MATHEMATICS (MATH)

MATH 501 Mathematics Content PRAXIS Review (1 Credit)
A review of the mathematical concepts included in the ETS PRAXIS (Professional Assessments for Beginning Teachers) Mathematics Content Knowledge secondary teachers' examination. (PASS/FAIL) Requirement: 24 credits in mathematics or permission of the Department Chairperson.

MATH 503 Computers in Mathematics (3 Credits)
This course provides students, who have basic computer literacy and some elementary knowledge of computer programming, specific skills in using mathematical software. Problems and projects are taken from a variety of mathematical subjects including: precalculus, calculus, number theory, geometry, linear algebra, abstract algebra, and statistics. Explanations and introductions to these subjects are provided.

MATH 508 Professionalized Subject Matter in Arithmetic (3 Credits)
This course offers a study of procedures in arithmetic. Attention is given to concepts in manipulative and problem solving areas. Various services for diagnostic and remedial measures are introduced and evaluated.

MATH 510 Professionalized Subject Matter in Algebra (3 Credits)
This course provides the student with a reappraisal of the fundamental concepts of algebra. Emphasis is placed on the manner in which these concepts can be used to teach algebra more effectively. This course demands evidence of effective use of taught concepts in the student's own classroom. Topics include: number, set, relations, functions, operation structure, and problem solving.

MATH 511 Professionalized Subject Matter in Middle School Mathematics (3 Credits)
This course stresses mathematical concepts and skills required of children entering the junior high school curriculum in recent years, as well as those, which are appropriate for junior high students with less interest and ability in mathematics. The student will be required to show evidence of use of some of these in the student's own classroom. Topics include: modular arithmetic, numeration, geometry, descriptive statistics, algebra, and mathematical games.
UG Pre-requisite: Perm of Chair for Undergraduates only

MATH 512 Professionalized Subject Matter in Geometry (3 Credits)
This course provides a review of fundamental concepts of geometry and an investigation of their significance in the teaching of secondary school mathematics. Concepts to be analyzed include: logic, proof, and axiomatic systems; physical and geometric models; sets, relations, and transformation; non-metric and metric concepts, duality and dimensionality; and coordination of spaces. Attention is given to: historical considerations bearing on the leaching of geometry; integration of geometry with algebra and science; and significant literature on the subject. This course requires evidence that the student is making effective use of these concepts in the student's own classroom.

MATH 514 Professionalized Subject Matter in Pre-Calculus Mathematics (3 Credits)
This course presents pre-calculus topics, particularly trigonometry and matrix operations. Attention is given to historical considerations and to current trends in teaching this content. This course requires evidence that the student is making effective use of these concepts in the student's own classroom.

MATH 515 Math Manipulatives I (3 Credits)
This course explores the use of manipulative such as geoboards, Cuisenaire rods, number lines, software and CD ROM materials in the teaching of mathematics in elementary and middle schools. Both commercial and teacher-made manipulative are utilized.

MATH 516 Mathematics Manipulative II (3 Credits)
This course continues the exploration of using manipulatives to teach mathematics. The student is required to show evidence of the ability to use these concepts and skills in a classroom.

MATH 517 Calculators in the K-8 Classroom (3 Credits)
This course explores the use of calculators in the teaching of mathematics K-8. Topics include using calculators to reinforce the elementary and middle school mathematics curriculum and constructing student projects which make use of the calculator.

MATH 518 Calculators in the Secondary Classroom (3 Credits)
This course explores the use of graphing calculators in the teaching of secondary school mathematics. The use of calculators is demonstrated for algebra, geometry, trigonometry, and calculus. Student projects are constructed which make use of the calculator.

MATH 526 Algorithmic Number Theory (3 Credits)
This course presents number theory from an historical point of view and emphasizes significant discoveries from ancient to modern times, as well as presenting unsolved problems and areas of current interest. Topics include: prime numbers and related theorems; Euclidean algorithm and quadratic reciprocity; Pythagorean numbers and continued fractions.

MATH 531 Numerical Analysis (3 Credits)
Topics include iterative methods of solving equations; interpolation and polynomial approximation; numerical differentiation and integration; numerical solution of differential equations; solution of linear systems by direct and iterative methods; matrix inversion and calculation of eigenvalues and eigenvectors of matrices. Selected algorithms may be programmed in FORTRAN and APL for solution on electronic computers at NJCU Computer Center.

MATH 536 Mathematical Modeling (3 Credits)
The main objectives of this course are: to explore mathematical models of real world situations, to set up such models, and to review the mathematics needed to treat such models. Analysis of computer simulations of the models plays a major role in this course.

MATH 540 Graph Theory (3 Credits)
Topics studied in this course include paths, walks, networks, trees, connected graphs, subgroups and related applications.

MATH 598 Mathmatical Principles of Computer Graphics (3 Credits)
Topics include: two dimensional algorithms; transformations, scaling, translations, rotations, matrix notation, line clipping, b-spline curve fitting, and recursion. Geometric tools for three-dimensional algorithms, and affine and projective geometry are included. Viewing and perspective transformations, wire frame models, algorithms for the triangle decomposition of polygons and hidden-line elimination are included. Object-oriented programming using C++ is included.

MATH 602 Elements of Modern Mathematics (Pre-Calculus) (3 Credits)
This course includes an introduction to sets; elementary work with unordered fields, finite fields, and ordered fields; elements of number theory; systems of numeration; introduction to logic; nonmetric and informal geometry; and growth of the number system.

MATH 638 Mathematical Principles of Computer Graphics (3 Credits)
This course examines topics like: two dimensional algorithms, transformations, scaling, translations, rotations, matrix notation, line clipping, b-spline curve fitting and recursion, geometric tools for three dimensional algorithms, affine and projective geometry, viewing and perspective transformations, wire frame models, algorithms for the triangle decomposition of polygons and hidden-line elimination.
Pre-Requisite(s): Approval by Chair of Math Department

MATH 651 Advanced Numerical Analysis (3 Credits)
This course examines the theoretical foundations of numerical methods and studies in detail existing numerical methods for solving many standard mathematical problems in analysis, algebra, theory of chaos and nonlinear dynamics. Error analysis will be developed for all methods. A very recent advancement like polynomial chaos will also be presented.

MATH 655 Numerical Linear Algebra (3 Credits)
The course examines the theoretical foundations of linear algebra and studies in detail the related numerical methods for analyzing linear algebra problems. Students will learn how to solve large systems of linear equations using different numerical methods, and computer software with the understanding and knowledge of the underlying mathematical concepts.

MATH 659 Independent Study (3 Credits)

MATH 661 Research Credit in Mathematics (3 Credits)
The candidate may elect to do independent research by enrolling in this course.

MATH 665 Research Credit in Mathematics (1 Credit)
The candidate who did not finish a thesis while enrolled in Math 661 may enroll in this course one time only to finish the thesis. (Prerequisite: MATH 661 and permission of the chairperson)