MATHEMATICS DEPARTMENT
COLLEGE OF ARTS & SCIENCES
SILLIMAN UNIVERSITY

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DR. EARL JUDE PAUL L. CLEOPE (Ph.D. in History)
Dean

DR. ENRIQUE G. ORACION (Ph.D. in Anthropology)
Dean, University Graduate Programs

DR. MAE BRIGITT BERNADEL L. VILLORDON (Ph.D. in Biology)
Mathematics Department Head

DR. MILLARD R. MAMHOT(Ph.D. in Mathematical Sciences)
Graduate Programs in Mathematics Coordinator

Faculty:

1. Dr. Jenette S. Bantug	**- Ph.D. in Mathematics**
2. Assoc. Prof. Alice A. Mamhot	**– M.S. in Mathematics**
3. Asst. Prof. Emelyn C. Banagua	**- M.S. in Mathematics**
4. Asst. Prof. Shariff Ivan G. Datar	**– M.S. in Mathematics**
5. Rhea Rheem M. Bolodo	**– M.S. in Mathematics**
6. Lourdes D. Eullaran	**– M.S. in Mathematics**

Program: The Master of Science in Mathematics Program

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.

The program encourages discussion and investigation of trending research issues in pure and applied mathematics. A graduate of this program possesses an opportunity to grow further mathematically and hence, expand the horizons of mathematics in the University.

Objectives:

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.

Admission Requirements

In addition to the University requirements for admission, MS Math applicants for admission must have taken and passed at least 18 units of undergraduate mathematics courses;

Graduation Requirements

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

Master's Thesis

The master's thesis must be a scholarly contribution to the mathematical knowledge. The procedure to be followed in complying with this requirement shall be specified by the Department consistent with relevant standard operating procedures of the HEI and in accordance with pertinent CHED memoranda.

A thesis adviser should be a holder of a Ph.D. in Mathematics or related fields, or a holder of M.Sc. degree in Mathematics or related fields with a track record in research and publication.

Comprehensive Examination

The Comprehensive Examination is a written examination that the student shall take after she/he has passed all the Required Courses. It is intended to determine whether the student has sufficient broad mathematical knowledge. It shall cover three areas: Algebra, Analysis and a third one to be chosen by the student.

The Department shall administer the exam and shall set the requirements for passing and retakes. A student who passes the Comprehensive Examination is advanced to candidacy for the M.Sc. Mathematics degree.

The MS Math Curriculum – (Based on CMO 10 series of 2011)

I. Basic Courses (9 units)

Math 131 Abstract Algebra I	3 units	
Math 113 Linear Algebra		3
Math 120 Number Theory		3

II. Major Courses (15 units)

Math 142 Graph Theory	3
Math 124 Complex Analysis	3
Math 143 Topological Spaces 1	3

Math 155 Real Analysis 1 3
Math 121 Mathematical Statistics I 3

III. Cognates(6 units)

Math 132___ Abstract Algebra II
Math 114___ Algebraic Geometry
Math 124___ Algebraic Number Theory
Math 140___ Algebraic Topology
Math 157___ Approximation Theory
Math 125___ Coding Theory
Math 158___ Combinatorial Mathematics
Math 147___ Design Theory
Math 149___ Differential Geometry
Math 159___ Functional Analysis
Math 133___ Geometric Crystallography
Math 134___ Graph Theory
Math 135___ Hyperbolic Geometry
Math 136___ Lie Algebra
Math 137___ Mathematics in Population Biology
Math 144___ Mathematical Finance
Math 145___ Mathematical Statistics
Math 148___ Multivariate Analysis
Math 160___ Numerical Analysis I
Math 161___ Numerical Analysis II
Math 162___ Numerical Optimization
Math 163___ Probability Theory
Math 164___ Projective Geometry
Math 156___ Real Analysis II
Math 165___ Stochastic Calculus
Math 166___ Theory of Ordinary Differential Equations
Math 167___ Theory of Partial Differential Equations
Math 126 Independent Study

IV. Math 250 Thesis Writing 6 units

Program of Study

A. Curricular

First Semester (1ST Year)

Math 131	Abstract Algebra I	3
Math 113	Linear Algebra	3
Math 143	Topological Spaces I	3
Math 120	Number Theory	3
		12

Second Semester (1st Year)

Math142	Graph Theory	3
Math 155	Real Analysis	3
Math 122	Mathematical Statistics	3
Math 124	Complex Analysis	3
		12

Summer/First Semester (2nd Year)

Cognate Course	3
Cognate Course	3

Comprehensive Exam on Major Subjects

Second Semester (2nd Year)

Thesis Writing	6

Section 10. Head of the Unit/Department (CMO 11)

The head of the unit/department must be at least a master's degree holder in the discipline for which the unit/department offers a program.

DR. MAE BRIGITT BERNADEL L. VILLORDON (Ph.D. in Biology)
Mathematics Department Head

Section 11. Administration of the Master's Program in Mathematics(CMO 11)

The Department shall appoint a Graduate Committee (GC) that will be responsible for administering the graduate program in mathematics. The responsibilities of the GC include the following:

1. Set and implement policies on faculty, course offerings and research standards of the programs in accordance with pertinent CHED memoranda;
2. Review and monitor the progress of students in the program; and
3. Attend to all developmental needs of the program.

Through the Graduate Committee, the institution shall see to it that the student completes the program of study on time and that the program maintains the expected academic standard.

Members of the Math Graduate Committee:

1. Dr. Millard R. Mamhot
2. Dr. Jenette S. Bantug
3. Rhea Rheem A. Muarip

Section 12. Qualifications of faculty(CMO 11)

A HEI that offers a graduate program in mathematics must have competent full-time faculty whose qualifications include not only graduate degrees in mathematics and/or related fields but also a good track record in research.

To offer a M.Sc. Mathematics program, the unit/department must satisfy the following minimum requirements:

1. The graduate faculty must consist of at least 5 faculty members teaching the program. The unit/department must have at least three (3) faculty member with an earned Ph.D. Mathematics degree. At least two (2) of these faculty members must have a full-time status with the institution.
2. The faculty is expected to be actively engaged in research and to publish in reputable scientific journals.
3. The faculty is encouraged to be active members of recognized professional organizations in mathematics.
4. The faculty is encouraged to be involved in extension activities.

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Course Descriptions

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 113 Linear Algebra (3 units)

Matrices, systems of linear equations, vector spaces, linear independence, linear transformations, determinants, eigenvalues and eigenvectors, diagonalization, and inner product spaces.

Math 121 Mathematical Statistics I (3 units)

Probability spaces, random variables, distribution functions, independence of random variables, expectation, convergence, characteristic functions, strong law of large numbers and central limit theorem.

Math 122 Mathematical Statistics II (3 Units)

Distributions Derived From The Normal Distribution, Survey Sampling, Estimation Of Parameters And Fitting Of Probability Distributions, Testing Of Hypothesis And Assessing Goodness Of Fit, Summarizing Data, Comparing Two Samples, Analysis Of Variance

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 Modern (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 143 Topological Spaces I (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 147 Advanced Calculus I (3 units)

Sets and Functions, Topological Terminologies, Monotonic Sequences, Compact sets, Continuity, uniform continuity, Limits of functions on 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.