

**Mathematics/Mathematics Education (MAT)**  
**Physical Sciences & Mathematics Department**  
**School of Natural & Social Sciences**  
**Carhart Science Building**

**Objectives:** The Mathematics program is intended for those students who desire to (1) teach 7-12 mathematics, (2) pursue advanced studies in mathematics, (3) apply mathematics in some technical field or (4) derive pleasure and profit from the study of mathematics.

**Mathematics/Mathematics Education (BA or BS)**

**42-50 hours**

The Mathematics Core is the foundation for a comprehensive major with three options: 1) Applied Mathematics, 2) Pure Mathematics, and 3) 7-12 Field Endorsement.

**Mathematics Core: 29 hours**

MAT	140 Calculus I.....	5
	240 Calculus II.....	5
	270 Foundations of Mathematics.....	3
	340 Calculus III.....	4
	350 Linear Algebra.....	3
	400 Real Analysis I.....	3
	410 Probability and Statistics I.....	3
	460 Senior Seminar or	
	465 Mathematics Education Seminar.....	3

Choose one of the following concentrations:

**Applied Mathematics Concentration: Minimum of 21 hours + 29 hour core**

All Applied Mathematics majors must take CSC 150 & 160 to meet computer literacy requirements.

Applied Mathematics students must choose an emphasis in A) Mathematics, B) Biology, C) Chemistry, D) Computer Science, E) Economics, or F) Physics.

General education requirements must be met in the following way: Students in all emphases must take BIO 110 as a Life Science, ECO 202 as a Social Science, and ECO 203 as a Block 3 elective. Students with an emphasis in B) Biology must take CHE 106 as a Physical Science. Students emphasizing in C) Chemistry or F) Physics must take PHY 301 & 321 as a Physical Science. Students with any other emphasis can take either PHY 301 & 321 or CHE 106 as a Physical Science

Students must take MAT 460 as listed in the core. Students must also take:

MAT	250 Differential Equations.....	3
	305 Discrete Mathematics.....	3
	405 Applied Mathematics.....	3
	415 Probability and Statistics II.....	3
	440 Numerical Analysis.....	3

Upper level courses may need supporting coursework completed before students can enroll, therefore students should contact their mathematics advisor(s) before enrolling.

**A) Mathematics**

MAT	320 College Geometry.....	3
	360 Abstract Algebra.....	3

**B) Biology**

Choose a minimum of 6 hours from:

BIO	320 Molecular Genetics (4)
	325 Ecology (4)
	345 Conservation Biology (3)
	385 Microbiology (4)

**C) Chemistry**

CHE	456 Physical Chemistry I.....	3
	457 Physical Chemistry II.....	3

**D) Computer Science**

Choose a minimum of 6 hours from:

CSC	310 Data Structures (3)
	345 Computer Graphics (3)
	365 Scripting Languages (3)
	378 Robotics (3)
	380 Operating Systems (3)
	432 Parallel Programming (3)

**E) Economics**

Choose a minimum of 6 hours from:

BUS	322 Managerial Finance (3)
ECO	302 Intermediate Macroeconomics (3)
	303 Intermediate Microeconomics (3)
	430 International Economics (3)

**F) Physics**

Choose a minimum of 6 hours from:

PHY	302/322 University Physics & Physics Lab II (5)
	336 Classical Mechanics (3)
	345 Thermodynamics (3)
	356 Electricity & Magnetism (3)
	457 Modern Physics (3)
	465 Optics (3)

**Pure Mathematics Concentration: 21 hours + 29 hour core**

Pure Mathematics majors must take CSC 150 to meet computer literacy requirements.

Students must take MAT 460 as listed in the core.

MAT	250 Differential Equations.....	3
	320 College Geometry.....	3
	360 Abstract Algebra.....	3
	440 Numerical Analysis.....	3
MAT	Electives numbered 300 or above.....	9

**Field Endorsement in Mathematics 7-12: 13 hours + 29 hour core**

7-12 Field Endorsement majors must take CSC 150 to meet computer literacy requirements.

Students must take MAT 465 as listed in the core.

MAT	305 Discrete Mathematics.....	3
	320 College Geometry.....	3
	360 Abstract Algebra.....	3
MAT	Electives numbered 180 or above.....	4

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MAT 210 or MAT 215 for one (1) credit can be applied to the Field Endorsement.

Students interested in the Field Endorsement are also required to complete the Secondary Professional Education courses.

EDU 409 Mathematics Content Area Methods and Materials must be taken as part of the professional education requirements.

**Minor in Mathematics: 21 hours**

A minor must include a minimum of 12 hours unduplicated by the student's major(s) and minor(s).

MAT 140 Calculus I.....	5
240 Calculus II.....	5
270 Foundations of Mathematics.....	3

MAT Electives numbered 300 or above.....8

**Mathematics Concentration for Elementary Teachers: 22 hours**

22 hours of optional work supporting the Elementary Education Endorsement

MAT 130 Pre-Calculus Mathematics.....	5
140 Calculus I.....	5
210 Math for Elem School Teachers I.....	3
215 Math for Elem School Teachers II.....	3

MAT Electives numbered 180 or above.....6

WSC will allow advanced placement credit for MAT 140 Calculus I (5) after a student has successfully completed MAT 240 Calculus II (5) with a grade of C or better at WSC, and has paid the current Credit by Examination rate per credit hour, provided:

1. The student is a freshman, and
2. MAT 240 Calculus II is taken in his/her first semester on this campus or during the first semester it is offered, and
3. No Calculus class is taken on any other college campus before coming to WSC.
- 4.

**Undergraduate Courses**

MAT 105 Intermediate Algebra (3) Prerequisite: Placement or "C-" grade or better in GST 102. Designed for the student with a limited algebra background but a solid foundation in computational arithmetic skills is expected. Study of ratios, proportions, sets, functions, number systems, simple equations, factoring, fractions, exponents, radicals, logarithms, algebraic manipulations. This course does not meet a general education requirement.

MAT 110 Topics and Ideas in Mathematics (3) Prerequisite: Placement or "C-" or better in MAT 105. An introduction to the basic ideas of mathematical thinking as they are related to the student in General Education. Consideration is given to such topics as algebra, geometry, sets, logic, probability, and statistics.

MAT 121 College Algebra (3) Prerequisite: Placement or "C-" or better in MAT 105. This course is a study of equations and inequalities; functions and graphs; polynomial and rational functions; exponential logarithmic functions; systems of equations and inequalities.

MAT 122 Applied Trigonometry (1) Prerequisite: C- or better in MAT 121. Angle measurement, circular functions, inverse trigonometric functions, trigonometric functions of an acute angle, solutions of right triangles, law of sines, law of cosines, additional theorems and related formulas, trigonometric identities, and applications.

MAT 130 Pre-Calculus (5) Prerequisite: Placement or "C-" or better in MAT 121. A unified course which includes sets, relations, functions, operations, graphs, polynomials, sequences, field properties, algebraic expressions, systems of equations and inequalities, complex numbers, exponential, logarithmic, circular, and trigonometric functions and limits.

MAT 140 Calculus I (5) Prerequisite: Placement or "C-" or better in MAT 130. Theory and applications of limits, derivatives, antiderivatives, definite integrals, and differentials of algebraic, trigonometric, logarithmic, and exponential functions.

MAT 180 Applied Probability and Statistics (3) Prerequisite: Placement or "C-" or better in MAT 121. A study that includes the binomial, normal, t-score, chi-square distributions and how they are related to testing hypothesis. The analysis of variance, least squares fit, correlation coefficient, mathematical expectation and how these topics are related to probability and decision making.

MAT 210 Mathematics for Elementary School Teachers I (1 or 3) Prerequisite: Placement or "C-" or better in MAT 105. Elementary sets, set operations, Venn diagrams, relations, equivalence relations, functions, numeration systems, whole numbers, integers, algorithms, divisibility, primes, congruence, rationales, and reals. The three hour course is intended for Early Childhood Unified Education, Elementary Education, Middle Level Education, and Special Education majors. The one hour course MAT 210 may be applied to the mathematics endorsement.

MAT 215 Mathematics for Elementary School Teachers II (1 or 3) Prerequisite: "C-" or better in MAT 210. Probability and data analysis, geometry, measurement, problem solving, reasoning and proof. One hour of MAT 215 may be applied to the mathematics field endorsement.

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MAT 240 Calculus II (5) Prerequisite: "C-" grade or better in MAT 140. Integration techniques, parametric equations, polar coordinates, conic sections, and infinite sequences and series.

MAT 250 Differential Equations (3) Prerequisite: MAT 240. First- and second-order methods for ordinary differential equations including: separable, linear, Laplace transforms, linear systems, and applications. Qualitative, analytic and numeric techniques will be considered.

MAT 270 Foundations of Mathematics (3) Prerequisite: MAT 140. This course covers topics in sets and logic with the objective of using these topics to study the nature of the different types of proofs used in mathematics. In addition, problem solving techniques and strategies are also covered.

MAT 305 Discrete Mathematics (3) A survey of elementary discrete mathematics. Topics include set theory, relations, functions, elementary graph theory, including directed graphs and trees and selected graph algorithms. Algebraic structures including groups, lattices, elementary combinatorics, permutations and combinations will be studied.

MAT 320 College Geometry (3) Prerequisite: MAT 140 or consent of instructor. The course presents a formal axiomatic development of neutral and Euclidean geometry with an emphasis on valid arguments. Non-Euclidean geometry will also be investigated.

MAT 340 Calculus III (4) Prerequisite: "C-" grade or better in MAT 240. Vectors and vector calculus, cylindrical and spherical coordinates, and the theory and application of partial derivatives and multiple integration.

MAT 350 Linear Algebra (3) Prerequisite: MAT 140. An introduction to matrix algebra which includes the inversion of a matrix, rank of matrix and characteristic roots of a matrix, bilinear, quadratic and hermitian forms, vector spaces, linear transformations, unitary and orthogonal transformations and linear dependence.

MAT 360 Introduction to Abstract Algebra (3) Prerequisite: MAT 270 and 340 or department consent. An introduction to abstract-structural concepts including equivalence relations, congruence modulo  $n$ , and homomorphisms, primarily within the context of group theory. There is an emphasis on construction of proofs.

MAT 400/500 Real Analysis I (3) Prerequisite: MAT 340. The real number system, basic notions of set theory, basic point set topology, limits and continuous functions, differentiable functions.

MAT 405 Applied Mathematics (3) Prerequisites: MAT 250 and 340. Explores analytical and numerical methods of solution in various mathematical and scientific areas. Topics include modeling, infinite series, vector analysis, Fourier series, partial differential equations, integral transformations, and complex analysis.

MAT 410 Probability and Statistics I (3) Prerequisite: MAT 340. The mathematical development of discrete and continuous probability distributions including multivariate distributions, moments and moment generating functions, the normal distribution, sampling distributions.

MAT 415/515 Probability and Statistics II (3) Prerequisite: MAT 410. A continuation of MAT 410, including sampling distributions, confidence intervals, hypothesis testing, correlation and regression.

MAT 420/520 Number Theory (3) Prerequisite: Jr./Sr. standing. Theory of primes, continued fractions, quadratic residues, congruencies, primitive roots, and indices.

MAT 430/530 Modern Algebra (3) Prerequisite: Jr./Sr. standing. This course studies rings, integral domains, fields, polynomial rings over a field, and the solving of polynomial equations by radicals. The course also covers mathematical similarity between the ring of integers and the ring of polynomials as well as the study of extension fields.

MAT 435/535 History of Mathematics (3) Prerequisite: Jr./Sr. standing. A survey of the history of mathematics emphasizing both development of mathematical concepts and the people involved.

MAT 440 Numerical Analysis (3) Prerequisite: MAT 240. An introduction to numerical solutions to problems in various mathematical and scientific areas.. Topics to include solution of equations and systems of equations, interpolation and curve fitting, approximation of polynomials, and numerical differentiation and integration.

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MAT 460 Senior Seminar in Mathematics (3) Prerequisite: Senior Standing. A research and discussion course in which one or more advanced topics will be discussed based upon faculty and student interest. Students will be required to research a mathematics topic and will make a public presentation of their findings.

MAT 465 Mathematics Education Seminar (3) Prerequisite: Senior Standing. A seminar course in which students will discuss the relationships between the mathematics they have studied and the teaching of mathematics. Students will research a topic in mathematics education and make a public presentation of their findings.

**Eligible seniors may enroll in 500 level graduate courses.  
Graduate Courses**

MAT 500 Real Analysis I (3) See MAT 400.

MAT 515 Probability and Statistics II (3) See MAT 415.

MAT 520 Number Theory (3) See MAT 420.

MAT 530 Modern Algebra (3) See MAT 430.

MAT 535 History of Mathematics (3) See MAT 435.

MAT 555 Real Analysis II (3) Prerequisite: MAT 400/500. This course is a continuation of MAT 400/500 Real Analysis I and includes topics such as infinite series and integration theory.

MAT 600 Current Issues and Trends in Mathematics/Mathematics Education (3) The course explores issues and trends having a direct impact on mathematics and the way in which mathematics is taught. It presents a comprehensive approach to the exploration of the various topics and issues discussed. The course offers students an opportunity to examine contemporary educational topics and how they impact the teaching of mathematics. The course will also provide students with a foundation for professional development.

MAT 610 Modern Developments in Geometry (3) A survey of geometrics to include Euclidean, Transformation, finite, and coordinate geometries and how they relate to high school geometry.

MAT 620 Topics in Discrete Mathematics for Teachers (3) A study of discrete structures to include finite graphs, matrices, sequences, and recurrence relations.

MAT 645 Mathematics Curriculum and Teaching (3) The course is designed to examine the principles underlying the development and teaching of the 5-12 mathematics curriculum. Emphasis will be placed on learning theory, different curricular models, the teaching of mathematics, and assessment. The roles that national, state, and local groups play in curriculum development will also be examined.

MAT 660 Mathematical Modeling and Statistics (3) Mathematical concepts and techniques are used in modeling real life problems. Statistical techniques are used in analyzing

MAT 682 Topics in Mathematics (3) The course will be based on current needs and wants of students in the program. It will provide the mathematical development necessary to support those needs and wants. Students may enroll in the course more than once as long as the topic to be covered is different each time. Possible topics might include (but not limited to): topology, complex analysis, sets and logic, ring and field theory, differential geometry, and/or chaos and fractals.