# Mathematics Education Advising Packet

## SJSU Single Subject Teaching Credential – Mathematics

### 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 37 hours of credential coursework in education and methods of teaching mathematics. (See *General Information* and *Applicant Requirements* available online at http://www.sjsu.edu/secondaryed/).

**Note: SJSU is *not* offering the Foundational Level Credential in mathematics.**

### Getting Information and Advice

Your first step in ascertaining whether you satisfy subject matter competency is to see an advisor; bring photocopies of all your transcripts. Your advisor will do the first level background screening and recommend additional courses that it may be necessary or advisable for you to take. Your advisor will complete a checklist of course equivalencies and give you a copy.

**Mathematics Education Advisors**

Students seeking the single subject credential in mathematics are each assigned one of the following Mathematics Education advisors based on the last two digits of their student identification number. All advisors can be reached via email at: lastname@math.sjsu.edu.

| Advisor Name | Office | Phone | Last 2 digits ID# |
|---|---|---|---|
| Dr. Trisha Bergthold | MH 415 | 924-5438 | 00-13 |
| Dr. Barbara Pence | MH 419 | 924-5142 | 14-27 |
| Dr. Richard Pfiefer | MH 316 | 924-5144 | 28-41 |
| Dr. Ferdie Rivera | DH 339 | 924-5170 | 42-55 |
| Dr. Cheryl Roddick | MH 313 | 924-5074 | 56-69 |
| Dr. Mohammad Saleem | MH 313 | 924-5141 | 70-85 |
| Dr. Julie Sliva Spitzer | MH 315 | 924-5120 | 86-99 |

### Mathematics Subject Matter Competency

Subject matter competency in mathematics is required to be fully admitted to the single subject credential program in mathematics. Subject matter competency can be demonstrated by completing a specified set of SJSU or equivalent courses, or through an alternative route by passing the CSET mathematics exams. Both routes require, in addition, minimum GPA requirements, completion of 45 hours of pre-professional experience, and a screening interview with the Mathematics Education Committee in the Mathematics Department.

## Mathematical Content Requirements

### *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 on pages 5 and 6. Credential candidates can satisfy the mathematical content requirements for subject matter competency in mathematics by completing either the SJSU coursework outlined below or equivalent coursework taken elsewhere. The Mathematics Education Committee must approve all course equivalencies. You may be asked to supply course descriptions for courses taken at other colleges or universities. **Note: the mathematics subject matter preparation program below is *not* necessarily equal to the requirements for a B.A. in mathematics at SJSU or anywhere else.**

**Please note: If you choose to satisfy subject matter competency via courses, then all coursework must be completed before starting any credential courses.**

### *Subject Matter Competency via CSET exams*

As an alternative to completing the full slate of mathematics courses, 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.
Your advisor can recommend mathematics courses to help you prepare for the CSET exams.

**Please note: If you choose to satisfy subject matter competency via CSET exams, then all exams must be completed before starting any credential courses.**

## 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 Teaching Credentialing (CTC) 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 201A or 201B), or by arranging on your own to assist in a regular, public secondary school mathematics classroom for at least 45 clock hours. The pre-professional experience must be completed before beginning the credential program.

## Screening Interview

The final component of subject matter competency in mathematics is the screening interview conducted with two members the Mathematics Education Committee. The purpose of this 20-30 minute screening interview is to review your coursework in mathematics, determine your status regarding requirements for mathematics subject matter competency, create a contract regarding requirements for demonstrating mathematics subject matter competency, and discuss your reasons for pursuing a teaching career.

After meeting with your advisor, if he/she has approved you for a screening interview, contact Ann Baldwin in the Office of Science and Math Education to schedule a 30-minute writing test and a screening interview. She can be reached at 924-5193 or Ann.Baldwin@sjsu.edu.

After the screening interview, you will be provided with a Subject Matter Competency Status Report that summarizes the results of the screening interview. The Subject Matter Competency Report serves as a contract between you and San Jose State University concerning requirements you need to complete (if any) to demonstrate mathematics subject matter competency, and indicates your admission status to the single subject credential program. The Subject Matter Competency Status Report is valid for five years and will be forwarded to the single subject credential program upon completion of your screening interview.

## Secondary Education Information

For information about the single subject credential program, contact Dr. Cathy Buell at Cmbuell@email.sjsu.edu or at (408) 924-3755.

**SJSU Mathematics Subject Matter Preparation Program**
**Course Descriptions**

| SJSU Courses | Descriptions |
|---|---|
| ***The following courses are required:*** | |
| ❑ Math 030 Calculus I | Introduction to calculus including limits, continuity, differentiation, applications and introduction to integration. Graphical, algebraic and numerical methods of solving problems. |
| ❑ Math 031 Calculus II | Definite and indefinite integration with applications. Sequences and series. Graphical, algebraic and numerical methods of solving problems. |
| ❑ 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. |
| ❑ 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) |
| ❑ Math 104 History of Mathematics | Mathematical development from earliest times to the twentieth century. (Prerequisite: Math 42 and Math 115) |
| ❑ 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) |
| ❑ 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) |
| ❑ 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 Rn emphasized; general real vector spaces and linear transformations introduced. (Prerequisite: Math 31) |
| ❑ 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) |
| ❑ 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) |
| ❑ Math 201A 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) |
| ***One course required from the following:*** | |
| ❑ Math 201B Mathematics for Secondary Teachers, ***OR*** | 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.) |
| ❑ Math 126 Theory of Numbers | Divisibility, prime numbers, congruences of first and higher degrees, theorems of Fermat, Euler and Wilson. Quadratic residues. (Prerequisites: Math 31 and Math 42) |

Courses continue on next page

**SJSU Mathematics Subject Matter Preparation Program**
**Course Descriptions (continued)**

| | |
|---|---|
| ***One course required from the following:*** | |
| ❑ Math 128B Abstract Algebra II, ***OR*** | Emphasis on rings, integral domains, fields, field extensions, Galois theory. (Prerequisite: Math 128A) |
| ❑ Math 129B Linear Algebra II, ***OR*** | 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 Math 129A) |
| ❑ Math 131A Introduction to Analysis, ***OR*** | Properties of real numbers including completeness and compactness. Continuous functions, uniform continuity, the derivative. (Prerequisites: Math 32 and Math 108) |
| ❑ Math 131B Introduction to Real Variables, ***OR*** | The theory of the Riemann integral, sequences and series of functions, spaces of functions. (Prerequisite: Math 131A) |
| ❑ Math 175 Introduction to Topology | Set theory, topological spaces and separation axioms, completeness, compactness, connectedness, functions and continuity, product spaces. (Prerequisite: Math 131A) |
| ***12 additional semester units required: may be selected from the following options*** | |
| ❑ Math 133A Ordinary Differential Equations | First order equations, higher order linear equations, applications, Laplace transforms, series solutions. Add'l topics. (Prereq: Math 32) |
| ❑ 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) |
| ❑ Physics 050 General Physics/Mechanics | Particle kinematics and dynamics, work and energy, linear momentum, rotational motion, fluids, vibrations, and sound. (Prerequisite: Math 30) |
| ❑ Physics 051 General Physics/Electricity and Magnetism, ***OR*** | Electric and magnetic fields, dc and ac circuits, electromagnetic waves. (Prerequisites: Phys 50 or 70 and Math 31) |
| ❑ Physics 052 General Physics/Heat and Light | Temperature, heat, thermodynamics, kinetic theory, geometric and physical optics. (Prerequisites: Phys 50 or 70) |
| ❑ CS 46A Introduction to Programming, ***OR*** | 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) |
| ❑ CS 49C Programming in C, ***OR*** | Beginning course in the C language (Prerequisite: previous programming experience and completion of math GE) |
| ❑ Math/Meteorology 50 Scientific Computing I | 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) |
| ❑ Math 143C Numerical Analysis and Scientific Computing, ***OR*** | 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. Substantial assignments using contemporary software packages and professional subprogram libraries. (Prerequisites: Math 32 and one of CS 50, CS 46A or CS 49C) |
| ❑ 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 systems of linear equations-direct and iterative methods, least squares problems, eigenvalues and eigenvectors, numerical stability and error analysis. Substantial assignments using contemporary software packages and professional subprogram libraries. (Prerequisites: Math 129A and one of CS 50, CS 46A or CS 49C) |
| ❑ 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) |
| ❑ 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) |