

MATHEMATICS DEPARTMENT

The Mathematics Program aims to provide the student an understanding of the foundations of mathematics and to develop his capacity for accurate and sustained mathematical reasoning as a fundamental tool for commercial and scientific pursuit. The theory and application of mathematics in the solution of problems in the basic sciences, engineering and business disciplines are being considered in the major courses offered in the program.

Bachelor of Science in Mathematics students must have the interest and aptitude for mathematics and the sciences, the capacity for analytical thinking and reasoning, the persistence and patience necessary in problem solving, and the ability to communicate well in both oral and written language.

Job Opportunity

An increasing wide variety of complex research and development problems in engineering, in the natural and social sciences and in business management are factors leading to a growing need for mathematics majors in our society today.

Graduates of this course are needed by educational institutions, banks, industrial firms, manufacturing companies, research centers, laboratories and government agencies. They are employed as teachers of mathematics in the secondary and college levels, as analysts, researchers, consultants, auditors, statisticians, economists or programmers.

Value to the Country

Today, in our fast-changing technological age, there is a need more

foundations mathematics and the sciences. Man is increasingly turning toward mathematical scientific methods in finding solutions to many real-world problems such as the optimization of resource allocations, the prediction of sales volume in business, the analysis of data generated by scientific experiments, etc. There is a great demand for graduates who can apply mathematical knowledge in these areas.

Admission Policy

In addition to the University's admission policy, the prospective BS Mathematics student must meet the following basic requirements:

1. A SUAPE-Mathematics Proficiency rating of 50 percentile or above, and
2. An average grade of 85% or above in all mathematics subjects in the senior year in high school.

A shiftee or a transferee must:

1. Comply with the basic requirements;
2. Have a QPA of at least 2.25 in all the semesters prior to his/her application to the B.S. Math program;
3. Comply with the minimum grade requirements for all the math courses taken prior to his/her application to the B.S. Math program.

If the applicant meets the requirements, he/she fills out the BS Math application form and submits to a brief interview with the chairman of the department.

If the comments of the chairman are favorable, the applicant is admitted to the Program and referred to a faculty adviser for subject assignments. If the comments of the chairman

are favorable, the applicant is admitted to the Program and referred to a faculty adviser for subject assignments. If the comments of the chairman are not favorable, the applicant is referred to the guidance counselor or dean for direction.

Retention Policy

In order to earn course credits, a student admitted to the BS Math Program must satisfy the minimum grade requirements (MGR) in the following:

| | |
|---------------------------------------------|-----|
| Math 11, 12 | 3.0 |
| Other Math Courses (including electives) | 2.0 |
| English | 2.0 |
| Science | 2.0 |

he MGR may be allowed to repeat the course no more than twice. If he fails in a course he has repeated for the first time, he may be considered “on probation” in the Program; he is allowed to repeat the course a second time provided his Math average grade as of that semester is at least 2.25. A BS Math student must maintain at least a Q.P.A. of 2.0 every semester to continue in the Program.

Bachelor of Science in Mathematics

First Year

| First semester | Units | Second semester | Units |
|--------------------------------------|-----------|---------------------------------------|-----------|
| BC 11 (Basic Communication Skills I) | 3 | BC 12 (Basic Communication Skills II) | 3 |
| Chem 11 Gen Chem. | 4 | Chem 12 Gen Chem. | 4 |
| Fil 13 Sining ng Pakikipagtalas | 3 | CS 2 Comp Fundamentals | 3 |
| Math 11 College Algebra | 3 | Fil 24N Pagbasa at Pagsulat | 3 |
| Math 12 Plane Trigonometry | 3 | Philo 31 (Intro to Logic) | 3 |
| PE 11 Basic Physical Education | 2 | Rel 22 (New Testament Message) | 3 |
| NSTP/ROTC/CWS | 3 | PE 12 Basic Physical Education | 2 |
| | | NSTP/ROTC/CWS | 3 |
| Total | 24 | Total | 24 |

Second Year

| First semester | Units | Second semester | Units |
|----------------------------------|-----------|--------------------------------|-----------|
| Math 16 Applied Gen Stat w Demog | 3 | Math 28 Math Analysis I. | 3 |
| Math 25 Plane Geometry | 3 | BC 25 Adv Comp & Res Paper | 3 |
| Speech 11 Basic Speech | 3 | Philo 31 Introduction to Logic | 3 |
| Phys 45 Gen Physics I | 4 | Phys 46 Gen Physics II | 4 |
| Psych 11 Gen Psychology | 3 | Hist 23 Western Civilization | 3 |
| Rel 11 Old Testament Message | 3 | Rel 22 New Testament Message | 3 |
| Foreign Language | 3 | PE 22 Basic Physical Education | 2 |
| PE 21 Basic Physical Education | 2 | Foreign Language | 3 |
| Total | 24 | Total | 24 |

Third Year

| First semester | Units | Second semester | Units |
|-----------------------------------|-----------|--------------------------------------|-----------|
| Math 33 Math Analysis II | 5 | Math 32 Linear Algebra I | 3 |
| Math 35 Abstract Algebra I | 3 | Math 36 Fundamental Concepts in Math | 3 |
| Math 39 Modern Geometry | 3 | Math 38 Math Analysis III | 5 |
| Litt 21 Literatures in the Phils. | 3 | Rel 61 Christian Ethics | 3 |
| FA 51 Fine Arts | 3 | Hist 41 Rizal's Life & Works | 3 |
| Pol Sci 51 Phil Gov't & Const | 3 | Litt 22 Survey of World Lit | 3 |
| Socio 63 Current Issues | 3 | PolSci 11 Taxation and Land Reform | 3 |
| Total | 23 | Total | 23 |

Fourth Year

| First semester | Units | Second semester | Units |
|---------------------------------|-----------|---------------------------|-----------|
| Math 41 Differential Equations. | 3 | Math 44 Graph Theory. | 3 |
| Math 47 Abstract Algebra II | 3 | Math 46 Complex Variables | 3 |
| Math 49 Advanced Calculus I. | 3 | Math 48 Probability | 3 |
| Math 54 Numerical Analysis | 3 | Math 62 Number Theory | 3 |
| Educ Elective2 | 3 | Math 68 Math Research II | 3 |
| Math 67 Math Research 67 | 3 | Math Elective* | 3 |
| Educ Elective1 | 3 | Educ Elective3 | 3 |
| Math 58 Statistical Theory | 3 | Educ Elective4 | 3 |
| Total | 24 | Total | 24 |

Course Description

Math 11 College Algebra (3 units)

Fundamental Operations, Basic theorems and principles, Axioms of the real number system, Factoring, Exponents, Radicals, Ratio and proportion, Equations, Functions and relations, Inequalities, Applications through problem-solving.

Math 12 Plane Trigonometry (3 units)

Cartesian coordinate system, Trigonometric functions, Solution of right triangles, Course and bearing, Graphs of trigonometric functions, Inverse trigonometric functions, Trigonometric equations, Oblique triangles.

Math 14 Solid Mensuration (3 units)

Review of plane geometry. Measurement of surface areas and volume of the different geometric solids.

Math 16 Applied General Statistics (3 units)

Nature of statistics, Permutations, Combinations, Probability, Sampling procedures, Collection and presentation of data, Interpretation of the normal

curve, Linear correlation and regression, Introduction to statistical inference. (PR Math 11)

Math 22 Advanced College Algebra (3 units)

Geometry of real numbers, Functions and their graphical representation, Linear and quadratic functions, Matrices and determinants, Polynomial functions, Permutation, Combination, Probability, Binomial theorem, Mathematical induction, Exponential and logarithmic functions, Complex numbers and vectors. (PR Math 11)

Math 25 Plane Geometry (3 units)

Coordinate Geometry, Angles, Straight lines, Triangles, Quadrilaterals and other polygons, Circles, Congruences, Similarity and proportionality, Solids and their volumes.

Math 28 Mathematical Analysis I (5 units)

Functions and their graphs, Operations on functions, Functions as mathematical models, Limit of a function: definitions and theorems, Continuity of a function at a number, Derivative of a function, Theorems on differentiation of algebraic functions and higher derivatives, Rectilinear motion, Derivatives of trigonometric functions, Related rates, Maximum and minimum function values, Applications involving an absolute extremum, Sketching graphs of functions and their derivatives, Differentials, Antidifferentiation, Definite integral and the fundamental theorem of calculus, Area of plane region, Volumes of solids by slicing, disks, and washers, Volume of solids by cylindrical shell. (PR Math 11, Math 12)

Math 32 Linear Algebra I (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. (PR Math 11)

Math 33 Mathematical Analysis II (5 units)

Logarithmic and exponential functions, Inverse trigonometric functions, Hyperbolic functions, Length of arc, Center of mass and centroid of a plane region, Work, Force due fluid pressure, Integration by parts, Trigonometric integrals, Trigonometric substitution, Integration of rational functions and logistic growth, Integration by other substitution techniques, Indeterminate forms, Improper integrals. (PR Math 28)

Math 35 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.

(PR Math 11)

Math 36 Fundamental Concepts in Mathematics (3 units)

Sets, Principles of logic, Methods of proof, Relations, Functions, Integers, Binary operations, Complex numbers, Matrices and matrix operations, Introduction to mathematical systems. (PR Math 22)

Math 38 Mathematical Analysis III (5 units)

Vectors in three-dimensional space, Operations on vectors: The dot and cross products, Planes and Lines in R^3 , Surfaces, Vector-valued functions and curves, Calculus of vector-valued functions, Curvature, Curvilinear motion, Differential calculus of functions of more than one variable, Multiple integration, Vector fields, Line integrals, Green's theorem, Surface integrals, Gauss divergence theorem, Stoke's theorem. (PR Math 33)

Math 39 Modern Geometry (Euclidean and Non-Euclidean) (3 units)

The first part of the course focuses on Euclidean and affine geometry on the plane. The second half may continue with Euclidean Geometry on the sphere; alternatively, an introduction to finite geometries and to non-euclidean hyperbolic and elliptic geometries, Interrelation of tools from geometry, linear algebra and abstract algebra. (PR Math 25)

Math 41 Differential Equations (3 units)

Equations of order one, Existence theorem, Separation of variables, Homogeneous functions, Exact equations, Linear equations of order one, Integrating factors, Bernoulli's equations, Non-elementary integrals, General solution of homogeneous equations, Linear coefficients with constant coefficients, Variation of parameters, Inverse differential operators, Laplace transforms, Linear systems. Applications. (PR Math 33)

Math 42 Differential Equations II (Elective) (3 units)

Linear systems of equations, Electric circuits and networks, Nonlinear equations, Power series solutions, Solutions of near regular points, Equations of hypergeometric type, Numerical methods, Partial differential equations, Orthogonal sets, Fourier series, Boundary value problems. (PR Math 41)

Math 44 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. (PR Math 22)

Math 45 Teaching Methods in Mathematics (elective) (3 units)

Use of principles of teaching learning associated with instructional operations in mathematics, Selection and application of teaching strategies

appropriate for particular math topic, Construction of bulletin boards. (4th Year Level)

Math 46 Complex Variables (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.

(PR Math 38)

Math 47 Abstract Algebra II (3 units)

Rings: integral domains, quaternions as a division ring, homomorphisms, ideals, factor rings.

Fields: Axioms and elementary theorems, finite fields, solutions of polynomial equations, field extensions.

(PR Math 35/131)

Math 48 Probability (3 units)

An introductory course in probability covering: axiomatic probability space, discrete and continuous random variables, special distributions, mathematical expectation, conditional probability and independence, multivariate distributions.

Laws of Large Numbers, and the Central Limit Theorem. (PR Math 16)

Math 49 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. (PR Math 38)

Math 50 Advanced Calculus II (elective) (3 units)

Definite integral, Improper integrals, Differentials of functions and transformations, Implicit function theorems.

(PR Math 49)

Math 51 Linear Algebra II (elective) (3 units)

Inner product spaces, Linear transformations, Eigenvalues and eigenvectors, Diagonalization of symmetric matrices, Real quadratic forms, Conic sections, Quadric surfaces, Modeling. (PR Math32)

Math 52 Real Analysis (elective) (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.

(PR Math 38)

Math 54 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. (PR BC 12, Math 35)

Math 56 Topology (elective) (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. (PR Math 38)

Math 58 Statistical Theory (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. (PR Math 16)

Math 62 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 67 Math Research I (3 units)

Production of research based on most recent developments in mathematics as published in math journals. All research titles must be with the approval of the research adviser and department chairman. (4th Year Level)

Math 68 Math Research II (3 units)

Mathematics research writing, elements of mathematics research paper, formulation of abstract, objectives, results, and other parts of a formal research output. (PR Math 67)

Members of the Faculty

Jenette S. Bantug

Instructor: BS Math (NORSU), MS Math (Silliman University)

Emelyn E. Coniendo

Instructor : BS math (NORSU), MS Math (Silliman University)

Shariff Ivan G. Datar

Instructor: BSME (Boston University, USA), MS Math (Silliman University)

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Assistant Professor: BSE Math (Silliman University), MAT Math (University of the Philippines, Diliman)

Alice A. Mamhot

Assistant Professor: BS Math (Silliman University), MAT Math (Silliman University), MS Math (Silliman University)

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Associate Professor: BS Math (Silliman University), MAT Math (Silliman University), MS Math (Ateneo de Manila University), PhD. in Mathematical Sciences (MPSC)

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