MATHEMATICS AND STATISTICS

Mathematics and Statistics Department (http://www.csuchico.edu/math/)
Holt Hall 101
530-898-6111
530-898-3097 (fax)
Email: mathdept@csuchico.edu
Chair: Kevin McGown

Insight

Math majors can expect small class sizes that allow students and faculty to know each other on a one-to-one basis. Additional support includes a drop-in tutoring lab with the dual goals of helping students with their math courses and providing employment for tutors. During the summer, the Research Experiences for Undergraduates (REUTs) program is an opportunity to conduct research alongside a faculty mentor.

In addition to university-wide scholarships, there are numerous scholarships available exclusively to math majors. The department also hires graders and tutors—a win-win for student workers as they earn a little bit of cash while improving their own math understanding by seeing other students' work, and learning to explain mathematical concepts and skills.

Experience

The Math Club serves as a social vehicle for some of our majors. This group organizes social events such as bowling, softball, and recreational math talks. Attending undergraduate math conferences and supporting Putnam exam participants are just some of the things Math Club has sponsored.

Students in the mathematics education option can participate in Project Math, designed to build a community of future teachers. An on-campus dormitory exclusively for math and science majors is another community-building opportunity.

Outlook

Job prospects are very good for any option you choose.

Statistician and data scientist are usually in the top 10 of any best jobs list (https://money.usnews.com/careers/best-jobs/rankings/the-100-best-jobs/), and the demand keeps growing as big tech companies and pharmaceutical and manufacturing companies all need statisticians and data analysts. Statisticians collect data, analyze and interpret the data, and write conclusions. Add a minor in computer science, and you have a very marketable skillset.

California (and many other states) has a chronic need for qualified high school math teachers, so graduates can find work in nearly any location. If you enjoy working with teenagers and helping them grow into responsible, productive adults, this can be a very rewarding job. One of the perks of a high school teacher is long summer vacations!

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

Programs

Undergraduate

Bachelor's

- Mathematics BS (https://catalog.csuchico.edu/colleges-departments/college-natural-sciences/mathematics/mathematics-bs/)

Minors

- Applied Statistics Minor (https://catalog.csuchico.edu/colleges-departments/college-natural-sciences/mathematics/applied-statistics-minor/)
- Mathematics Education Minor (https://catalog.csuchico.edu/colleges-departments/college-natural-sciences/mathematics/mathematics-education-minor/)
- Mathematics Minor (https://catalog.csuchico.edu/colleges-departments/college-natural-sciences/mathematics/mathematics-minor/)
- Statistics Minor (https://catalog.csuchico.edu/colleges-departments/college-natural-sciences/mathematics/statistics-minor/)

Certificates

- Data Science Certificate (https://catalog.csuchico.edu/colleges-departments/college-natural-sciences/mathematics/data-science-certificate/)

Credentials

- Mathematics Single Subject Matter Preparation Program (https://catalog.csuchico.edu/colleges-departments/college-natural-sciences/mathematics/mathematics-single-subject-matter-preparation-program/)

Graduate

Master's

- Mathematics Education MS (https://catalog.csuchico.edu/colleges-departments/college-natural-sciences/mathematics/mathematics-education-ms/)

See Course Description Symbols and 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 discussion. (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. (021954)
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

MATH 118 Trigonometry **3 Units GE**
Prerequisite: GE Mathematics/Quantitative Reasoning Ready.
Typically Offered: Fall and spring
Trigonometric functions, graphs, identities and conditional equations, logarithms, solutions of triangles, and complex numbers. 3 hours discussion. (005500)
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 119 Precalculus Mathematics **4 Units GE**
Prerequisite: GE Mathematics/Quantitative Reasoning Ready, and either 1/2 year of high school trigonometry or MATH 118 (may be taken concurrently).
Typically Offered: Fall and spring
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)
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 119X Precalculus Problem Session **1 Unit**
Prerequisite: Faculty permission.
Corequisites: MATH 119.
Typically Offered: Fall and spring
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)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

MATH 120 Analytic Geometry and 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
Limits and continuity. The derivative and applications to related rates, maxma and minima, and curve sketching. Transcendental functions. An introduction to the definite integral and area. 4 hours discussion. (005506)
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 120X Calculus Problem Session **1 Unit**
Prerequisite: Faculty permission.
Corequisites: MATH 120.
Typically Offered: Fall and spring
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)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

MATH 121 Analytic Geometry and Calculus **4 Units**
Prerequisite: MATH 120.
Typically Offered: Fall and spring
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)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

MATH 121X Calculus Problem Session **1 Unit**
Prerequisite: Concurrent enrollment in MATH 121, faculty permission.
Typically Offered: Fall and spring
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)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

MATH 125 Advanced Number and Operation **3 Units**
Prerequisite: Successful completion of high school precalculus, concurrent enrollment in MATH 118 or 119, or faculty permission.
Typically Offered: Fall only
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)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

MATH 130 Introduction to R **1 Unit**
Typically Offered: Fall and spring
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)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 2 units
Course Attributes: Lower Division; Laptop required

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

MATH 230 An Introduction to Computational Mathematics 3 Units
Prerequisite: MATH 121, no previous computer experience required.
Typically Offered: Fall only
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. (005526)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 9 units
Course Attributes: Lower Division

MATH 235 Elementary Linear Algebra 3 Units
Prerequisite: MATH 121.
Typically Offered: Fall and spring
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. (005553)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

MATH 241 Secondary Math Early Field Experience 1 Unit
Typically Offered: Fall and spring
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. (020432)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

MATH 260 Elementary Differential Equations 4 Units
Prerequisite: MATH 121.
Typically Offered: Fall and spring
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. (005509)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division

MATH 260X Elementary Differential Equations Problem Session 1 Unit
Corequisites: MATH 260.
Typically Offered: Fall and spring
Designed to supplement MATH 260 with broader and deeper applications of differential equations, providing the student with opportunities for additional problem-solving skills. A minimum of 20 hours of activity are required to earn credit for the class; forty hours are available. 3 hours independent study. (020315)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Lower Division

MATH 290 Mathematics and Statistics Tutoring 1 Unit
Corequisites: Concurrent enrollment in a course offered through the Dept of Mathematics Statistics at CSU, Chico.
Typically Offered: Fall and spring
This course provides supplemental mathematics statistics tutoring. 3 hours independent study. (020823)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 8 units
Course Attributes: Lower Division

MATH 295 Project MATH Seminar Year 2 1 Unit
Prerequisite: MATH 195.
Typically Offered: Fall and spring
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. (020433)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 2 units
Course Attributes: Lower Division

MATH 298 Special Topics 1-3 Units
Typically Offered: Inquire at department
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. (021615)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Lower Division

MATH 299 Special Problems 1-3 Units
Prerequisite: Faculty permission.
Typically Offered: Inquire at department
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. (021629)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division

MATH 300 Undergraduate Mathematics Seminar 2 Units
Prerequisite: GE Mathematics/Quantitative Reasoning Ready.
Typically Offered: Fall and spring
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. (021647)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 8 units
Course Attributes: Upper Division

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

MATH 333 History of Mathematics **3 Units**
Prerequisite: MATH 121; MATH 220 or MATH 225; and at least one upper division mathematics course. Recommended: MATH 330W.
Typically Offered: Spring only
Study of the historical development of mathematics, with particular emphasis on the relationship between mathematics and society. 3 hours discussion. (005531)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 337 Introduction to the Theory of Numbers **3 Units**
Prerequisite: MATH 121, MATH 330W.
Typically Offered: Fall only
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)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 341 Mathematical Topics for the Credential **3 Units**
Prerequisite: MATH 121 or MATH 225.
Typically Offered: Fall only
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)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 342 Math Topics for the Credential **3 Units**
Prerequisite: MATH 341.
Typically Offered: Spring only
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)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 344 Graph Theory **3 Units**
Prerequisite: MATH 121; CSCI 217, MATH 217, or MATH 330W.
Typically Offered: Fall only odd years
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)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 346 College Geometry **3 Units**
Prerequisite: MATH 220 or MATH 225; MATH 330W.
Typically Offered: Spring only
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)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 350 Introduction to Probability and Statistics **3 Units**
Prerequisite: MATH 121.
Typically Offered: Fall and spring
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)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 351 Introduction to Probability and Statistics **3 Units**
Prerequisite: MATH 350.
Typically Offered: Spring only
Continuation of MATH 350. 3 hours discussion. (005535)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 360 Ordinary Differential Equations **3 Units**
Prerequisite: MATH 260.
Typically Offered: Spring only
Systems of first order linear equations, existence and uniqueness theorems, stability, Sturm separation theorems, power series methods. 3 hours discussion. (005538)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 361 Boundary Value Problems and Partial Differential Equations **3 Units**
Prerequisite: MATH 260.
Typically Offered: Fall only
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)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

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 535A, 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, ring, 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; Laptop required

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

MATH 475 Calculus of Variations **3 Units**
Prerequisite: MATH 260; MATH 361 is recommended.
Typically Offered: Fall only even years
Classical problems in the calculus of variations. Euler-Lagrange equations. Isoperimetric problems, Fermat's principle. Lagrangian and Hamiltonian mechanics of particles. Two independent variables. Applications to physics and engineering. 3 hours discussion. (005590)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 480 Mathematical Modeling **3 Units**
Prerequisite: MATH 235, MATH 260.
Typically Offered: Spring only
The translation of real world phenomena into mathematical language. Possible applications include population and competing species models, mathematical theories of war, traffic flow, river pollution, water waves and tidal dynamics, probabilistic and simulation models. 3 hours discussion. (005592)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 485 Advanced Topics in Data Science **3 Units**
Prerequisite: CSCI 385 or MATH 385; MATH 456 (may be taken concurrently).
Typically Offered: Spring only
Getting connected to current events in Data Science and building an online presence. Ethics of predictive analytics and privacy and open data. Reporting and dissemination of research using interactive dashboards and web-publishing. Introduction to current scalable technologies to handle Big Data. Introduction to advanced statistical analysis and machine learning techniques for Data Science. 3 hours lecture. (021890)
Cross listing(s): CSCI 485
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division

MATH 490 Data Science Capstone **1-3 Units**
Prerequisite: MATH 485, senior standing, approved project, enrollment in the Data Science Certificate Program.
Typically Offered: Fall and spring
Students work independently to provide a service in the form of a data product to a local business, researcher, or community member. Students provide status reports at weekly meetings and present their finished project to a group of peers at the end of the semester in an appropriate venue such as at an undergraduate seminar series or poster symposium. 0 hours supervision. (021898)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

MATH 495H Honors Reading Course **3 Units**
Prerequisite: Admission to the Department Honors Program, completion of MATH 420W with a grade of B or higher.
Typically Offered: Fall and spring
Directed reading in an advanced topic under the guidance of an Honors thesis supervisor. The course exceeds the usual level of difficulty associated with undergraduate work. It provides the background necessary to write an Honors thesis. 9 hours supervision. (005595)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

MATH 498 Advanced Topics in Mathematics **1-3 Units**
Prerequisite: At least one 300- or 400-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. 3 hours supervision. (005593)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Upper Division

MATH 499 Special Problems **1-3 Units**
Prerequisite: Faculty permission.
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. 3 hours supervision. (005594)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

MATH 499H Honors Thesis **3 Units**
Prerequisite: 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.
Typically Offered: Fall and spring
Preparation of written thesis in mathematics under supervision of Honors thesis advisor. The thesis, based on studies begun in MATH 495H, will require original work beyond that normally required in undergraduate work. Completed written thesis must be approved by the thesis supervisor and Honors advisor. A summary of the thesis will be presented by the student in public lecture. Successful completion of MATH 495H and MATH 499H is one of the requirements for being designated as an Honors graduate in mathematics. 9 hours supervision. (005596)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division

MATH 610 Topics in Mathematics for Secondary Teachers: Analysis **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 analysis topics appropriate for the secondary school curriculum. These topics and strategies provide a basis for reflective analysis and deepening knowledge of analysis. 3 hours seminar. (005599)
Grade Basis: Report in Progress: ABC/NC
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Graduate 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

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
Through an array of pedagogical strategies, secondary mathematics teachers explore mathematical modeling appropriate for the seconday school curriculum. These topics and strategies provide a basis for the reflective analysis and deepening knowledge of mathematical modeling. 3 hours seminar. (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

Mathematics Education

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

Associate Professor
Doctor of Philosophy Vanderbilt Univ

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
Emeritus
Doctor of Philosophy Carnegie Mellon Univ

Walter J Neath 1970
Emeritus
Doctor of Philosophy Illinois Institute of Technolo

Margaret A Owens
Emeritus
Doctor of Philosophy Univ of Oregon

Sharon R Ross 1969
Emeritus
Doctor of Philosophy Univ of Cal-Berkeley

Neil C Schwertman 1974
Emeritus
Doctor of Philosophy Univ of Kentucky

Robin N Soloway
Emeritus
Doctor of Philosophy Univ of Wisconsin-Madison

Eldon J Vought 1970
Emeritus
Doctor of Philosophy Univ of Cal-Riverside

Buck Ware
Emeritus
Doctor of Philosophy Univ of Cal-Santa Cruz