Masters of Arts in Mathematics for Teachers

General Description
This degree is designed for working mathematics teachers with a Single Subject Credential in Mathematics (from California or other state or nation), or mathematics teachers holding a Subject Matter Authorization in Introductory Mathematics attached to a Single or Multiple Subject Credential. The purpose of the Master of Arts in Mathematics for Teachers is to enable secondary and middle school mathematics teachers to increase their understanding of secondary school mathematics, its pedagogy, and related topics. The course of study is designed to deepen mathematical knowledge and integrate it with prior experiences and training.

Requirements for Admission
Admission to the graduate program leading to the Master of Arts in Mathematics for Teachers requires the following:
• a baccalaureate degree with a relevant major (as determined by the Mathematics Graduate Program Committee) from an accredited college or university
• a 2.50 GPA (A=4.0) for the last (baccalaureate or post-baccalaureate) 90 quarter units (60 semester units) of college or university coursework attempted
• good academic standing at the last college or university attended
• submission of a letter of application to the Department of Mathematics.
• application to the university for graduate status.

Requirements for the Master of Arts in Mathematics for Teachers
A minimum of 45 units and satisfaction of the CSU Graduation Writing Assessment Requirement (GWAR), are required for the MA in Mathematics for Teachers. The following courses are required of all students:
1. MATH 520
2. MATH 521
3. MATH 522
4. MATH 523
5. MATH 524
6. MATH 525
7. MATH 526
8. MATH 540
9. MATH 591 or MATH 577

After successfully completing 6 or more of the first 8 courses above and after having been advanced to candidacy, a candidate for the degree of Master of Arts in Mathematics for Teachers should contact their advisor and the Graduate Studies Coordinator to determine whether they will satisfy the culminating experience requirement by completing a project or by examination. If the candidate chooses the project option, the candidate will enroll in MATH 591. If the candidate chooses the examination option (see details below), the candidate must still satisfy the 45 unit requirement by satisfactorily completing an approved offering of MATH 577 or other equivalent course.
Each candidate who wishes to attempt the culminating examination must choose 3 out of the following 8 listed areas:

1. Discrete Mathematical Models
2. Statistics and Data Analysis
3. Numerical Approach to Calculus and Differential Equations
4. Geometric Linear Algebra
5. Number Theory and Cryptography
6. Dynamical Geometry
7. History of Mathematics
8. Mathematics Education

A committee consisting of at least 3 faculty members, based on the areas chosen by the candidate, will be set up to administer the test. The candidate is required to write all three subtests in the same examination period. A candidate will be given a grade of “Pass”, or “Fail” in each of the three subtests. A “Pass” in all three subtests constitutes a clear pass of the culminating examination. Any candidate who receives a “Fail” in two or more subtests will be required to re-write all three subtests in a second attempt. A candidate who receives a “Fail” in only one subtest will be required to re-write only that particular subtest in a second attempt. Any candidate who does not pass the examination after the rewrite must complete MATH 591. Examinations can be scheduled twice a year, during the period July through August and during the CSUB December break.

COURSE DESCRIPTIONS

NOTE: All courses require graduate standing. Students who have not attained graduate standing and who are interested in enrolling in a graduate class are encouraged to consult with the instructor and/or members of the Mathematics Graduate Program Committee.

MATH 520 Discrete Mathematical Models (5)
Construction and analysis of difference models from physical, biological, social, and financial sciences. Cobweb analysis, convergence, stability and chaos in discrete dynamical systems. Phase plane analysis of systems of difference equations. (5 units lecture)

MATH 521 Statistics and Data Analysis (5)
Classical and non-parametric confidence intervals and hypothesis tests for means, proportions, linear and multiple regression, and analysis of variance. Techniques include graphical displays, transformations, outlier identification, smoothing, regression and robustness; use of statistical package. Prerequisite: prior experience with statistical analysis at the level of Math 140. (5 units lecture)

MATH 522 Numerical Approach to Calculus and Differential Equations (5)
Use of numerical and algebraic techniques to study change. The use of forward, back, and symmetric differences in data analysis. Divided differences as average rates of change and as approximations to instantaneous rate of change. Difference equations and Euler’s method as numerical approximations to differential equations. Riemann sums, midpoint, trapezoid and Simpson’s method to approximate accumulated change. Error analysis for numerical approximations. Prerequisite: (1) MATH 520 or (2) MATH 300. (5 units lecture)

MATH 523 Geometric Linear Algebra (5)
Algebra and geometry of vectors in two and three dimensions. Complex numbers. Matrices as linear transformations of R^2 and R^3. Rigid motions in two and three dimensions, their classification and matrix representations: Theory and classification of conic sections. Theory of perspective. Prerequisite: MATH 300. (5 units lecture)

MATH 524 Number Theory and Codes (5)
Elementary theory of natural numbers, including prime numbers, divisibility, modular arithmetic, and Diophantine equations. Applications in cryptography such as Caesar ciphers and RSA cryptosystem. Additional topics selected by instructor. This course makes use of a significant amount of calculator or computer programming. Prerequisite: MATH 300. (5 units lecture)
MATH 525 Dynamical Geometry (5)
Investigations in the Euclidean geometry of two dimensions using dynamical software. Emphasis on exploration, conjecture and verification. Prerequisite: MATH 300 or equivalent experience with the role of proof in Mathematics. (5 units lecture)

MATH 526 Introduction to the History of Mathematics (5)
Development of mathematics from its empirical origins to its present form. Euclid’s Elements. Prerequisites: (1) MATH 300, and (2) at least two mathematics courses that require MATH 300 as a prerequisite. (4 units lecture & 1 units lab)

MATH 540 Introduction to Mathematics Education Research (5)
Brief introduction to basic philosophies, key terms and generally accepted strategies of both quantitative and qualitative research, such as the criteria and procedures appropriate for establishing validity reliability, credibility, and trustworthiness. Understanding ethics, confidentiality, protection of human subjects, variables, sampling, and data collection. Major emphasis on being able to find, evaluate, and use research in math education. (5 units lecture)

MATH 577 Advanced Topics in Mathematics (15)
Topics and prerequisites to be announced. May be repeated for different topics. General prerequisite: Major or minor in Mathematics. (1-5 units lecture)

MATH 580 Advanced Research Participation (15)
Individual mathematical investigation, under supervision. (Experience as a research assistant does not count for credit.) Offered on a credit/no credit basis only. Prerequisite: Permission of instructor. (1-5 units lecture)

MATH 591 Culminating Project (5)
Design and implementation of a written report of mathematical, or field research or similar activity. Prerequisites: Successful completion of 30 approved credits towards the Master of Arts in Mathematics for Teachers. Appointment of a Culminating Activity Committee consisting of three faculty members approved by the Mathematics Graduate Program Committee. (5 units lecture)