

Self Study - Department of Mathematics and Statistics

Spring 2009

I. General Information about the Program

A. The Mathematics Major

The BA in Mathematics at CSUS requires that students complete a standard 18-unit lower division sequence of mathematics courses and an introductory course in computer science. These courses include calculus (a three-semester sequence of 4-unit courses), differential equations and linear algebra. They prepare students for the analytic rigor that underscores upper division mathematics and statistics courses as well as give them the fundamental tools to apply mathematics in lower division science and engineering courses. Mathematics majors are strongly urged to take elementary physics with calculus to better appreciate the importance of calculus-based mathematical models throughout the sciences. All majors complete 15 units of upper division core study. This core consists of an introduction to formal mathematics as well as a pair of yearlong sequences in modern abstract algebra and real analysis, classical subjects that form the foundation of all modern mathematical study. Besides these core topics, students are required to take an additional 12-15 elective units from their chosen specialty: pure mathematics, applied mathematics, or preparation for secondary teaching. The pure mathematics option contains those subjects most likely to be of assistance in a graduate program while the applied option stresses material in statistics and areas that have applications in industry. The applied option also prepares the student for further study in the applications of mathematics. The secondary teacher preparation option is an approved waiver program for the secondary credential and has a specific set of electives separately approved by the state as a waiver for the state's content examinations in mathematics. This program is more fully explained below.

The BA program provides all mathematics graduates with a common background in the core areas of mathematics: modern algebra and real analysis. With the depth and breadth of training in the major, students are able to enter graduate programs or use their skills in the classroom or the corporate and industrial world.

The Department of Mathematics and Statistics has changed the name of its old Double Major – Mathematics and Computer Science (BA) degree program, and made some changes in the degree requirements. The new degree is a BA (soon to be BS) in Mathematics and Applied Computing. We made these changes in consultation with the Computer Science Department because they no longer offer some of the

courses in the old major. They eliminated the senior project requirement because they felt most of the project proposals received by their department were not appropriate for students in this program. The mathematics requirements changed only slightly. The modified program has been approved by the Department of Computer Science as well as the Department of Mathematics and Statistics. This program is for students who are interested in applications, particularly computer science applications. It provides a coherent program in both disciplines that retains the most important features of both. This is accomplished by reducing slightly the upper division requirements in both mathematics and computer science, and taking advantage of the overlap in lower division requirements. This gives students a useful applied program which can be completed in four years.

B. The Teacher Preparation Program

K-8: The University is currently implementing the CSUS Liberal Studies blended Program. This academic program is designed for students who are interested in becoming K-8 teachers and also receiving a California teaching credential. It is structured so students may complete all academic and education classes as well as student teaching in a total of 4½ years. Math 17 (An Introduction to Exploration, Conjecture, and Proof in Mathematics) and Math 107A-B (Fundamental Mathematical Concepts) comprise the 9-unit mathematics requirement for this program. The department, in consultation with faculty from the local community colleges, is reviewing and revising the content of these courses to insure that they meet CCTC (California Commission on Teacher Credentialing) guidelines for this blended program. Faculty members of the Department of Mathematics and Statistics are working with faculty members from the School of Education on blending of the mathematics and education components of the program.

7-12: In addition to our regular subject matter program, which was last approved by the CCTC in 2006, the department has implemented an Integrated Mathematics Major/Single Subject Credential Program (also called the Blended Program) in which students begin their pedagogical studies while they are completing the coursework required for the bachelor's degree in mathematics. The Blended Program was developed as a joint effort of faculty in the Department of Mathematics and Statistics, faculty in the College of Education, and 7-12 educators. At the heart of the Blended Program is a vision of a mathematics teacher who can communicate mathematical ideas with clarity and precision, organize and analyze information, solve problems readily, construct logical arguments and who enjoys mathematics and appreciates its beauty. In addition, graduates of the program will develop their teaching abilities with the goal of becoming quality mathematics instructors. The program is designed to provide extensive opportunities for participants to learn to

teach the state adopted mathematics content standards, and to know and understand the foundations of education, and the functions of schools in society. A student who successfully completes the Blended Program will receive a Bachelor of Arts degree with a Major in Mathematics, as well as complete all the requirements to obtain an SB 2042 Preliminary Single Subject with English Learner Authorization Teaching Credential.

Subject matter and professional preparation courses are offered concurrently throughout the Blended Program. Most students take five semesters to complete the program after admission. Typically, during each of the first four semesters students enroll in two subject matter courses and two professional preparation courses in addition to other general education courses and graduation requirement courses. The fifth semester is devoted to supporting the student teaching experience.

There is a Steering Committee consisting of faculty from the College of Education and the Department of Mathematics and Statistics, who, working together, will coordinate the program so that real connections are made between the mathematics courses and the education courses. This Steering Committee will include the Blended Program Coordinator, faculty from the Department of Mathematics and Statistics, and faculty from the College of Education, as well as other interested faculty. Issues that will be covered by this committee will include connections between the mathematics courses and the education courses, and revisions in the program that need to be made in response to issues that arise as the program is underway. Since its inception, there have been changes made in the coursework required for the Blended Program. Most notably, three courses have been developed that are now offered through the Department of Mathematics and Statistics that replaced coursework previously offered by the Department of Teacher Education. These are Math 316 (Psychology of Mathematics Instruction), Math 371A (Schools and Community A) and Math 371B (Schools and Community B). Math 316 is an introduction to professional pedagogy as well as the psychology and sociology of learning mathematics. A thorough analysis of the Teaching Performance Expectations, practical experience in designing and reflecting on lesson and unit plans with an emphasis on strategies for contextualizing teaching and learning are central to the course. Supporting this mission is a core understanding of the theories of cognitive, social and emotional development of adolescent learners. At the conclusion of the course, candidates are expected to demonstrate competence in the area of lesson and unit planning, classroom management design, differentiating instruction, and assessment. Math 316 is taken during the first semester of the Blended Program. Understanding the cognitive processes and theories of learning, the social dynamics of classroom, school and community, and the emotional

development of adolescents is central to successful teaching. Using these understandings as well as acquired expertise in the use of instructional models, candidates can then develop standards-based and units of instruction with appropriate modifications and accommodations for English language development and for students with learning disabilities. Math 371A-B provides teaching candidates an opportunity to study students, schools, and their communities in order to understand more completely the influences on learners and the contexts in which teaching takes place. It is important for candidates to recognize the unique profile of the school community and discern that the classroom context is a dynamic that is influenced by all participants, especially the teacher. Math 371A is taken concurrently with EDTE 470A (Student Teaching I), in which students receive their first formal student teaching experience, which is supervised by faculty from the Department of Mathematics and Statistics. Math 371B is taken concurrently with EDTE 470B (Student Teaching II) which is the second semester of student teaching that is also supervised by mathematics faculty.

During the two semesters in which they do their student teaching, students in the Blended Program have been supported with the Voula Steinberg Memorial Blended Program Stipend awards of \$1000 in the first semester (while enrolled in EDTE 470A) and \$2000 in the second semester (while enrolled in EDTE 470B). In addition, several Voula Steinberg Memorial Blended Program in Mathematics Scholarships of \$2500 each are available for students enrolled in the Blended Program. In the 2008-09 academic year, six such scholarships were awarded.

The Blended Program began in fall 2002, and the first students completed the program in fall 2004. Since its inception, 36 students have been accepted into the program. Of these, seventeen students have completed the program, six students have left the program, and thirteen are currently enrolled and in varying states of progress. It is anticipated that two of these will finish in spring 2009. Of the six who have left the program, three of these did receive their math degrees but did not finish the credential requirements, one anticipates receiving the math degree in spring 2009, one continues to work toward a math degree, and one changed majors to Liberal Studies and has not yet completed the requirements of that major.

These numbers are the total in all programs for those teachers receiving credentials in mathematics at CSUS:

	2005-06	2006-07	2007-08
Regular	10	20	17
Foundational Level	8	4	8

C. Function as a Service Department

The Department of Mathematics and Statistics serves virtually the entire university with undergraduate course offerings. All graduates of CSUS are required to complete at least one course in quantitative reasoning to satisfy GE group B4, and many degree programs expect their students to complete a number of mathematics courses forming an integral part of the foundation of the student's field of study. In this role of serving all CSUS students, the department maintains communications with the university and responds appropriately to requests from other departments regarding the content and purposes of service courses we offer.

General Education - The department's GE courses in Area B4 are Math 1, 17, 24, 26A, 26B, 29, 30, 31, and 35 as well as Stat 1 and 50. Many students, whose majors do not require specific mathematical preparation, elect to study Math 1 (Mathematical Reasoning) which gives a general overview of topics from basic mathematics and its applications. This helps them develop an appreciation for the place of the discipline in the modern world. Other students fulfill the requirement by taking more specialized courses that are a necessary part of more technical fields of study. These will be discussed in later sections of this study. From courses that offer a general perspective of mathematics to more focused general education courses in calculus and statistics, the general education offerings of the Department of Mathematics and Statistics make up a significant portion of the teaching load and are a major component of departmental activities. The general education offerings of the department are periodically reviewed in the GE program's own program review of group B, and the current set of courses, goals and objectives, etc., were last reviewed in 2004.

Physical Science, Engineering, and Computer Science Gateway Courses - These include Math 29 (Pre-calculus Mathematics), Math 30 and 31 (Calculus I and II), and Stat 50 (Introduction to Probability and Statistics). They are part of the preliminary coursework necessary for students who wish to enter these particular majors, and as

such effectively constitute a gateway into those majors. Not all majors are required to take every course in this list and some majors also require Math 32 (Calculus III) and/or Math 45 (Differential Equations for Science and Engineering). The department has recently submitted to NSM (School of Natural Sciences and Mathematics) an analysis and recommendations for potential communication with the School of Engineering concerning progress of their students through NSM courses (the calculus sequence in particular) that may help their advising and retention efforts. The proposal and analysis have also been communicated to Engineering and are included in appendix A below, and a summary accompanies the introduction to the focused inquiry section below.

Biological Science and Construction Management Gateway Courses - These include Math 26A-B (Calculus for the Social and Life Sciences) and Stat 1 (Introduction to Statistics). Both majors encourage their students to take the higher-level calculus courses, Math 30 and 31.

Business Gateway Courses - The pre-major to Business Administration includes two mathematics courses, Stat 1 and Math 24 (Modern Business Mathematics). Math 24 is a course developed for the College of Business Administration at this campus. The role of these courses in the business curriculum can be found in the BSBA (BS in Business Administration) Curriculum Alignment Matrices document on the College of Business Administration website. The matrices describe the content of the courses (standard material for statistics; study of functions, mathematics of finance, and rates of change for Math 24), as well as the skills to be acquired by the students. For example, students can expect assignments and tests requiring clearly written solutions with interpretations and assignments involving problems arising in the economic and business world.

Incorporating the use of technology, such as Excel spreadsheets to enhance the study of functions and to familiarize the students with the use of spreadsheets in a mathematical context, has been delayed pending obtaining a computer lab accessible to all the sections of Math 24. This is a problem that needs to be addressed for several of our courses.

Liberal Studies - The Liberal Studies major was created many years ago primarily as part of a waiver program for the multiple subject credential. The program contains 9 units of mathematics in a series of specialized courses Math 17 and 107A-B. These courses are designed for future teachers who will teach our elementary school children the mathematical and arithmetic concepts that become the foundation for the rest of their education. The waiver program status of the program was rescinded by the state around five years ago in favor of requiring the content competency exams of