compactness, product spaces, connectedness, complete metric spaces, function spaces.

Math 141 Advanced Calculus I (3 units)

Sets and Functions, Topological Terminologies, Monotonic Sequences, Compact sets, Continuity, uniform continuity, Limits of functions on \mathbb{R}^n , Taylor's Theorem.

Math 148 Advanced Calculus II (3 units)

Definite integral, improper integrals, differentials of functions and transformations, implicit function theorems. PR Math 141

Math 151 Numerical Analysis (3 units)

Cramer's rule, Gauss–Jordan pivot, Gauss–Siedel methods, Horner's method, Newton's method. Methods for solving the area under the normal curve, Simpson's method, trapezoidal method.

Math 155 Real Analysis (3 units)

Set theory, real number system, measurable sets, Lebesgue measure, Non-measurable sets, measurable functions, Riemann integral, Lebesgue Integral, convergence in measure, differentiation of an integral, absolute continuity.

Facilities/Library Support

I. Library Collection.

Library collection and current lines of subscription in the University library for mathematics are:

- A. Journals
 1. The Mathematics Teacher
 2. American Mathematical Monthly
 3. The Philippine Statistician
- B. Books: At present, the University library has about 3,000 volumes of math books with more than 1,800 titles. This can well sustain the proposed MS Math program of the Mathematics Department.
- C. Cyber Library. The University Library has Internet facilities available for students to use for his research work. It is located at the ground floor of the Silliman University Main Library.

II. Classrooms/Math Laboratory Rooms

The Mathematics Department is housed at the west wing of the third floor of the Science Complex building of Silliman University. It has four classrooms which can also be utilized as mathematics laboratory rooms; one office room for the department chairman and one room for

the members of the math faculty. The Department has seven computers for student and faculty use. Comfort rooms for male and female students and faculty are also located adjacent to the rooms each with full time janitors for maintenance.

Faculty Profile

- 1. DR. MARCELO M. ALQUIZA**
MS MATHEMATICS – UNIVERSITY OF TENNESSEE
PH.D. IN MATHEMATICS – TEXAS CHRISTIAN UNIVERSITY

- 2. DR. MILLARD R. MAMHOT**
MS MATH–ATENEO DE MANILA UNIVERSITY, QUEZON CITY
PH.D. IN MATHEMATICAL SCIENCES

- 3. DR. ROGER THURLING**
PH.D. IN MATHEMATICS – KENT UNIVERSITY

- 4. DR. FELIX P. MUGA II**
PH.D. IN MATHEMATICS – UNIVERSITY OF THE PHILIPPINES
FACULTY, ATENEO DE MANILA UNIVERSITY
SUMMER PROFESSOR

- 5. PROF. FELICIANO I. LABRADOR**
MAT MATHEMATICS – UNIVERSITY OF THE PHILIPPINES

- 6. PROF. GILDA E. ESCRIBNER**
MAT MATHEMATICS – UNIVERSITY OF THE PHILIPPINES

- 7. PROF. KEMMONS S. KILAT**
MAT MATHEMATICS – SILLIMAN UNIVERSITY

- 8. PROF. ALICE A. MAMHOT**
MAT MATHEMATICS – SILLIMAN UNIVERSITY
CHAIRPERSON