

Approval Form

Proposal Title: Math Dept. Catalog Description Update
 Sponsor(s) G. Itzkowitz Dept.: Math Ext. 6582

Check one: Course Specialization Concentration Minor Achievement Certificate
 Certification Program Major Program Minor Change Catalog Changes
(please name deletion or credit/hour/catalog change)

Undergraduate Graduate _____ Credit Hours

<p>Step 1 (Department)</p> <p><input checked="" type="checkbox"/> Approved <u>2/16/94</u> Date</p> <p><input type="checkbox"/> Not Approved</p> <p><u>Ronald J. Fisher</u> Dept. CC Chairperson</p> <p><input checked="" type="checkbox"/> Reviewed <u>2/22/94</u> Date</p> <p><u>Al Atkinson, Ph.D.</u> Dept. Chairperson</p>	<p>Step 2 (Receipt)</p> <p><input type="checkbox"/> SCC# <u>93-44-76</u></p> <p>Proposal Received <u>SENATE</u> Date</p> <p>FEB 24 1994</p> <p>RECEIVED</p> <p>_____ SCC Chairperson</p>	<p>Step 3 (School CC)</p> <p>Reviewed <u>3/28/94</u></p> <p><input checked="" type="checkbox"/> Approved <input type="checkbox"/> Not Approved</p> <p>Comments:</p> <p><u>Joanne Scott</u> School Curr. Comm. Chairperson</p>
---	---	--

<p>Step 4 (Academic Dean)</p> <p><input checked="" type="checkbox"/> Recommend <input type="checkbox"/> Not Recommend <input type="checkbox"/> Conditionally Recommend (see comments)</p> <p>Reviewed <u>4/4/94</u> Date</p>	<p>Comments:</p> <p>SENATE</p> <p>APR 8 1994</p> <p>RECEIVED</p> <p><u>Robert D. [Signature]</u> Signature, Dean of School</p>
---	---

Step 5 (SCC)

Open Hearing _____ Date

Approved by Senate Curriculum Committee 5/16/94 Date

Returned to sponsor(s) for the following reasons:

Step 6 (Senate)

Presented to Senate 3/10/94 Date

Approved Not Approved

Notification to Executive Vice-President/Provost _____ Date

[Signature]
Signature, SCC Chairperson

Step 7 (Executive V.P./Provost)

Received 6/3/94
Date

Approved Yes No

If no, reasons are as follows:

Student credit hours _____

Faculty load hours _____

Equalized credit hours _____

Official copy and approval sheet filed _____
Date

[Signature]
Signature, Executive Vice-President/Provost

Registrar

Approved course description received 22 Aug 94
Date

Hegis Taxonomy and Course Number assigned N/A

[Signature]
Signature, Registrar

22 Aug 94
Date

Notification forwarded:

- Senate Curriculum Committee Chairperson
- Department Chairperson(s)
- Academic Dean(s)
- Registrar
- Sponsor(s)

MATHEMATICS UNDERGRADUATE COURSES

OLD CATALOG DESCRIPTIONS:

1701 DEVELOPMENTAL MATHEMATICS

1701.096 3 s.h.

Basic Algebra

(Prerequisite: Successful completion of Computation B or demonstrated competency.)

This full semester remedial course includes signed numbers, first degree equations, factoring, exponents, roots and radicals, rational expressions and graphing systems of equations. The 3.0 hours of credit granted for it do not apply toward graduation.

1701.097 1.5 s.h.

Developing Algebra Skills

(Prerequisite: The need for minimal remediation in algebra)

This half-semester remedial course completes the mastery of basic algebra by focusing on rational expressions, equations in two variable, graphing, inequalities and radical expressions. The 1.5 hours of credit granted for it are not applicable toward graduation.

1701.098 1.5 s.h.

Computation A

This half-semester remedial course focuses on the arithmetic of natural numbers, decimals and fractions. The 1.5 hours of credit are not applicable toward graduation.

1701.099 1.5 s.h.

Computation B

(Prerequisite: Progression from Computation A or demonstrated need for minimal remediation)

This half-semester remedial course completes computation mastery by focusing on percents, word problems and the elementary use of variables in formulas. The 1.5 hours of credit granted do not apply toward graduation.

1701 MATHEMATICS, GENERAL

1701.121 3 s.h.

Intermediate Algebra

(Prerequisites: Algebra B, Elementary Algebra or equivalent)

This course emphasizes the mathematical skills and techniques used in business and social sciences. Its topics are linear and quadratic functions, inverse functions, graphs, introduction to analytic geometry, progressions, combinations and permutations and the Binomial Theorem.

1701.122 4 s.h.

Precalculus Mathematics

(Prerequisites: 1701.121 or equivalent preparation, e.g., high school Algebra II)

This course prepares students for Calculus I. It includes the structure of the real number system, elementary analytic geometry, and algebraic, exponential, logarithmic and trigonometric functions (including their graphs, inverses and related functions). Students also study conic sections and systems of linear inequalities.

1701.130 4 s.h.

Calculus I

(Prerequisites: 1701.122 or equivalent)

This course begins with functions, limits, and continuity. It introduces the derivative and uses it to differentiate polynomial, rational, algebraic and trigonometric functions. Differentiation is applied to extrema and related rate problems. The integral as the limit of a sum is linked to the antiderivative by the Fundamental Theorem of Calculus and used to find areas, volumes and arc length.

1701.131 4 s.h.

Calculus II

(Prerequisite: 1701.130 with a grade of C or better, and 0701.102 or equivalent experience and 1703.150)

This course defines transcendental functions and studies the techniques for differentiating and integrating the logarithmic, circular and hyperbolic functions and their inverses. It introduces integration by parts, partial fractions and other techniques, along with indeterminate forms, improper integrals and an introduction to infinite series.

1701.201 3 s.h.

Structures of Mathematics

(Prerequisites: knowledge of intermediate algebra is recommended.)

This course includes a development of the principal stages of the number system as used in elementary school arithmetic from the first through the sixth grade. It develops the representation and properties of the natural, integer and rational numbers and introduces the real numbers on an intuitive basis. It also includes an introduction to logic, systems of numeration and a general discussion of mathematical systems.

1701.202 3 s.h.

Introduction to Geometry

This course develops the fundamental concepts of Euclidean geometry from a modern point of view. Its topics include: sets, points, lines, space, betweenness, incidence, congruence, parallelism, similarity and area. Not open to mathematics majors.

1701.210 3 s.h.

Linear Algebra

(Prerequisites: 1701.131 or permission.)

This course covers vector spaces, linear dependence and independence, linear equations and matrices, dimension and basis of a vector space, inner and cross products, orthogonality, eigenvalues and eigenvectors.

1701.230 4 s.h.

Calculus III

(Prerequisite: 1701.131)

This course covers vectors, vector functions and the use of linear algebra concepts, velocity, acceleration, partial differentiation, directional derivatives, multiple integration, surface and line integrals and further discussion of infinite series.

1701.320 3 s.h.

Differential Equations

(Prerequisites: 1701.230 and 1701.210)

Applications of ordinary differential equations and their methods of solution form the major part of this course. It also includes first order equations of first and higher degrees; linear differential equations; integration in series and Laplace Transform solutions.

1701.332 3 s.h.

Numerical Analysis

(Prerequisites: 0701.102, 1701.210 and 1701.131)

This course covers elements of error analysis, real roots of an equation, polynomial approximation by finite difference and least square methods, interpolation, quadrature and numerical solution of ordinary differential equations.

1701.340 3 s.h.

Modern Algebra I

(Prerequisites: 1701.210 and Intro. to Symbolic Logic or permission.)

This course covers the natural numbers, integers, rationals, and reals as mathematical systems, and the introductory theory of groups, rings, integral domains, and fields. Also included are homomorphisms and isomorphisms, subgroups, kernels, rings and ideals and polynomial rings.

1701.341 3 s.h.

Modern Algebra II

(Prerequisite: 1701.340)

This course extends the study begun in Modern Algebra I to a more detailed investigation of abstract algebraic structures. It includes homomorphisms and isomorphisms, subgroups and the Sylow theorems, rings and ideals, polynomial rings, ring and field extension and Galois theory.

1701.350 3 s.h.

Geometry I

(Prerequisites: 1701.131 and Intro. to Symbolic Logic or permission)

This course includes incidence, distance function, betweenness, plane and space separation properties, triangle congruence, absolute geometry and the Saccheri quadrilateral and the parallel postulate.

1701.351 3 s.h.

Geometry II

(Prerequisites: 1701.350)

This course includes similarity, area functions, circles and spheres, isometries, constructability, metrization theory, arc length, circular area measure, Jordan measure, volume and Cavalieri's principle, hyperbolic geometry and logical foundations of Euclidean geometry.

1701.410 3 s.h.

History of Mathematics

(Prerequisite: 1701.131)

This course includes a survey of the development of mathematical ideas from early times up to present day college mathematics. It emphasizes historical mathematical problems and their solution. It requires readings and reports on selected topics.

1702 STATISTICS

1702.360 3 s.h.

Introduction to Probability and Statistics I

(Prerequisite: 1701.131)

An introduction to the theory and application of mathematical statistics at the postcalculus level, this course emphasizes probability theory and applications. It covers sample spaces, probability theory, random variables, discrete and continuous probability distributions, mathematical expectation and multivariate distributions.

1702.361 3 s.h.

Introduction to Probability and Statistics II

(Prerequisite: 1702.360)

A continuation of 1702.360, this course emphasizes statistical theory and applications. It considers estimation and hypothesis testing using the normal, student's t, chi-square and F distributions. It includes analysis of variance, non-parametric statistics, goodness of fit tests, and regression and correlation.

1703 APPLIED MATHEMATICS

1703.125 3 s.h.

Calculus: Techniques and Applications

(Prerequisite: 1701.122 or equivalent preparation)

This course introduces students to the techniques of differential and integral calculus. It emphasizes the applications of limits, derivatives, integrals and sequences. The course provides significance and specific uses of the calculus in today's world.

1703.150 3 s.h.

Discrete Mathematics

(Prerequisites: 0701.102 and 1701.121)

This course includes topics essential for work in computer science beyond elementary programming. It covers numeration systems and computer codes, sets and logic, algorithms, software structures, combinatorics, and trees and graphs. It emphasizes the solution of problems in these areas, and, at the instructor's discretion, it may require computer programs which are relevant to these areas.

1703.350 3 s.h.

Advanced Topics in Discrete Mathematics

(Prerequisites: 1703.150 or equivalent preparation.)

This course studies topics selected from the following: analysis of algorithms, first order mathematical logic, combinatorics, digraphs and networks, recursion theory and difference equations, lattice theory, formal languages and automata and coding theory.

1703.400 3 s.h.

Applications of Mathematics

(Prerequisites: 1701.230 and 1701.210)

This course includes a presentation of examples of mathematics applied to the fields of the biological, physical and social sciences. Mathematical models are used to describe physical systems, to solve problems and to obtain new results when possible.

MATHEMATICS UNDERGRADUATE COURSES

NEW CATALOG DESCRIPTIONS:

1701 DEVELOPMENTAL, MATHEMATICS

1701.96 Basic Algebra Skills 3 s.h.
(Prerequisites: Successful completion of Computation B or demonstrated competency.)

This full semester basic skills course includes signed number, first degree equations, factoring, exponents, roots and radicals, rational expressions, systems of equations and graphing. The 3.0 hours of credit granted for it do not apply toward graduation. Use of calculators is required.

1701.097 Developing Algebra Skills 1.5 s.h.
(Prerequisites: The need for minimal remediation in algebra)

This half-semester basic skills course completes the mastery of basic algebra by focusing on rational expressions, equations in two variables, graphing, inequalities, and radical expressions. The 1.5 hours of credit granted for it are not applicable toward graduation. Use of calculators is required.

1701.098 Computation A 1.5 s.h.

This half-semester basic skills course focuses on the arithmetic of natural numbers, decimals, fractions, and problem solving. The 1.5 hours of credit are not applicable toward graduation. Use of calculators is required.

1701.099 Computation B 1.5 s.h.

(Prerequisite: Progression from Computation A or demonstrated need for minimal remediation)

This half-semester basic skills course completes computation mastery by focusing on percents, word problems and the elementary use of formulas. The 1.5 hours of credit granted do not apply toward graduation. Use of calculators is required.

1701 MATHEMATICS, GENERAL

1702.121 - Intermediate Algebra 3 s.h.

(Prerequisites: Algebra B, Elementary Algebra or equivalent)

This course emphasizes the basic algebraic skills and techniques used in business and social sciences. It will prepare students to take science and mathematics courses in the general education bank. Topics included are a review of algebra, solutions of linear, rational, and quadratic functions, exponential notions, relations and functions, graphs, determinants. Use of calculators is required.

1701.122 Pre-Calculus Mathematics 4 s.h.
(Prerequisite: 1701.121 Intermediate Algebra or equivalent
preparation: e.g. high school algebra II.)

This course prepares students for Calculus I or Calculus T&A. The contents include: a brief review of intermediate algebra, the structure of the real number system, elementary analytic geometry, and algebraic, exponential, logarithmic and trigonometric functions (including their inverses and related functions). Graphs of functions and conic sections also are studied. A graphics calculator is required.

1701.130 Calculus I 4 s.h.
(Prerequisite: 1701.122 Pre-Calculus or equivalent)

This course begins with a discussion of functions, the limit concept and continuity. The concept of a derivative is introduced and the student learns to differentiate polynomial functions, rational functions, algebraic and trigonometric functions. Differentiation is applied to extreme problems and to problems in related rates. The integral as the unit of a sum is linked to the antiderivative by the Fundamental Theorem of Calculus and used to find areas, volumes and arc length. A graphics calculator is required for this course.

1701.131 Calculus II 4 s.h.
(Prerequisite: 1701.130 Calculus I & 1703.150) This course

begins with the techniques for differentiating and integrating the logarithmic, exponential and hyperbolic functions and the inverse trigonometric functions. Integration by parts, partial fractions and other more advanced integration techniques are introduced, along with a discussion of numerical integration, sequences and infinite series. A graphics calculator is required for this course.

1701.201 Structures of Mathematics 3. S.H.

This course concerns the development of number systems and algebraic structures, including the natural numbers, the integers, rational numbers, real and complex numbers. Concrete examples of selected algebraic structures such as modular arithmetic and matrices are also included. Students will be required to reason mathematically, solve problems, and communicate mathematics effectively at different levels of formality, using a variety of representations of mathematical concepts and procedures. Use of calculators is required.

1701.202: Introduction to Geometry 3 s.h.
(Prerequisite: Intermediate algebra or equivalent)

This course develops the fundamental concepts of Euclidean geometry from a modern point of view. Its topics include sets, points, lines, space, betweenness, incidence, congruence, parallelism, similarity, transformations, volumes, and area. Non-Euclidean geometries are introduced. Not open to mathematics majors. Use of calculators is required.

1701.210 Linear Algebra 3 s.h.
(Prerequisites: 1701.131 Calculus II or permission of instructor)

This course includes: vector spaces, linear dependence and independence, linear equations and matrices, dimension and basis of a vector space, inner product and cross products, orthogonality, eigenvalues and eigenvectors. Use of graphics calculators is required and computers may be used at the option of the instructor.

1701.230 Calculus III 4 s.h.
(Prerequisite: 1701.131 Calculus II)
This course includes: polar coordinates, vectors, vector functions, velocity, acceleration, partial differentiation, directional derivatives, and multiple integration. The student might be expected to use a computer in addition to the graphics calculator.

1701.320 Differential Equations 3 s.h.
(Prerequisites: 1701.230 Calculus III and 1701.210 Linear Algebra)
Applications of ordinary differential equations and their methods of solution form the major part of this course. It also includes the solution of nth order equations, particularly of first and higher degree linear differential equations, and series and Laplace Transform solutions. Students might be asked to use computers and/or graphics calculators as an aid in solving equations.

1701.332 Numerical Analysis 3 s.h.
(Prerequisites: 0701.102 Introduction to Programming and 1701.131 Calculus II, and 1701.210 Linear Algebra)
This course includes: elements of error analysis, real roots of an equation, polynomial approximation by finite difference and least square methods, interpolation, quadrature, numerical solution of ordinary differential equations, and numerical solutions of systems of linear equations. The student should expect to program a computer in addition to using a graphics calculator.

1701.340 Modern Algebra I 3 s.h.
(Prerequisites: 1701.210 Linear Algebra & Intro. to Symbolic Logic)
This course includes: the natural numbers, integers, rationals, and reals as mathematical systems, and the introductory theory of groups, rings, integral domains, and fields. Also included are homomorphisms and isomorphisms, subgroups, kernels, rings and ideals, and polynomial rings. At the option, of the instructor, computer use might be required.

1701.341 Modern Algebra II 3 s.h.
(Prerequisite: 1701.340 Modern Algebra I)
This course extends the study begun in Modern Algebra I to a more detailed investigation of abstract algebraic structures. Included are Sylow theorems, rings and ideals, polynomial rings, ring and field extension and Galois theory.

1701.350 Geometry I 3 s.h.
(Prerequisites: 1701.131 Calculus II & Intro. to Symbolic Logic or permission)
This survey geometry course uses both synthetic and algebraic approaches to study finite geometries, transformational geometry, advanced concepts in Euclidean geometry, and non-Euclidean geometries. At the option of instructor computer use might be required.

1701.351 Geometry II 3 s.h.
(Prerequisites: 1701.350 Geometry I)
This course continues the study of geometries begun in Geometry I with consideration of convexity, constructions, area and volume. Additional topics studied may include inversion; projective geometry; differential geometry; symmetry, polyhedra, and tilings; dynamical systems and fractals; or lattices. At the option of instructor computer use might be required.

1701.410 History of Mathematics 3 s.h.

(Prerequisites: 1701.131 Calculus II)

This course includes a survey of the development of mathematical ideas from early times up to present day college mathematics. Emphasis is on historical mathematical problems and their solution. Readings and reports on selected topics are required.

1702 STATISTICS

1702.360 Introduction to Probability and Statistics I 3 s.h.

(Prerequisites: 1701.131 Calculus II)

An introduction to the theory and application of mathematical statistics at the post-calculus level. After a brief introduction to the concepts of descriptive and inferential statistics, the emphasis is on probability theory and its applications. Topics covered include sample spaces, random variables, discrete and continuous probability distributions, mathematical expectation, and multivariate distributions. Use of graphing calculator is required.

1702.361 Introduction to Probability and Statistics II 3 s.h.

(Prerequisites: 1702.360 Introduction to Probability and Statistics I)

A continuation of 1702.360, the course emphasizes the theory of inferential statistics and its applications. The Central Limit Theorem is more fully developed as are the concepts of estimation and hypothesis testing. The properties of estimators are covered and tests using normal, t, chi-square, and F distributions are studied. Nonparametric methods, regression, and correlation are also covered. Use of graphing calculator is required.

1703 APPLIED MATHEMATICS

1703.125 Calculus Techniques and Applications 3 s.h.

(Prerequisite: 1701.122 Pre Calculus Mathematics or equivalent preparation)

Introduces students to the techniques of differential and integral calculus. Emphasis is placed on practical applications of limits, derivatives, integrals and sequences with business applications highlighted. This course also provides experience with and information about the significance and specific uses of the calculus in today's world. A graphics calculator is required.

1703.150 Discrete Mathematics 3 s.h.
(Prerequisites: 0701.102 Introduction to Programming and 1701.121 Intermediate Algebra)

This course covers topics essential for work in computer science beyond elementary programming. Included are: numeration systems, and computer codes, sets, logic, algorithms, relations, combinatorics, and graphs. Emphasis is placed on the solution of problems, and, at the instructor's discretion, computer programs may be assigned. Graphics calculators may also be used.

1703.350 Advanced Topics in Discrete Mathematics 3 s.h.
(Prerequisites: 1703.150 or equivalent preparation.)

Course topics are selected from the following: analysis of algorithms, first order mathematical logic, combinatorics, digraphs and networks, recursion theory and difference equations, lattice theory, formal languages, automata theory, and coding theory. This course may not be offered annually, and students might be expected to use computers and/or graphics calculators.

1703.400 Applications of Mathematics 3 s.h.
(Prerequisite: 1701.230 Calculus III and 1701.210 Linear Algebra)

This course includes a presentation of examples of mathematics applied to the fields of the biological, physical, and social sciences. Mathematical models are used to describe physical systems, to solve problems, and to obtain new results when possible. It is expected that students have the ability to use computers and/or graphics calculators.