Mathematicians can work with engineers, physicists, and biologists in to predict trends—for example, how a pandemic can spread. Applied can be applied to security systems; mathematical models can be used of many industries and government jobs. Knowledge of number theory both theoretical research programs or developing the next cool piece of technology. Good knowledge of computer programming strengthens both degrees.

### Programs

#### Undergraduate

**Bachelor’s**
- Statistics Minor

#### Graduate

**Master’s**

See Course Description Symbols and Terms ([https://catalog.csuchico.edu/academic-standards-policies/course-description-symbols-terms/](https://catalog.csuchico.edu/academic-standards-policies/course-description-symbols-terms/)) for an explanation of course description terminology and symbols, the course numbering system, and course credit units.

### Mathematics

- In certain courses, at the discretion of the instructor, you may be required to buy a computer program and/or graphing calculator.
- Completion of the Entry-Level Mathematics (ELM) requirement is a prerequisite for registration in all MATH courses.
- Enrollment in any mathematics course requires a grade of C- or higher in all prerequisite courses or their transfer equivalents.
MATH 5L  Foundational Mathematics B  1 Unit
Prerequisite: Credit in Math 031 or GE Math Ready with Support.
Corequisites: MATH 105.
Typically Offered: Fall and spring
Foundational level California Common Core State Standards mathematics topics in support of general education mathematics. This course is a supplemental requirement for Math Ready with Support students required to enroll in designated general education courses. 3 hours laboratory. (005498)
Grade Basis: ABC/No Credit
Repeatability: You may take this course for a maximum of 1 unit
Course Attributes: Pre-Collegiate

MATH 7L  Foundational Mathematics B  1 Unit
Prerequisite: Credit in Math 031 or GE Math Ready with Support.
Corequisites: MATH 107.
Typically Offered: Fall and spring
Foundational level California Common Core State Standards mathematics topics in support of general education mathematics. This course is a supplemental requirement for Math Ready with Support students required to enroll in designated general education courses. 3 hours laboratory. (022081)
Grade Basis: ABC/No Credit
Repeatability: You may take this course for a maximum of 1 unit
Course Attributes: Pre-Collegiate

MATH 10L  Foundational Mathematics B  1 Unit
Prerequisite: Credit in Math 031 or GE Math Ready with Support.
Corequisites: MATH 110.
Typically Offered: Fall and spring
Foundational level California Common Core State Standards mathematics topics in support of general education mathematics. This course is a supplemental requirement for Math Ready with Support students required to enroll in designated general education courses. 3 hours laboratory. (022082)
Grade Basis: ABC/No Credit
Repeatability: You may take this course for a maximum of 1 unit
Course Attributes: Pre-Collegiate

MATH 16L  Foundational Mathematics B  1 Unit
Prerequisite: Credit in Math 031 or GE Math Ready with Support.
Corequisites: MATH 116.
Typically Offered: Fall and spring
Foundational level California Common Core State Standards mathematics topics in support of general education mathematics. This course is a supplemental requirement for Math Ready with Support students required to enroll in designated general education courses. 3 hours laboratory. (022083)
Grade Basis: ABC/No Credit
Repeatability: You may take this course for a maximum of 1 unit
Course Attributes: Pre-Collegiate

MATH 31B  Foundational Mathematics A  1 Unit
Prerequisite: GE Math Ready with Support and Early Start Program.
Corequisites: BIOL 102.
Typically Offered: Fall and spring
Foundational level California Common Core State Standards mathematics topics. Satisfactory completion of this course fulfills the prerequisite for enrollment in Math 005L, MATH 007L, MATH 010L, and MATH 016L. This course is a supplemental requirement for Math Ready with Support, Early Start Program Required students required to enroll in designated general education courses. 3 hours laboratory. (022087)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 1 unit
Course Attributes: Pre-Collegiate

MATH 31G  Foundational Mathematics A  1 Unit
Prerequisite: GE Math Ready with Support and Early Start Program.
Corequisites: ERTH 130.
Typically Offered: Fall and spring
Foundational level California Common Core State Standards mathematics topics. Satisfactory completion of this course fulfills the prerequisite for enrollment in Math 005L, MATH 007L, MATH 010L, and MATH 016L. This course is a supplemental requirement for Math Ready with Support, Early Start Program Required students required to enroll in designated general education courses. 3 hours laboratory. (022086)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 1 unit
Course Attributes: Pre-Collegiate

MATH 31N  Foundational Mathematics A  1 Unit
Prerequisite: GE Math Ready with Support and Early Start Program.
Corequisites: SCED 101.
Typically Offered: Fall and spring
Foundational level California Common Core State Standards mathematics topics. Satisfactory completion of this course fulfills the prerequisite for enrollment in Math 005L, MATH 007L, MATH 010L, and MATH 016L. This course is a supplemental requirement for Math Ready with Support, Early Start Program Required students required to enroll in designated general education courses. 3 hours laboratory. (005493)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 1 unit
Course Attributes: Pre-Collegiate

MATH 31P  Foundational Mathematics A  1 Unit
Prerequisite: GE Math Ready with Support and Early Start Program.
Corequisites: PSSC 101.
Typically Offered: Fall and spring
Foundational level California Common Core State Standards mathematics topics. Satisfactory completion of this course fulfills the prerequisite for enrollment in Math 005L, MATH 007L, MATH 010L, and MATH 016L. This course is a supplemental requirement for Math Ready with Support, Early Start Program Required students required to enroll in designated general education courses. 3 hours laboratory. (022085)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 1 unit
Course Attributes: Pre-Collegiate
MATH 101 Patterns of Mathematical Thought 3 Units GE
Prerequisite: GE Mathematics/Quantitative Reasoning Ready or Ready with Support.
Typically Offered: Fall and spring
An informal approach to mathematics designed to bring an appreciation and workable knowledge of the subject to non-majors. Not acceptable for a mathematics major or minor. 1 hour discussion, 2 hours lecture. (005514)
General Education: Quantitative Reasoning (B4)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

MATH 105 Introduction to Statistics 3 Units GE
Prerequisite: GE Mathematics/Quantitative Reasoning Ready.
Typically Offered: Fall and spring
Summary of numerical data, distributions, linear regression, and introduction to statistical inference. Statistical software is used. 1.5 hours discussion, 1.5 hours lecture. (005501)
General Education: Quantitative Reasoning (B4)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

MATH 107 Finite Mathematics for Business 3 Units GE
Prerequisite: GE Mathematics/Quantitative Reasoning Ready.
Typically Offered: Fall and spring
Solutions to systems of linear equations, matrices, linear programming, combinatorics, probability, binomial and normal distributions. 1.5 hours discussion, 1.5 hours lecture. (005521)
General Education: Quantitative Reasoning (B4)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

MATH 108 Statistics of Business and Economics 3 Units GE
Prerequisite: GE Mathematics/Quantitative Reasoning Ready.
Typically Offered: Fall and spring
Descriptive statistics, sampling theory, statistical inference and tests of hypotheses, analysis of variance, chi-square tests, simple regression and correlation, and multiple regression and correlation. 1.5 hours discussion, 1.5 hours lecture. (001042)
General Education: Quantitative Reasoning (B4)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

MATH 109 Survey of Calculus 4 Units GE
Prerequisite: GE Mathematics/Quantitative Reasoning Ready. MATH 118 and MATH 119 (or equivalent) with a C- or higher, or a qualifying score on the department administered calculus readiness assessment in addition to high school trigonometry and precalculus with a C- or higher.
Typically Offered: Fall and spring
This course covers the fundamental concepts and techniques of differential and integral calculus with an introduction to differential equations. Emphasis on applications from the Life Sciences. This course is not intended for majors in mathematics, physics, chemistry, or engineering. No credit for students with credit in MATH 120. A score that meets department guidelines on a department administered calculus readiness exam must be achieved by those who claim high school equivalence. 4 hours discussion. (005512)
General Education: Quantitative Reasoning (B4)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

MATH 110 Concepts and Structures of Mathematics 3 Units GE
Prerequisite: GE Mathematics/Quantitative Reasoning Ready.
Typically Offered: Fall and spring
Structure of the real number system, operations on real numbers, number theory. Not acceptable for a mathematics major or minor. 3 hours lecture. (005522)
General Education: Quantitative Reasoning (B4)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

MATH 116 College Algebra 4 Units GE
Prerequisite: GE Mathematics/Quantitative Reasoning Ready.
Typically Offered: Fall and spring
This course covers advanced algebra concepts beyond the scope of Intermediate Algebra. The topics include algebraic simplifying, conics, theory and solution of equations and inequalities, systems of equations, linear functions, exponential and logarithmic functions, polynomial and rational functions, binomial expansion, and partial fractions. 4 hours lecture. (020430)
General Education: Quantitative Reasoning (B4)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

MATH 117 Hands-On Lab, Mathematics 2 Units
Prerequisite: MATH 110.
Corequisites: MATH 210 or faculty permission.
Typically Offered: Fall and spring
The Hands-On Lab for Mathematics provides a rich, sustained, and guided teaching experience for undergraduate students preparing to be elementary or middle school teachers. By developing, refining, and repeatedly teaching a lesson aligned to California mathematics standards, prospective teachers gain insights into the complexities of teaching mathematics content. In addition, prospective teachers engage in Lesson Study with the teachers for these children, thus acquiring experience in a collegial relationship with practicing professionals. 2 hours seminar. (020430)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>GE</th>
<th>Prerequisite</th>
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<tbody>
<tr>
<td>MATH 118</td>
<td>Trigonometry</td>
<td>3</td>
<td>GE</td>
<td>GE Mathematics/Quantitative Reasoning Ready.</td>
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<td><img src="image" alt="Typically Offered: Fall and spring" /></td>
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<td>Trigonometric functions, graphs, identities and conditional equations, logarithms, solutions of triangles, and complex numbers. 3 hours discussion. (005500)</td>
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<td>![General Education: Quantitative Reasoning (B4)]</td>
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<tr>
<td>MATH 119</td>
<td>Precalculus Mathematics</td>
<td>4</td>
<td>GE</td>
<td>GE Mathematics/Quantitative Reasoning Ready, and either 1/2 year of high school trigonometry or MATH 118 (may be taken concurrently).</td>
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<td><img src="image" alt="Typically Offered: Fall and spring" /></td>
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<td>Functions and graphs, including polynomial, rational, exponential, logarithmic, and trigonometric functions. Systems of equations and inequalities, polar and parametric equations, complex numbers, and analytic trigonometry. 4 hours discussion. (005504)</td>
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<td>![General Education: Quantitative Reasoning (B4)]</td>
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<td>MATH 119X</td>
<td>Precalculus Problem Session</td>
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<td>Faculty permission.</td>
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<td><img src="image" alt="Corequisites: MATH 119" /></td>
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<td>Designed to supplement MATH 119 with additional applications. Provides the student with the opportunity for additional assistance in developing problem-solving abilities. 3 hours independent study. (005505)</td>
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<tr>
<td>MATH 120</td>
<td>Analytic Geometry and Calculus</td>
<td>4</td>
<td>GE</td>
<td>MATH 118 and MATH 119 (or equivalent) with a C- or higher, or a qualifying score on the department administered calculus readiness assessment in addition to high school trigonometry and precalculus with a C- or higher.</td>
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<td><img src="image" alt="Typically Offered: Fall and spring" /></td>
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<td>Limits and continuity. The derivative and applications to related rates, maxima and minima, and curve sketching. Transcendental functions. An introduction to the definite integral and area. 4 hours discussion. (005506)</td>
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<td>![General Education: Quantitative Reasoning (B4)]</td>
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<td>MATH 120X</td>
<td>Calculus Problem Session</td>
<td>1</td>
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<td>Faculty permission.</td>
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<td><img src="image" alt="Corequisites: MATH 120" /></td>
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<td>Designed to supplement MATH 120 with additional applications of introductory calculus. Provides the student with the opportunity for additional assistance in developing problem-solving abilities. 3 hours independent study. (005510)</td>
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<tr>
<td>MATH 121</td>
<td>Analytic Geometry and Calculus</td>
<td>4</td>
<td></td>
<td>MATH 120.</td>
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<td><img src="image" alt="Typically Offered: Fall and spring" /></td>
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<td>The definite integral and applications to area, volume, work, differential equations, etc. Sequences and series, vectors and analytic geometry in 2 and 3-space, polar coordinates, and parametric equations. 4 hours discussion. (005507)</td>
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<tr>
<td>MATH 121X</td>
<td>Calculus Problem Session</td>
<td>1</td>
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<td>Concurrent enrollment in MATH 121, faculty permission.</td>
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<td><img src="image" alt="Typically Offered: Fall and spring" /></td>
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<td>Designed to supplement MATH 121 with additional applications and expanded explanations of concepts encountered in second-semester calculus. Provides the student with the opportunity for additional assistance in coming to an understanding of the concepts of calculus. 3 hours independent study. (005511)</td>
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<td>MATH 125</td>
<td>Advanced Number and Operation</td>
<td>3</td>
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<td>Successful completion of high school precalculus, concurrent enrollment in MATH 118 or 119, or faculty permission.</td>
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<td><img src="image" alt="Typically Offered: Fall only" /></td>
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<td>Investigate number and operation through calculation and abstraction, find patterns and relationships through computation, develop and test mathematical conjectures, and develop an appreciation of proof and an ability to make mathematical arguments. Basic concepts from Number Theory are explored, culminating in proof of the Fundamental Theorem of Arithmetic and related theorems in other number sets. 3 hours discussion. (021846)</td>
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<td>MATH 130</td>
<td>Introduction to R</td>
<td>1</td>
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<td>Concurrent enrollment in MATH 121, faculty permission.</td>
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<td><img src="image" alt="Typically Offered: Fall and spring" /></td>
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<td>This accelerated short-course is designed as a primer to get the complete novice up and running with the basic knowledge of how to use the statistical programming language R. Target audience is anyone who wants to become the boss of their own data and conduct their own analysis. We cover how to get data into R, how to manipulate it into analyzable format, and how to create informative plots. Emphasis is placed on reproducibility and literate programming. The course culminates with a data exploration project. This course requires the use of a laptop computer and appropriate software. Typically offered as 3 hour discussion for 5 weeks. 1 hour discussion. (021774)</td>
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<td><img src="image" alt="Course Attributes: Lower Division; Laptop required" /></td>
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MATH 185  Data Analytics for Social Good  3 Units  GE
Prerequisite: GE Mathematics/Quantitative Reasoning Ready.
Typically Offered: Fall and spring
This course introduces students how to start harnessing the power
of data to intelligently cope with the requirements of citizenship,
employment, and family to be prepared for a healthy, happy and
productive life. Students practice collecting and wrangling data into a
usable form, visualizing large data sets to discover patterns, representing
data in a meaningful way, exploring varying interpretations of the data
and results, and discussing potentials for misuse and abuse. This course
promotes critical reflection on the ethical, social, cultural, and political
dimensions of data as well as providing direct hands on experience with
both spreadsheets, and the programming language R. Students from all
majors are welcome, no prior programming experience is expected. 1
hour activity, 2 hours lecture. (022285)
General Education: Quantitative Reasoning (B4)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division; Laptop required

MATH 195  Project MATH Seminar Year 1  1 Unit
Typically Offered: Fall and spring
The Project M.A.T.H. Seminar - Year 1 is a biweekly seminar for students
in their first year of Project M.A.T.H., an innovative program for students
interested in becoming secondary mathematics teachers. Students work
with mentor teachers, prepare and present lessons, and participate in
a structured early field experience. Completion of the seminar series
satisfies the Credential Program's Early Field Experience requirement. 1
hour seminar. (020431)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 2 units
Course Attributes: Lower Division

MATH 198  Special Topics  1-3 Units
Prerequisite: GE Mathematics/Quantitative Reasoning Ready.
Typically Offered: Fall and spring
This course is for special topics offered for 1.0-3.0 units. Typically the
topic is offered on a one-time-only basis and may vary from term to term
and be different for different sections. See The Class Schedule for the
specific topic being offered. 3 hours discussion. (005528)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Lower Division

MATH 199  Special Problems  1-3 Units
Typically Offered: Fall and spring
This course is an independent study of special problems offered for
1.0-3.0 units. 9 hours supervision. (020782)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division

MATH 210  Concepts and Structures of Mathematics  3 Units
Prerequisite: MATH 110.
Typically Offered: Fall and spring
Problem-solving, probability and statistics, measurement and the metric
system, geometry. Not acceptable for a mathematics major or minor. 3
hours discussion. (005523)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

MATH 217  Discrete Mathematics  3 Units
Prerequisite: GE Mathematics/Quantitative Reasoning Ready, CSCI 111
with a grade of C or higher (may be taken concurrently), MATH 119 (or
equivalent).
Typically Offered: Fall and spring
Offers an intensive introduction to discrete mathematics as used in
computer science. Topics include sets, relations, propositional and
predicate logic, basic proof methods including mathematical induction,
digital logic circuits, complexity of algorithms, elementary combinatorics,
and solving linear recurrence relations. 3 hours discussion. (005550)
Cross listing(s): CSCI 217
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

MATH 220  Analytic Geometry and Calculus  4 Units
Prerequisite: MATH 121.
Typically Offered: Fall and spring
Vector functions and space curves. Functions of several variables, partial
derivatives, and multiple integrals. Vector calculus line integrals, surface
integrals, divergence/curl, Green's Theorem, Divergence Theorem, and
Stokes' Theorem. 4 hours discussion. (005508)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

MATH 220X  Calculus Problem Session  1 Unit
Corequisites: MATH 220.
Typically Offered: Fall and spring
Designed to supplement MATH 220 with broader and deeper applications
of calculus, providing students with opportunities for additional problem-
solving skill building. Twenty hours activity minimum for credit, but 40
hours are available to students. 3 hours independent study. (020358)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

MATH 225  Algebra Functions, Real and Complex Number Systems  3 Units
Prerequisite: MATH 125.
Typically Offered: Spring only
This course focuses on developing your abilities in making sense of
algebraic manipulation in the context of functions, polynomial rings, and
matrices. The course and the classroom are structured as a supportive,
collaborative learning environment in which mathematical discourse
is valued and exploration encouraged. You will investigate algebra and
polynomials through calculation and abstraction, find patterns and
relationships through computation, develop and test mathematical
conjectures, and develop an appreciation of proof and an ability to
construct mathematical arguments. More advanced concepts from
Number Theory are explored, culminating in proofs of the Unique Prime
Factorization Theorem and the Division Algorithm for different rings. 3
hours discussion. (021953)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
<th>Prerequisite</th>
<th>Typically Offered</th>
<th>Corequisites</th>
<th>Grade Basis</th>
<th>Repeatability</th>
<th>Course Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 230</td>
<td>An Introduction to Computational Mathematics</td>
<td>3</td>
<td>MATH 121, no previous computer experience required.</td>
<td>Fall only</td>
<td>An introduction to the use of mathematical computer software. This course provides an introduction to a programming environment, preparing math majors to use computers to explore and solve varied math problems. The software used in this class depends on the instructor and may be chosen from Mathematica, GP/PARI, GAP, SAS, R, etc. This course satisfies the computer literacy requirement for mathematics majors. 3 hours discussion.</td>
<td>(005526)</td>
<td>You may take this course for a maximum of 9 units</td>
<td>Lower Division</td>
</tr>
<tr>
<td>MATH 235</td>
<td>Elementary Linear Algebra</td>
<td>3</td>
<td>MATH 121</td>
<td>Fall and spring</td>
<td>Matrices, determinants, cartesian n-space (basis and dimension of a subspace, rank, change of basis), linear transformations, eigenvalues. Numerical problems will be emphasized. 3 hours discussion.</td>
<td>(005553)</td>
<td>You may take this course for a maximum of 3 units</td>
<td>Lower Division</td>
</tr>
<tr>
<td>MATH 241</td>
<td>Secondary Math Early Field Experience</td>
<td>1</td>
<td>MATH 121</td>
<td>Fall and spring</td>
<td>This seminar and the associated CAVE field experience give prospective teachers early exposure to issues relevant to the profession of teaching secondary mathematics. In particular, the experience helps these future teachers develop a deeper understanding of the K-12 mathematics curriculum, understand connections between their university subject matter preparation and K-12 academic content, and reflect on developmental and social factors that affect K-12 students’ learning of mathematics. 1 hour seminar.</td>
<td>(020432)</td>
<td>You may take this course for a maximum of 4 units</td>
<td>Lower Division</td>
</tr>
<tr>
<td>MATH 260</td>
<td>Elementary Differential Equations</td>
<td>4</td>
<td>MATH 121</td>
<td>Fall and spring</td>
<td>First order separable, linear, and exact equations; second order linear equations, Laplace transforms, series solutions at an ordinary point, systems of first order linear equations, and applications. 4 hours discussion.</td>
<td>(005509)</td>
<td>You may take this course for a maximum of 4 units</td>
<td>Lower Division</td>
</tr>
<tr>
<td>MATH 290</td>
<td>Mathematics and Statistics Tutoring</td>
<td>1</td>
<td>MATH 295</td>
<td>Fall only</td>
<td>This course provides supplemental mathematics statistics tutoring. 3 hours independent study.</td>
<td>Credit/No Credit</td>
<td>You may take this course for a maximum of 8 units</td>
<td>Lower Division</td>
</tr>
<tr>
<td>MATH 295</td>
<td>Project MATH Seminar Year 2</td>
<td>1</td>
<td>MATH 195</td>
<td>Fall and spring</td>
<td>The Project M.A.T.H. Seminar - Year 2 is the continuation of a biweekly seminar for students in Project M.A.T.H., an innovative program for students interested in becoming secondary mathematics teachers. Students work with mentor teachers, prepare and present lessons, and participate in a structured early field experience. They also take on a leadership role in the seminar. Completion of the seminar series satisfies the Credential Program’s Early Field Experience requirement. 1 hour seminar.</td>
<td>(020433)</td>
<td>You may take this course for a maximum of 2 units</td>
<td>Lower Division</td>
</tr>
<tr>
<td>MATH 298</td>
<td>Special Topics</td>
<td>1-3</td>
<td>Faculty permission</td>
<td>Inquire at department</td>
<td>This course is for special topics offered for 1.0 - 3.0 units. Typically the topic is offered on a one-time-only basis and may vary from semester to semester and be different for different sections. See the class schedule for the specific topic being offered. 0 hours supervision.</td>
<td>Graded</td>
<td>You may take this course more than once</td>
<td>Lower Division</td>
</tr>
<tr>
<td>MATH 299</td>
<td>Special Problems</td>
<td>1-3</td>
<td>Faculty permission</td>
<td>Inquire at department</td>
<td>This course is an independent study of special problems offered for 1.0-3.0 units. You must register directly with a supervising faculty member. 0 hours supervision.</td>
<td>Graded</td>
<td>You may take this course for a maximum of 6 units</td>
<td>Lower Division</td>
</tr>
<tr>
<td>MATH 300</td>
<td>Undergraduate Mathematics Seminar</td>
<td>2</td>
<td>GE Mathematics/Quantitative Reasoning Ready</td>
<td>Fall and spring</td>
<td>This course is designed to expose you to mathematics not normally covered in your regular curriculum. Guest speakers are drawn from the ranks of our faculty, including other disciplines, our students, and industry. Talks are interactive, participatory, and fun. There is no prerequisite, except an interest in interesting mathematics. Topics typically include selections from number theory, math education, statistics, problem solving, undergraduate research, calculus, differential equations, spatial and planar geometry, probability, computer applications, mathematical operations, modeling, topology, trigonometry, metric measurements, elliptical curves, and bubbles, among others. This exposure broadens your horizons and expands your curiosity in hopes that you will explore mathematics beyond your required courses. 2 hours lecture.</td>
<td>(021647)</td>
<td>You may take this course for a maximum of 8 units</td>
<td>Upper Division</td>
</tr>
</tbody>
</table>
MATH 305 Conceptual and Practical Statistics 3 Units
Prerequisite: MATH 120 or MATH 109 (may be taken concurrently).
Typically Offered: Spring only
Design of statistical experiments, graphing, sampling techniques, probability, and common probability distributions will be discussed, with an emphasis on practical applications. Uses and misuses of statistics, misrepresentation of data, and proper and improper statistical analyses will be discussed. 3 hours discussion. (005532)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 310 Patterns and Structures in Mathematics 3 Units
Prerequisite: MATH 110; MATH 210 or MATH 225.
Typically Offered: Fall and spring
Builds upon student's understanding of numbers and operations to develop their algebraic and proportional reasoning. Probability viewed as an application of proportional reasoning. Foundational statistics is also covered. Overall focus on developing a deep understanding of mathematics that is relevant to the teaching of Kindergarten-8th grade. Not acceptable for a mathematics major or minor except the Foundational Math Education option and Math Education minor. 3 hours discussion. (005542)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 311 Intuitive Foundations of Geometry 3 Units
Prerequisite: MATH 110, MATH 210; or MATH 225.
Typically Offered: Spring only odd years
An intuitive approach to problem-solving in Euclidean, coordinate, motion, and space geometry. Concrete models are used for analyzing abstract ideas. Not acceptable for a mathematics major or minor other than the Math Education minor. 3 hours discussion. (005543)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 314 Probability and Statistics for Science and Technology 4 Units
Prerequisite: MATH 121; and one of the following: CSCI 111, MATH 130 (may be taken concurrently), MATH 230 or MECH 208.
Typically Offered: Fall and spring
Basic concepts of probability and statistics with emphasis on models used in science and technology. Probability models for statistical estimation and hypothesis testing. Confidence limits. One- and two-sample inference, simple regression, one- and two-way analysis of variance. Credit cannot be received for both MATH 314 and MATH 315. 4 hours discussion. (005533)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division; Laptop required

MATH 315 Applied Statistical Methods I 3 Units
Prerequisite: MATH 105, MATH 109, or MATH 120, or faculty permission.
Typically Offered: Fall and spring
Single and two sample inference, analysis of variance, multiple regression, analysis of co-variance, experimental design, repeated measures, nonparametric procedures, and categorical data analysis. Examples are drawn from biology and related disciplines. The statistical programming language R is used. Appropriate for biology, agriculture, nutrition, psychology, social science and other majors. 3 hours discussion. (005568)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 317 Cryptography 4 Units
Prerequisite: CSCI 111; MATH 217 or MATH 330W.
Typically Offered: Spring only
This is the first course in cryptography with an emphasis on public key cryptosystems, digital signature schemes, and the underlying mathematical principles on which they are based. Students implement algorithms and solve problems in programming-based assignments. Some time is devoted to getting familiar with the Python programming language and the SageMath Software system. 4 hours discussion. (022044)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division

MATH 318 Topological Data Analysis 3 Units
Prerequisite: MATH 217 or MATH 330W; CSCI 111 or faculty permission.
Typically Offered: Spring only odd years
In this course students use the tools of topology to study data sets in terms of their shape. Students become familiar with the basics of topology, and master a subset of algorithms for computing Betti number, topological persistence, homology cycles, Reeb graphs, and Laplace spectra. Students become familiar with designing algorithms for problems in applications dealing with data, and how to research the background of a topic in data analysis or machine learning. 3 hours discussion. (022453)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 330W Methods of Proof (W) 3 Units W
Prerequisite: GE Written Communication (A2) requirement and MATH 121.
Typically Offered: Fall and spring
A survey of elementary principles of logic, emphasizing the nature of proof. Standard methods of proof will be illustrated with examples from various branches of mathematics, including set theory and the theory of functions and relations. Other possible sources of examples include the calculus, number theory, theory of equations, topology of the real line. 3 hours seminar. (005530)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Writing Course
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisite</th>
<th>Typically Offered</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 333</td>
<td>History of Mathematics</td>
<td>3</td>
<td>MATH 121; MATH 220 or MATH 225; and at least one upper division mathematics course. Recommended: MATH 330W.</td>
<td>Fall only</td>
<td>Study of the historical development of mathematics, with particular emphasis on the relationship between mathematics and society. 3 hours discussion. (005531)</td>
</tr>
<tr>
<td>MATH 337</td>
<td>Introduction to the Theory of Numbers</td>
<td>3</td>
<td>MATH 121, MATH 330W.</td>
<td>Fall only</td>
<td>Basic properties of the integers, division algorithm, fundamental theorem of arithmetic, number-theoretic functions, Diophantine equations, congruences, quadratic residues, continued fractions. 3 hours discussion. (005585)</td>
</tr>
<tr>
<td>MATH 341</td>
<td>Mathematical Topics for the Credential</td>
<td>3</td>
<td>MATH 121 or MATH 225.</td>
<td>Fall only</td>
<td>This course is designed to supplement the mathematical background of the candidate for the single subject credential in mathematics. The mathematical topics will be discussed from the student's and the teacher's points of view to aid the candidate in making the transition to secondary school mathematics. Topics include mathematical problem-solving, conceptual ideas using algebra, geometry, and functions, incorporating technology into the mathematics curriculum, and finite systems. 3 hours seminar. (005544)</td>
</tr>
<tr>
<td>MATH 342</td>
<td>Math Topics for the Credential</td>
<td>3</td>
<td>MATH 341.</td>
<td>Spring only</td>
<td>This course focuses on having students examine mathematical pedagogy and the understanding and evaluations of students as mathematical learners as it analyzes secondary mathematics curriculum from an advanced standpoint. Students will have opportunities to be involved in the facilitation of mathematical learning. Topics include: history of mathematics education, contemporary mathematics curricula, problem solving, mathematical reasoning and methods of proof, mathematical learning theories, communication, assessment and collaborative learning communities. 3 hours discussion. (005545)</td>
</tr>
<tr>
<td>MATH 344</td>
<td>Graph Theory</td>
<td>3</td>
<td>MATH 121; CSCI 217, MATH 217, or MATH 330W.</td>
<td>Fall only odd years</td>
<td>An introduction to graph theory and network theory. Directed graphs, trees, connectivity, duality, coloring, and planarity are studied both from a theoretical perspective as well as with respect to efficient algorithms. 3 hours discussion. (005591)</td>
</tr>
<tr>
<td>MATH 346</td>
<td>College Geometry</td>
<td>3</td>
<td>MATH 220 or MATH 225; MATH 330W.</td>
<td>Spring only</td>
<td>An exploration of axioms and models for Euclidean and non-Euclidean geometries focusing on the independence of the Parallel Postulate. Additional topics will be chosen from Euclidean plane geometry, transformation geometry, and the geometry of polyhedra. 3 hours discussion. (005561)</td>
</tr>
<tr>
<td>MATH 350</td>
<td>Introduction to Probability and Statistics</td>
<td>3</td>
<td>MATH 121.</td>
<td>Spring only</td>
<td>Probability theory and application, discrete and continuous random variables and their distribution, basic sampling distributions, theory and concepts of expectations and variance. Statistical software may be used. 3 hours discussion. (005534)</td>
</tr>
<tr>
<td>MATH 351</td>
<td>Introduction to Probability and Statistics</td>
<td>3</td>
<td>MATH 350.</td>
<td>Spring only</td>
<td>Continuation of MATH 350. 3 hours discussion.</td>
</tr>
<tr>
<td>MATH 360</td>
<td>Ordinary Differential Equations</td>
<td>3</td>
<td>MATH 260.</td>
<td>Spring only</td>
<td>Systems of first order linear equations, existence and uniqueness theorems, stability, Sturm separation theorems, power series methods. 3 hours discussion. (005538)</td>
</tr>
<tr>
<td>MATH 361</td>
<td>Boundary Value Problems and Partial Differential Equations</td>
<td>3</td>
<td>MATH 260.</td>
<td>Fall only</td>
<td>Partial differential equations, separation of variables, orthogonal sets of functions, Sturm-Liouville problems, Fourier series, boundary value problems for the wave equation, heat equation, and Laplace equation. Bessel functions, Legendre polynomials. 3 hours discussion. (005540)</td>
</tr>
</tbody>
</table>

**Mathematics and Statistics**

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MATH 385  Introduction to Data Science  3 Units
Prerequisite: CSCI 111, MATH 130, or MATH 230, MATH 109 or MATH 120.
Typically Offered: Fall only
Data Science is the science of learning from data in order to gain useful predictions and insights. The course provides an overview of the wide area of data science, with a particular focus on the tools required to store, clean, manipulate, visualize, model, and ultimately extract information from various sources of data. Topics include the analytics life cycle, data integration and modeling in R/Python, relational databases and SQL, text processing and sentiment analysis, and data visualization. Emphasis is placed on reproducible research, code sharing, version control, and communicating results to a non-technical audience. 3 hours discussion. (021756)
Cross listing(s): CSCI 385
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 398  Special Topics in Math  1-3 Units
Prerequisite: At least one 100- or 200-level mathematics course appropriate to the subject, faculty permission.
Typically Offered: Fall and spring
This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See the Class Schedule for the specific topic being offered. 9 hours supervision. (005559)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Upper Division

MATH 399  Special Problems  1-3 Units
Typically Offered: Fall and spring
This course is an independent study of special problems offered for 1.0-3.0 units. You must register directly with a supervising faculty member. MATH 399 cannot be used to fulfill major requirements without prior approval of the advisor and department chair. 0 hours supervision. (005560)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

MATH 401  CMP Institute - Summer 1  2 Units
Typically Offered: Summer session only
CMP Institute - Summer 1 2 hours discussion. (005578)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division

MATH 405  CMP Institute-Sp  1 Unit
Typically Offered: Spring only
1 hour lecture. (005552)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

MATH 407  CMP Institute - Summer 2  1 Unit
Typically Offered: Summer session only
1 hour discussion. (005579)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 2 units
Course Attributes: Upper Division

MATH 420W  Advanced Calculus (W)  3 Units  W, GW
Prerequisite: GE Written Communication (A2) requirement, MATH 220, MATH 330W, upper-division standing.
Typically Offered: Fall and spring
Limits, continuity, uniform continuity, the definite integral, series, convergence, uniform convergence, and metric spaces. Differentiation and integration of functions of several variables. Transformation of multiple integrals. 3 hours discussion. (005575)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Writing Course; Graduation Writing Assessment

MATH 421  Advanced Calculus  3 Units
Prerequisite: MATH 420W
Typically Offered: Spring only even years
Continuation of MATH 420W. 3 hours discussion. (005576)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 425W  Computational and Communication in Mathematical Modeling (W)  3 Units  W, GW
Prerequisite: GE Written Communication (A2) requirement, completion of computer literacy requirement, MATH 225, MATH 235, MATH 330W, and upper division standing.
Typically Offered: Fall only
In this course, intended for pre-service teachers, student experience mathematical modeling with content common in the secondary setting (algebra through calculus) as well as from their undergraduate coursework and develop and produce formal modeling reports. Students use technology to aid in exploring real-world circumstances, make sense of and analyze existing models, and develop their own mathematical models. 3 hours discussion. (021977)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Writing Course; Graduation Writing Assessment

MATH 428  Differential Geometry  3 Units
Prerequisite: MATH 220, MATH 330W.
Typically Offered: Fall only odd years
The geometry of curves and surfaces in Euclidean 3-space. 3 hours lecture. (005566)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 435  Linear Algebra  3 Units
Prerequisite: MATH 220, MATH 235, MATH 330W.
Typically Offered: Spring only even years
Vector spaces, linear operators, bilinear forms and scalar products, unitary spaces; matrix polynomials, eigenvalues, and Jordan normal form. 3 hours discussion. (005581)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
MATH 437  Topology  3 Units  
Prerequisite: MATH 220, MATH 330W.  
Typically Offered: Fall only even years  
Metric spaces, continuous functions, homeomorphisms, separation, and covering axioms, connectedness. 3 hours discussion. (005563)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division  

MATH 442  Mathematics and the Teaching of Mathematics  3 Units  
Prerequisite: MATH 342.  
Typically Offered: Fall only  
Completes a three course series, started with two semesters of Mathematics for the Credential, MATH 341 and MATH 342. Students compare instructional strategies and explore the role content and pedagogical content knowledge has in these strategies. Central to the class is a lesson study project which entails a cycle of lesson development, implementation, reflection and revision, and implementation again. Students concurrently enrolled in EDTE 555A, Teaching Practicum I for Blended Math Candidates, are able to implement their lesson as part of the practicum, and have a real context for the full content of the course. 3 hours lecture. (020978)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division  

MATH 449  Modern Algebra  3 Units  
Prerequisite: MATH 220, MATH 235, MATH 330W.  
Typically Offered: Fall only  
Introduction to basic algebraic structures such as groups, rings, and fields. The fundamental concepts of homomorphism, subgroup, normal subgroup and factor group of a group as well as subring, ideal and factor ring of a ring; permutation groups and matrix groups. 3 hours discussion. (005582)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division  

MATH 450  Computational Statistics  3 Units  
Prerequisite: MATH 220, MATH 350 or MATH 650. Strongly Recommended: MATH 235 or a similar exposure to Linear Algebra.  
Typically Offered: Fall only  
Continuation of MATH 350 with a strong focus on computational tools used to fit statistical models. Topics may include Bayesian statistics, Monte Carlo, Markov chain Monte Carlo, optimization expectation-maximization algorithms, matrix decompositions, variational inference, stochastic optimization, and neural networks. This course requires the use of a laptop computer and appropriate software such as R or Python. 3 hours discussion. (005562)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division  

MATH 451  Modern Algebra II  3 Units  
Prerequisite: MATH 449.  
Typically Offered: Spring only odd years  
Continuation of MATH 449, topics may include group actions, the Sylow theorems, number fields, finite fields, algebraic extensions, field automorphisms, splitting fields of polynomials, Galois groups, and solvable groups. 3 hours discussion. (021971)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division  

MATH 456  Applied Statistical Methods II  3 Units  
Prerequisite: MATH 314 or MATH 315.  
Typically Offered: Spring only even years  
Advanced topics in applied statistics including multiple and logistic regression, multivariate methods, multi-level modeling, repeated measures, and others as appropriate. The statistical programming language R is used. Appropriate for biology, agriculture, nutrition, business, psychology, social science and other majors. 3 hours discussion. (005570)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division  

MATH 458  Sampling Methods  3 Units  
Prerequisite: MATH 314, MATH 315, or MATH 351 (may be taken concurrently).  
Typically Offered: Spring only odd years  
The theory and application of survey sampling techniques. Topics include simple random sampling, stratified sampling, systematic sampling, and cluster sampling. Appropriate for mathematics, computer science, psychology, social science, agriculture, biology, and other majors. 3 hours discussion. (005573)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division  

MATH 461  Numerical Analysis  3 Units  
Prerequisite: MATH 220 or MATH 260; completion of computer literacy requirement.  
Typically Offered: Spring only  
Approximation; numerical integration; numerical solution of ordinary and partial differential equations; interpolation and extrapolation. 3 hours discussion. (005584)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division  

MATH 465  Introduction to Complex Variables  3 Units  
Prerequisite: MATH 220.  
Typically Offered: Fall only  
Algebra of Complex Numbers, Cauchy-Riemann Equations, the exponential, trigonometric, and logarithmic functions, complex integration and Cauchy integral formula, Taylor and Laurent series, the residue theorem, conformal mapping, and applications. 3 hours discussion. (005577)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division  

MATH 472  Introduction to Chaotic Dynamical Systems  3 Units  
Prerequisite: MATH 260. Recommended: MATH 235, MATH 360.  
Typically Offered: Fall only odd years  
An introduction to the study of non-linear dynamical systems. Both discrete and continuous systems will be studied using classical analysis combined with geometric techniques and computer simulation. Areas of application include fractal geometry, coding theory, fluid turbulence, population fluctuation, and chaotic vibrations of structures and circuits. 3 hours discussion. (005588)  
Grade Basis: Graded  
Repeatability: You may take this course for a maximum of 3 units  
Course Attributes: Upper Division
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisite(s)</th>
<th>Typically Offered</th>
<th>Admission Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 475</td>
<td>Calculus of Variations</td>
<td>3</td>
<td>MATH 260; MATH 361 is recommended</td>
<td>Fall only even years</td>
<td>completion of MATH 361</td>
</tr>
<tr>
<td>MATH 480</td>
<td>Mathematical Modeling</td>
<td>3</td>
<td>MATH 235, MATH 260</td>
<td>Spring only</td>
<td>-</td>
</tr>
<tr>
<td>MATH 485</td>
<td>Advanced Topics in Data Science</td>
<td>3</td>
<td>CSCI 385 or MATH 385; MATH 456 (may be taken concurrently)</td>
<td>Spring only</td>
<td>-</td>
</tr>
<tr>
<td>MATH 490</td>
<td>Data Science Capstone</td>
<td>1-3</td>
<td>MATH 485, senior standing, approved project, enrollment in the Data Science Certificate Program.</td>
<td>Fall and spring</td>
<td>admission to program</td>
</tr>
<tr>
<td>MATH 495H</td>
<td>Honors Reading Course</td>
<td>3</td>
<td>Admission to the Department Honors Program, completion of MATH 420W with a grade of B or higher.</td>
<td>Fall and spring</td>
<td>admission to program</td>
</tr>
<tr>
<td>MATH 496H</td>
<td>Honors Thesis</td>
<td>3</td>
<td>Completion of MATH 495H with a grade of B or higher, and approval by the department Honors advisor and thesis supervisor of the proposed thesis topic.</td>
<td>Fall and spring</td>
<td>approval by advisor and supervisor</td>
</tr>
<tr>
<td>MATH 500H</td>
<td>Advanced Topics in Mathematics</td>
<td>1-3</td>
<td>At least one 300- or 400-level mathematics course appropriate to the subject, faculty permission.</td>
<td>Fall and spring</td>
<td>admission to program</td>
</tr>
<tr>
<td>MATH 599H</td>
<td>Special Problems</td>
<td>1-3</td>
<td>Faculty permission.</td>
<td>Fall and spring</td>
<td>admission to program</td>
</tr>
<tr>
<td>MATH 610</td>
<td>Topics in Mathematics for Secondary Teachers: Analysis</td>
<td>3</td>
<td>Admission to the master's program in mathematics education or instructor permission.</td>
<td>Fall and spring</td>
<td>admission to program</td>
</tr>
</tbody>
</table>

Course Attributes: Upper Division
MATH 615 Data Analysis for Graduate Research 3 Units
Prerequisite: MATH 105, MATH 305, MATH 315, or MATH 350.
Typically Offered: Fall only
This course provides a hands-on introduction to using data to rigorously answer research questions. Students practice cleaning and manipulating data, creating data visualizations, and conducting introductory level statistical analysis using real-world data sets that are relevant to their field. Analysis topics include single and two-sample inference, analysis of variance, multiple regression, analysis of co-variance, experimental design, repeated measures, nonparametric procedures, and categorical data analysis. Reproducible research is strongly emphasized through the use of statistical computing software (e.g., SPSS, Stata, SAS, R, Python). Recommended for all majors that use data for research. 3 hours discussion. (005597)
Grade Basis: Graduate Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Graduate Division

MATH 620 Topics in Mathematics for Secondary Teachers: Geometry 3 Units
Prerequisite: Admission to the master’s program in mathematics education or instructor permission.
Typically Offered: Inquire at department
Through an array of pedagogical strategies, secondary mathematics teachers explore geometry appropriate for the secondary school curriculum. These topics and strategies provide a basis for reflective analysis and deepening knowledge of geometry. 3 hours seminar. (005602)
Grade Basis: Report in Progress: ABC/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division

MATH 630 Topics in Mathematics for Secondary Teachers: Foundations of Mathematics 3 Units
Prerequisite: Admission to the master’s program in mathematics education or instructor permission.
Typically Offered: Inquire at department
Through an array of pedagogical strategies, secondary mathematics teachers explore the foundations of mathematics topics appropriate for the secondary school curriculum. These topics and strategies provide a basis for reflective analysis and deepening knowledge of the foundations of mathematics. 3 hours seminar. (005601)
Grade Basis: Report in Progress: ABC/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division

MATH 633 Topics in Mathematics for Secondary Teachers: Number Theory 3 Units
Prerequisite: Admission to the master’s program in mathematics education or instructor permission.
Typically Offered: Inquire at department
Through an array of pedagogical strategies, secondary mathematics teachers explore number theory appropriate for the secondary school curriculum. These topics and strategies provide a basis for reflective analysis and deepening knowledge of number theory. 3 hours seminar. (005605)
Grade Basis: Report in Progress: ABC/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division

MATH 635 Topics in Mathematics for Secondary Teachers: Discrete Mathematics 3 Units
Prerequisite: Admission to the master’s program in mathematics education or instructor permission.
Typically Offered: Inquire at department
Through an array of pedagogical strategies, secondary mathematics teachers explore discrete mathematics topics appropriate for the secondary school curriculum. These topics and strategies provide a basis for reflective analysis and deepening knowledge of discrete mathematics. 3 hours seminar. (005600)
Grade Basis: Report in Progress: ABC/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division

MATH 637 Topics in Mathematics for Secondary Teachers: History of Mathematics 3 Units
Prerequisite: Admission to the master’s program in mathematics education or instructor permission.
Typically Offered: Inquire at department
Through an array of pedagogical strategies, secondary mathematics teachers explore the history of mathematics appropriate for the secondary school curriculum. These topics and strategies provide a basis for reflective analysis and deepening knowledge of the history of mathematics. 3 hours seminar. (005603)
Grade Basis: Report in Progress: ABC/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division

MATH 640 Topics in Mathematics for Secondary Teachers: Modern Algebra 3 Units
Prerequisite: Admission to the master’s program in mathematics education or instructor permission.
Typically Offered: Inquire at department
Through an array of pedagogical strategies, secondary mathematics teachers explore modern algebra topics appropriate for the secondary school curriculum. These topics and strategies provide a basis for reflective analysis and deepening knowledge of modern algebra. 3 hours seminar. (005598)
Grade Basis: Report in Progress: ABC/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division

MATH 650 Topics in Mathematics for Secondary Teachers: Probability and Statistics 3 Units
Prerequisite: Admission to the master’s program in mathematics education or instructor permission.
Typically Offered: Inquire at department
Through an array of pedagogical strategies, secondary mathematics teachers explore probability and statistics appropriate for the secondary school curriculum. These topics and strategies provide a basis for reflective analysis and deepening knowledge of probability and statistics. 3 hours seminar. (005606)
Grade Basis: Report in Progress: ABC/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate Division
### Mathematics Education

**MATH 660  Topics in Mathematics for Secondary Teachers: Mathematical Modeling**  
3 Units  
**Prerequisite:** Admission to the master’s program in mathematics education or instructor permission.  
**Typically Offered:** Inquire at department  
This course is an examination of literature, theories, and pedagogical practices pertaining to equity in secondary mathematics classrooms and similar settings. Students engage in discussion and analysis of selected readings on equity in Mathematics Education, and students learn about, practice, and reflect on pedagogical techniques to promote equitable access to mathematics. Major assessments occur in portfolio format. 1 hour discussion, 2 hours lecture.  
(005604)  
**Grade Basis:** Report in Progress: ABC/NC  
**Repeatability:** You may take this course for a maximum of 6 units  
**Course Attributes:** Graduate Division

**MATH 697  Independent Study**  
1-3 Units  
**Typically Offered:** Fall and spring  
This course is a graduate-level independent study offered for 1.0-3.0 units. You must register directly with a supervising faculty member. 3 hours supervision.  
(005616)  
**Grade Basis:** Report in Progress: Graded  
**Repeatability:** You may take this course for a maximum of 6 units  
**Course Attributes:** Graduate Division

**MATH 698  Grad Advanced Topics in Math**  
1-3 Units  
**Typically Offered:** Fall and spring  
This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See the Class Schedule for the specific topic being offered. 9 hours supervision.  
(005615)  
**Grade Basis:** Graduate Graded  
**Repeatability:** You may take this course more than once  
**Course Attributes:** Graduate Division

**MATH 699P  Master's Project**  
1-3 Units  
**Typically Offered:** Fall and spring  
This course is offered for 1.0-6.0 units. You must register directly with a supervising faculty member. 9 hours supervision.  
(005622)  
**Grade Basis:** Report in Progress: CR/NC  
**Repeatability:** You may take this course for a maximum of 6 units  
**Course Attributes:** Graduate Division

**MATH 699T  Master's Study**  
1-3 Units  
**Typically Offered:** Fall and spring  
This course is offered for 1.0-6.0 units. You must register directly with a supervising faculty member. 9 hours supervision.  
(005620)  
**Grade Basis:** Report in Progress: CR/NC  
**Repeatability:** You may take this course for a maximum of 6 units  
**Course Attributes:** Graduate Division

**MTHE 601  Research in Mathematics Education**  
3 Units  
**Prerequisite:** Admission to a master’s degree program in mathematics education or permission of instructor.  
**Typically Offered:** Summer session only  
This course will examine research in mathematics education that includes areas of teaching, learning, curriculum, and socio-cultural context. Selected research will be critically reviewed for research design and claims. In a culminating project, students will conduct a review on a specific topic in math education research literature. This is a required course in the MA and MS programs in mathematics education. 3 hours seminar.  
(005929)  
**Grade Basis:** Graduate Graded  
**Repeatability:** You may take this course for a maximum of 3 units  
**Course Attributes:** Graduate Division

**MTHE 602  Equitable Access to Mathematics in the Secondary Classroom**  
3 Units  
**Prerequisite:** MTHE 601, Admission to Master’s degree program in Math Education.  
**Typically Offered:** Fall only odd years  
This course is an examination of literature, theories, and pedagogical practices pertaining to equity in secondary mathematics classrooms and similar settings. Students engage in discussion and analysis of selected readings on equity in Mathematics Education, and students learn about, practice, and reflect on pedagogical techniques to promote equitable access to mathematics. Major assessments occur in portfolio format. 1 hour discussion, 2 hours lecture.  
(022026)  
**Grade Basis:** Graduate Graded  
**Repeatability:** You may take this course for a maximum of 3 units  
**Course Attributes:** Graduate Division

**MTHE 680  Research Methods in Mathematics Education**  
3 Units  
**Prerequisite:** Admission to master’s degree program in Mathematics Education, faculty permission.  
**Typically Offered:** Inquire at department  
The course focuses on quantitative and qualitative methods to conduct research in mathematics education that informs and strengthens their classroom practice. Successful completion of the course requires students to develop a research proposal. 3 hours supervision.  
(005930)  
**Grade Basis:** Graduate Graded  
**Repeatability:** You may take this course for a maximum of 3 units  
**Course Attributes:** Graduate Division

**MTHE 690  Thesis/Project Writing Seminar**  
1-3 Units  
**Prerequisite:** MTHE 680.  
**Typically Offered:** Fall and spring  
Formulation and pursuit, with supervision, of advanced projects and theses. The emphasis is on planning, reading, discussing, and evaluating student’s manuscript-in-progress. This is a required course in the MA and MS programs in mathematics education. 3 hours seminar.  
(005931)  
**Grade Basis:** Report in Progress: ABC/NC  
**Repeatability:** You may take this course for a maximum of 3 units  
**Course Attributes:** Graduate Division

### Mathematics and Statistics Department

**The Faculty**

- **Guillermo C Alesandroni**  
  2022  
  Assistant Professor  
  Doctorate Oklahoma St Univ Main Campus

- **Colette J Calmelet**  
  2008  
  Doctorate Oklahoma St Univ Main Campus

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**University Catalog 2023-2024**  
13
Talwinder S Chetra 2007
   Lecturer
   Master of Science Guru Nanak Dev University

Michael J Coons 2022
   Associate Professor
   Doctor of Philosophy Simon Fraser University

Ashley L Csicsery 2012
   Lecturer
   Master of Education Western Governors University

Robin A Donatello 2004
   Associate Professor
   Doctor of Philosophy Univ of Cal-Los Angeles

Sergei A Fomin 2004
   Professor
   Doctor of Philosophy Kazan State University (Kazan, Russia)

Jay D Gatton 2019
   Lecturer
   Bachelor of Science CSU-Chico

Katharine L Gray 2007
   Professor
   Doctor of Philosophy Univ of Montana

Jing Guo 2016
   Assistant Professor
   Doctor of Philosophy Univ of Kentucky

Christine A Herrera 2016
   Associate Professor
   Doctor of Philosophy Other US Institution

Sophy Huck 2001
   Lecturer
   Master of Science CSU-Chico

John A Lind 2018
   Associate Professor
   Doctor of Philosophy Univ of Chicago

Brian J Lindaman 2013
   Professor
   Doctor of Philosophy Univ of Kansas Main Campus

Nicholas J Lytal 2020
   Assistant Professor
   Master of Science Univ of Cal-Davis

Mary Elizabeth R Matthews 2013
   Associate Professor
   Doctor of Education Boston Univ

Thomas W Mattman 2000
   Professor
   Doctor of Philosophy McGill University (Montreal–Canada)

Allison J McConnell 2019
   Lecturer
   Master of Science CSU-Chico

Susan A Mcelwain 2007
   Lecturer
   Master of Arts Univ of Phoenix

Kevin J McGown 2014
   Chair
   Doctor of Philosophy Univ of Cal-San Diego

Dustin R Paisley 2001
   Lecturer
   Master of Science Univ of Kentucky

Maranda N Porter 2022
   Lecturer
   Doctor of Philosophy Univ of Cal-Riverside

Katie Raymond 2005
   Lecturer
   Master of Science CSU-Chico

Vladimir Rosenhaus 1999
   Professor
   Doctor of Philosophy Institute of Physics, Estonian Academy of Science

Edward A Roualdes 2003
   Associate Professor
   Doctor of Philosophy Univ of Kentucky

Ann P Steckel 2006
   Lecturer
   Master of Science Wilkes Univ

Karsten Stemmann 2023
   Lecturer
   Doctor of Philosophy Univ of Southern Cal

Kat Strand 2016
   Associate Professor
   Doctor of Philosophy Portland St Univ

Stephen R Strand 2016
   Assistant Professor
   Doctor of Philosophy Portland St Univ

Daniel Vallieres 2016
   Associate Professor
   Doctor of Philosophy Univ of San Diego

Kao C Vang 2023
   Lecturer
   Master of Science CSU-Fresno

Galina V Volkova 2023
   Lecturer
   Master of Science Kharkov University

Moua V Xiong 2004
   Lecturer
   Master of Science CSU-Chico

Emeritus Faculty
Stephen G Bemiller 1969
   Emeritus
Jorgen J Berglund
Emeritus
Doctor of Philosophy Univ of Massachusetts at Amher

Nancy J Carter
Emeritus
Doctor of Philosophy Oregon St Univ

Judith A Clark
Emeritus

Lloyd M Cook  1932
Emeritus

Lawrence R Dion  1963
Emeritus
Master of Arts Univ of Detroit

William B Fisher
Emeritus
Doctor of Philosophy Univ of Oregon

Richard L Ford
Emeritus
Doctor of Philosophy Univ of Cal-Irvine

Donald Fridshal  1971
Emeritus

Simon M Goberstein
Emeritus
Doctor of Philosophy Univ of Ark-Fayetteville

Dennis I Goslin  1965
Emeritus
Master of Science Oregon St Univ

Ladawn Haws  1988
Professor
Doctor of Philosophy Univ of Cal-Davis

Gordon H Hughes  1974
Emeritus
Doctor of Philosophy Univ of Cal-Riverside

Terry L Kiser
Emeritus
Doctor of Philosophy Oregon St Univ

John A Ladwig
Emeritus
Doctor of Philosophy Univ of Oregon

Eric S Langford
Emeritus
Doctor of Philosophy Rutgers Univ New Brunswick

Edward M Matzdorff  1970
Emeritus
Doctor of Philosophy Oregon St Univ

Mervin E Meyer
Emeritus
Doctor of Philosophy Univ of Cal-Riverside

Gregory L Naber