

Major Courses

Major Subjects

- 4091201 Principles of Mathematics 3(3-0-6)
Nature and structure of mathematics, elementary logic, mathematical proof, sets, relations and functions
- 4091401 Calculus 1 3(3-0-6)
Limits and continuity of functions, derivatives of algebraic and transcendental functions, applications of derivatives, indeterminate forms and L'Hospital's rule
- 4092201 Number System 3(3-0-6)
Pre-requisite: 4091201 Principles of Mathematics
Construction of number system by axiomatic system, real numbers, natural numbers, integers, rational numbers, irrational numbers, and complex numbers
- 4092401 Calculus 2 3(3-0-6)
Pre-requisite: 4091401 Calculus 1
Indefinite integrals, techniques of integration, definite integrals and applications, improper integrals, sequences and infinite series, and convergence
- 4092501 Introduction to Geometry 3(3-0-6)
Axiomatic system, Euclidean geometry, Euclid's Elements Book 1 and analysis using axiomatic system, discovery of non- Euclidean geometry, and geometry in basic education core curriculum
- 4093201 Set Theory 3(3-0-6)
Pre-requisite: 4091201 Principles of Mathematics
Construction of set theory by axiomatic system, axiom of choices, ordered sets, cardinal and ordinal numbers
- 4093301 Abstract Algebra 3(3-0-6)
Pre-requisite: 4091201 Principles of Mathematics
Basic knowledge of groups, subgroups, rings, integral domains and fields
- 4093601 English for Mathematics 1 3(3-0-6)
Basic English communication skills in listening, speaking, reading and writing for mathematics, mathematical terminology, and searching mathematical research

- 4093602 English for Mathematics 2 3(3-0-6)
 Pre-requisite: 4093601 English for Mathematics 1
 Terminology in advanced mathematics; reading, interpreting, summarizing and presenting academic articles; writing abstract, and teaching mathematics in English
- 4093801 Analysis of Mathematical Contents in Primary Education 3(3-0-6)
 Analysis of mathematical contents for basic education core curriculum in primary education by emphasizing on concepts and mathematical processes
- 4093802 Analysis of Mathematical Contents in Lower Secondary Education 3(3-0-6)
 Pre-requisite:
 4093801 Analysis of Mathematical Contents in Primary Education
 Analysis of mathematical contents for basic education core curriculum in lower secondary education by emphasizing on concepts and mathematical processes
- 4093803 Analysis of Mathematical Contents in Higher Secondary Education 3(3-0-6)
 Pre-requisite:
 4093802 Analysis of Mathematical Contents in Lower Secondary Education
 Analysis of mathematical contents for basic education core curriculum in higher secondary education by emphasizing on concepts and mathematical processes
- 4094201 Number Theory 3(3-0-6)
 Pre-requisite: 4091201 Principles of Mathematics
 Divisibility, prime numbers, greatest common divisors, least common multiples, relative prime numbers, linear Diophantine equations, congruence, linear congruence, Chinese remainder theorem, divisibility tests, and Euler's theorem
- 4094302 Linear Algebra 3(3-0-6)
 Elementary operations on matrix, determinants, system of linear equations, vector space, linear transformation, inner product space, eigenvalues and eigenvectors, diagonal matrix and orthogonally diagonalizable matrix
- 4094504 Introduction to Graph Theory 3(3-0-6)
 Definition, walk and connectivity of graphs; trees, Eulerian graph, Hamiltonian graph, planar graph and duality, graph coloring, directed graph and applications

4094901	Seminar on Mathematics Research analysis, critique, and presentation in mathematics and mathematical education from academic journals and documents, concepts of boosting knowledge in research	1(0-2-1)
4094910	Mathematics Projects Definitions, types, preparation processes, writing, exhibition, presentation and evaluation of mathematics projects	2(1-2-3)
4112201	Introduction to Probability and Statistics Counting sample points, probability, random variables, expected values of random variables, probability distributions of discrete and continuous random variables, sampling, sampling distributions, parameter estimation, and statistical hypothesis testing	3(3-0-6)
4092202	Mathematical Modeling Procedures and techniques of mathematical modeling, examples of mathematical models, dynamic modeling and analyzing, modeling with differential equations, and dimensional analysis for mathematical models	3(3-0-6)
4092601	Selected Topics in Mathematics Selected topics enhancing mathematics competence or mathematics topics in current trends	3(3-0-6)
4092701	Introduction to Mathematical Software Basic knowledge of mathematical software packages, finding solutions from mathematical operators, graphing, data presentation, and practice	3(2-2-5)
4093303	Discrete Mathematics Counting and recurrence relations, graph theory, graph representation with matrix, trees and sorting, networks, Boolean algebra and combinatorial circuits	3(3-0-6)
4093401	Calculus 3 Pre-requisite: 4092401 Calculus 2 Vector and analytic geometry in three-dimensional spaces, functions of several variables, limits and continuity of functions of several variables, partial derivatives, multiple integrals and applications	3(3-0-6)

- 4093402 Differential Equations 3(3-0-6)
 Pre-requisite: 4092401 Calculus 2
 Concepts of differential equations, first order differential equations and applications, higher-order linear differential equations, Laplace transform, and applications
- 4093604 Linear Programming 3(3-0-6)
 Linear programming problems, graphical and simplex methods, dual problems and applications
- 4093605 Mathematics of Finance and Insurance 3(3-0-6)
 Interest, certain annuities, yield rates from investment, amortization schedules, sinking funds, bonds, net single premium, net level premium, and annuity of life insurance
- 4094301 Advanced Abstract Algebra 3(3-0-6)
 Pre-requisite: 4093301 Abstract Algebra
 Ring, integral domains and fields; ring isomorphism theorem and polynomial ring; quotient, extension and finite fields
- 4094303 Introduction to Theory of Equations 3(3-0-6)
 Pre-requisite: 4091401 Calculus 1
 Polynomial equations, roots of polynomial equations, relations of coefficients and roots of equations, quadratic equations, cubic equations, quartic equations, and root approximation
- 4094401 Partial Differential Equations 3(3-0-6)
 Pre-requisite:
 4093401 Calculus 3 and 4093402 Differential Equations
 First order partial differential equations, second order partial differential equations, elliptic partial differential equations, hyperbolic partial differential equations, and parabolic partial differential equations
- 4094402 Advanced Calculus 3(3-0-6)
 Pre-requisite: 4093401 Calculus 3
 Sequences and series of functions, special functions, functions of several variables, line integrals, surface integrals, and convergence tests of improper integrals

- 4094403 Vector Analysis 3(3-0-6)
 Pre-requisite: 4093401 Calculus 3
 Vector-valued functions, derivatives and integrals of vector-valued functions, tangent vectors, perpendicular vectors, radius of curvature, vector fields, line integrals, surface integrals and applications
- 4094404 Mathematical Analysis 3(3-0-6)
 Pre-requisite: 4091201 Principles of Mathematics
 Cauchy sequences of rational numbers, least upper bound property, limits of sequences of real numbers, limit superior and limit inferior, series of real numbers, limits and continuity of functions
- 4094405 Introduction to Real Analysis 3(3-0-6)
 Pre-requisite: 4094404 Mathematical Analysis
 Topology on real line, uniform continuity, intermediate value theorem, extreme value theorem, differentiation, Riemann integrals, sequences and series of functions
- 4094406 Introduction to Complex Analysis 3(3-0-6)
 Functions of complex variables, analytic functions, elementary functions, derivatives, integrals, sequences and series of residue functions, and conformal mapping
- 4094407 Numerical Analysis 3(3-0-6)
 Error analysis, numerical solutions of nonlinear equations, numerical solutions of systems of linear and nonlinear equations, interpolation, numerical differentiation and integration, and numerical solutions of ordinary differential equations
- 4094505 Introduction to Topology 3(3-0-6)
 Metric spaces, topological spaces, compactness, connectedness, and product spaces
- 4095501 Mathematics Activities 2(1-2-3)
 Mathematics camp, recreational mathematics, mathematical games, songs for teaching mathematics, art and mathematics, and mathematical applications

- 4111101 Principles of Statistics 3(3-0-6)
 Basic concepts of statistics, descriptive statistics, random variables, probability distributions, parameter estimation, statistical hypothesis testing, correlation, regression analysis, and nonparametric tests
- 4112306 Application Software for Statistics and Research 3(2-2-5)
 Statistical software packages in terms of assessment tools, measurement of central tendency, measurement of dispersion, parameter estimation, hypothesis testing, correlation and regression analysis, analysis of variance, and nonparametric tests
- 4113105 Statistics for Research 3(3-0-6)
 Concepts and importance of statistics and research, data gathering, questionnaire creation, data presentation, checking data validity prior to analysis, basic probability, probability distributions of random variables, parameter estimation, hypothesis testing, chi-square test, correlation and simple regression analysis, analysis of variance, and data analysis with software packages
- 4113410 Operations Research 3(3-0-6)
 Basic concepts of operations research and mathematical modeling, linear programming, transportation and assignment problems, network analysis, PERT-CPM, integer programming, dynamic programming, nonlinear programming, and analysis of variance, and problem analysis with software packages

Courses in Teaching Major Subjects

- 4094801 Mathematics Teaching Methodology 1 3(2-2-5)
 Mathematical skills and processes, preparation for learning activities; models, methods, and techniques of teaching mathematics; production and use of instruction media
- 4094802 Mathematics Teaching Methodology 2 3(2-2-5)
 Design, analysis and evaluation of lesson plan; assessment and evaluation of learning mathematics
- 4092801 Selected Topics in Mathematical Education 3(3-0-6)
 Selected topics to enhance competence on organizing learning mathematics, or mathematical education topics in current trends

4093702 Computer Assisted Instruction in Mathematics 3(2-2-5)
Basic knowledge of software packages, production of lessons and
electronic instruction media by software packages, and applications to learning and
teaching mathematics