

# SJSU Single Subject Teaching Credential in Mathematics<sup>†</sup> Advising Packet

## Overview of Requirements

The single subject teaching credential in mathematics involves two major components.

- Demonstrating subject matter competency in mathematics. This packet describes requirements for demonstrating subject-matter competency in mathematics.
- Completing 38 hours of credential coursework in education and methods of teaching mathematics.

## Getting Information and Advice

Your first step in ascertaining whether you satisfy subject matter competency is to see an advisor. Please bring photocopies of all your transcripts as well as CSET results.

## Mathematics Education Advisors

Students seeking the single subject credential in mathematics are each assigned a Mathematics Education advisor based on the last two digits of their student identification number. <http://www.sjsu.edu/math/programs/credentials/>.

## Department of Secondary Education

The following website also contains detailed information on the necessary steps towards applying to the credential program: <http://www.sjsu.edu/secondaryed/>

## Mathematics Subject Matter Competency

Subject matter competency in mathematics is a **prerequisite** to being fully admitted to the single subject credential program in mathematics. Subject matter competency can be demonstrated via coursework **or** exams. Both routes require, in addition, minimum GPA requirements and completion of 45 hours of pre-professional experience. Please contact the chair of the Mathematics Education Committee for a referral to a mathematics education advisor.

**NOTE:** The SJSU single subject credential program is currently under strict enrollment limits, due to state budget constraints. *~If~* we have more qualified applicants than available spaces, priority will be given to those applicants with the strongest mathematics backgrounds.

## **Subject Matter Competency via Courses**

San Jose State University's state-approved mathematics subject matter preparation program consists of 16-17 courses totaling 52-54 semester units (about 78-81 quarter units), depending on course choices. SJSU course numbers and descriptions are given below. Credential candidates can complete either the SJSU coursework or equivalent coursework taken elsewhere. Your advisor will determine course equivalencies. You may be asked to supply course descriptions for courses taken at other colleges or universities. **Note: the**

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<sup>†</sup> SJSU does **not** offer the Foundational Level Credential in Mathematics as a stand-alone credential.

required coursework is not necessarily equal to the requirements for a B.A. in mathematics at SJSU or anywhere else.

### SJSU Mathematics Subject Matter Preparation Program – Course Descriptions

SJSU Courses	Descriptions
<b>The following courses are required:</b>	
<input type="checkbox"/> Math 030 Calculus I	Introduction to calculus including limits, continuity, differentiation, applications and introduction to integration. Graphical, algebraic and numerical methods of solving problems.
<input type="checkbox"/> Math 031 Calculus II	Definite and indefinite integration with applications. Sequences and series. Graphical, algebraic and numerical methods of solving problems.
<input type="checkbox"/> Math 032 Calculus III	Functions of more than one variable, partial derivatives, multiple integrals and vector calculus. Graphical, algebraic, and numerical methods of solving problems.
<input type="checkbox"/> Math 042 Discrete Mathematics	Sets, logic, methods of proof including mathematical induction, functions, relations, elementary combinatorics, probability, Boolean algebras. (Prerequisite: Math 19 or eligibility for Math 30P)
<input type="checkbox"/> Math 104 History of Mathematics	Mathematical development from earliest times to the twentieth century. (Prerequisite: Math 42 and Math 115)
<input type="checkbox"/> Math 115 Modern Geometry and Transformations	Synthetic and analytic theory of projective transformations, similarities, Euclidian motions, inversive geometry and an introduction to non-Euclidean geometry. (Prerequisite: Math 31)
<input type="checkbox"/> Math 128A Abstract Algebra I	Group theory: permutation groups, abelian groups, morphism theorems, finite groups. Introduction to rings and fields. (Prerequisites: Math 108 and Math 129A)
<input type="checkbox"/> Math 129A Linear Algebra I	Matrices, systems of linear equations, vector geometry, matrix transformations, determinants, eigenvectors and eigenvalues, orthogonality, diagonalization, applications, computer exercises. Theory in $R^n$ emphasized; general real vector spaces and linear transformations introduced. (Prerequisite: Math 31)
<input type="checkbox"/> Math 161A Applied Statistics I	Descriptive and inferential statistics. Collection and analysis of data, discrete and continuous probability models, random variables, Central Limit Theorem, confidence intervals, hypothesis testing. Analysis of variance and regression as time permits. (Prerequisite: Math 31)
<input type="checkbox"/> Math 161B Applied Statistics II	A continuation of Math 161A. Analysis of variance for one-factor and several-factor experiments. Linear and multiple regression. Use of statistical software package is an integral part of the course. Student project required. (Prerequisite: Math 161A)
<input type="checkbox"/> Math 102 Mathematics for Secondary Teachers	Secondary school mathematics from an advanced viewpoint, plus topics from higher mathematics. Emphasizes inductive reasoning in problem solving. Applications useful to junior and senior high school teachers. (Prerequisite: equivalent of mathematics minor)

### SJSU Mathematics Subject Matter Preparation Program – Course Descriptions (cont.)

<b>One course required from the following:</b>	
<input type="checkbox"/> Math 201B Mathematics for Secondary Teachers, <b>OR</b>	Secondary school mathematics from an advanced viewpoint, plus topics from higher mathematics. Emphasizes deductive reasoning in problem solving. Applications useful to junior and senior high school teachers. (Prerequisite: equivalent of mathematics minor. Note: Math 201A is not a prerequisite.)
<input type="checkbox"/> Math 126 Theory of Numbers	Divisibility, prime numbers, congruences of first and higher degrees, theorems of Fermat, Euler and Wilson. (Prerequisites: Math 31 & Math 42)
<b>One course required from the following:</b>	
<input type="checkbox"/> Math 128B Abstract Algebra II, <b>OR</b>	Emphasis on rings, integral domains, fields, field extensions, Galois theory. (Prerequisite: Math 128A)
<input type="checkbox"/> Math 129B Linear Algebra II, <b>OR</b>	Continuation of Math 129A. Abstract vector spaces and linear transformations, diagonalization, Cayley-Hamilton theorem, minimal polynomials, Jordan canonical form. Selected topics from inner product and adjoint, duality, rational canonical form and applications. (Prerequisite: Math 108 and 129A)
<input type="checkbox"/> Math 131A Introduction to Analysis, <b>OR</b>	Properties of real numbers including completeness and compactness. Continuous functions, uniform continuity, the derivative. (Prerequisites: Math 32 and Math 108)

<input type="checkbox"/> Math 131B Introduction to Real Variables, <b>OR</b>	The theory of the Riemann integral, sequences and series of functions, spaces of functions. (Prerequisite: Math 131A)
<input type="checkbox"/> Math 175 Introduction to Topology	Set theory, topological spaces and separation axioms, completeness, compactness, connectedness, functions and continuity, product spaces. (Prerequisite: Math 131A)
<b>12 additional semester units required: may be selected from the following options</b>	
<input type="checkbox"/> Math 133A Ordinary Differential Equations	First order equations, higher order linear equations, applications, Laplace transforms, series solutions. Add'l topics. (Prereq: Math 32)
<input type="checkbox"/> Math 142 Introduction to Combinatorics	Sets, permutations, combinations, probability, mathematical induction, counting techniques, generating functions, partitions, recurrence relations, inclusion-exclusion. Polya's theorem and applications to computer science, mathematics, engineering, and physical sciences. (Prerequisite: Math 31 and Math 42)
<input type="checkbox"/> Physics 050 General Physics/Mechanics	Particle kinematics and dynamics, work and energy, linear momentum, rotational motion, fluids, vibrations, and sound. (Prerequisite: Math 30)
<input type="checkbox"/> Physics 051 General Physics/Electricity and Magnetism, <b>OR</b> <input type="checkbox"/> Physics 052 General Physics/Heat and Light	Electric and magnetic fields, dc and ac circuits, electromagnetic waves. (Prerequisites: Phys 50 or 70 and Math 31) Temperature, heat, thermodynamics, kinetic theory, geometric and physical optics. (Prerequisites: Phys 50 or 70)
<input type="checkbox"/> CS 46A Introduction to Programming, <b>OR</b> <input type="checkbox"/> CS 49C Programming in C, <b>OR</b> <input type="checkbox"/> Math/Meteorology 50 Scientific Computing I	Basic skills and concepts of computer programming in an object-oriented language. Classes, methods and argument passing, control structures, iteration, and recursion. Problem solving, class discovery, and step-wise refinement. Programming and documentation style. Weekly hands-on activity. (Prerequisite: Eligibility for Math 30P) Beginning course in the C language (Prerequisite: previous programming experience and completion of math GE) Computer systems and programming, emphasizing solution of problems in atmospheric sciences. Includes computer systems, flow diagrams, UNIX and C FORTRAN programming, mass data handling and formatting. (Prerequisite: Math 32)
<input type="checkbox"/> Math 143C Numerical Analysis and Scientific Computing, <b>OR</b> <input type="checkbox"/> Math 143M Numerical Analysis and Scientific Computing	Development and comparison of important algorithms for scientific computing in terms of efficiency, accuracy and reliability. Topics include nonlinear equations, interpolation, approximation theory, differentiation, integration, differential equations, numerical stability, and error analysis. (Prerequisites: Math 32 and one of CS 50, CS 46A or CS 49C) Development and comparison of important algorithms for scientific computing in terms of efficiency, accuracy and reliability. Topics include systems of linear equations-direct and iterative methods, least squares problems, eigenvalues and eigenvectors, numerical stability and error analysis. (Prerequisites: Math 129A and one of CS 50, CS 46A or CS 49C)
<input type="checkbox"/> Math 177 Linear and Nonlinear Optimization	Linear inequalities, the simplex method and other algorithms, duality, integer optimization, convex optimization, quadratic optimization, game theory. (Prerequisite: Math 129A)
<input type="checkbox"/> Math 178 Mathematical Modeling	Basic modeling techniques including graphing, proportion, curve fitting and interpolation, optimization, probability and computer simulation, derivatives and differences. Technology will be incorporated to model applied problems from business/economics, physical/life/social sciences and engineering. (Prerequisite: Math 129A)

### **Subject Matter Competency via CSET exams**

As an alternative to completing the coursework, you can demonstrate subject matter competency by passing the three CSET subtests in mathematics.

#### **CSET Exams (Passing scores are valid for 5 years from date of test)**

- CSET Subtest I – Algebra and Number Theory
- CSET Subtest II – Geometry and Probability & Statistics
- CSET Subtest III – Calculus and History of Mathematics

Information about the CSET exams is available online at <http://www.cset.nesinc.com>.

### **Please Note**

In our many years of collective experience, we have found that mathematics credential candidates benefit dramatically from having taken at least a small slate of college level mathematics coursework prior to entering the credential program. Although there are no specific requirements, your advisor can recommend those mathematics courses from the list below that will broaden and deepen your knowledge of mathematics as well as help you prepare for the CSET exams. In general, we recommend two semesters of calculus plus three upper division mathematics courses plus Mathematics for Secondary Teachers.

### Recommended Mathematics Coursework

- ☐ Math 30 Calculus 1 (or an equivalent course at a local community college)
- ☐ Math 31 Calculus 2 (or an equivalent course at a local community college)
- ☐ Math 42 Discrete Math (or an equivalent course at a local community college)
- ☐ Math 129A Linear Algebra (or an equivalent course at a local community college)
- ☐ Math 126 Number Theory
- ☐ Math 115 Modern Geometry and Transformations
- ☐ Math 161A Applied Statistics
- ☐ Math 104 History of Mathematics
- ☐ Math 102 Mathematics for Secondary Teachers

### **Grade Point Average (GPA) Requirements**

- A minimum GPA of 2.75 for all college and university work
- A minimum GPA of 2.5 for all mathematics courses
- A minimum GPA of 2.5 for all upper division mathematics courses

### **Pre-professional Experience**

The California Commission on Teacher Credentialing requires a 45-hour pre-professional field experience before you can be fully admitted to the credential program. The primary purpose is to provide you with a recent extended experience with youth in a secondary school mathematics classroom to help you decide if you are truly interested in pursuing a career in teaching. This experience can be satisfied by coursework involving a field experience component (for example, in SJSU's Math 102), or by arranging on your own to assist in a regular, public secondary school mathematics classroom for at least 45 clock hours.