MESA STATE COLLEGE

AY 2008 – 2009 Program Review

Mathematics

Mesa State College
Mathematics Program Review Self Study
for 2003-2007

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A. Overview and Brief History of the Program

The mathematics program is part of the Department of Computer Science, Mathematics and Statistics and consists of several subprograms as listed below.

Majors (BS degrees)
- Mathematics
- Mathematics with Concentration in Secondary Education
- Mathematics with Concentration in Statistics

Minors
- Mathematics
- Statistics

Associate in Mathematics

Courses offered through the mathematics program are designed to help students develop problem-solving, logical and critical thinking skills. With a major in mathematics, students gain an understanding of the nature of proof, a broad general understanding of mathematics, and a deep understanding of at least one area of mathematics. Students who choose a Concentration in Secondary Education gain the breadth of mathematics content and conceptual understanding necessary to be successful high school teachers. With a Concentration in Statistics, students develop an understanding of statistical reasoning, necessary assumptions and correct use of statistical procedures.

In addition to providing coursework for the mathematics subprograms listed above, the mathematics program also serves the greater campus community by providing mathematics and statistics courses for other programs including those that satisfy the Mesa State College General Education mathematics requirement and the Liberal-Arts major with an Elementary Education Concentration in Mathematics.

Every student earning a B.S. or a B.B.A. degree from Mesa State College must take College Algebra (MATH 113) or higher, and students earning a B.A. degree must take College Mathematics (MATH 110) or higher in order to meet general education requirements. These two courses constitute approximately 50 percent of the mathematics courses taught in the department each semester.

Mesa State College awards both associate and baccalaureate degrees. Different degrees require various levels of mathematics and/or statistics expertise. Therefore, in addition to providing general-education coursework, the mathematics program supports a number of other majors by offering courses such as Probability and Statistics (STAT 200), Calculus for Biology (MATH 146), Business Calculus (MATH 121), Numerical Analysis (MATH 361), and the three-course sequence required for all Liberal-Arts Majors in the Elementary-Education option (MATH 105, 205, and 301). Also, majors in the Physical Sciences are required to complete the standard Calculus sequence. Thus, the mathematics program plays an integral role in preparing students for their coursework in many of the majors in the College. As such, it is critical that the content

of these support courses be appropriate for the associated disciplines. The content of these courses must not only help students to acquire mathematical literacy, but also must provide them with the specific skills necessary for their success in future coursework. To succeed in this endeavor, members of the mathematics faculty periodically meet with members of other departments to review the content contained in the service and support courses. For example, mathematics faculty members teaching the STAT 200 course met with faculty in Psychology and Sociology to ensure that the content and focus of that course meet their students' needs. Mathematics faculty member Ed Bonan-Hamada regularly discusses the Calculus for Biology course with biology faculty. Dan Schultz-Ela meets with the Education faculty to align the mathematics content courses for Elementary Education with the Education department's methods course and the needs of the local school districts. These types of interactions assure that the mathematics support courses do indeed provide the necessary background for students in other disciplines. Internally, details of course content are under continuous review. For example, the textbooks used for service classes are frequently re-evaluated to ensure continued appropriateness and to compare with texts being used at similar institutions.

Below is a chronology of the mathematics program at Mesa State College from the time that Mesa State College became a baccalaureate degree granting institution to the present.

1974 Mesa College was authorized by the Colorado Legislature to begin offering baccalaureate degrees. The Division of Computer Science, Mathematics and Engineering began offering a Bachelor of Science Degree in Computer Science with 11 full-time faculty members, 9 in mathematics. The degree required coursework in the areas of mathematics, computer science and statistics. This coursework included 12 quarter courses in mathematics, 6 of which were at the upper division level.

1978 An agreement was reached with the University of Northern Colorado (UNC) for Mesa College students to become certified to teach mathematics at the secondary level. Three new courses were added: History of Mathematics, Modern Geometry I, and Modern Geometry II. This agreement enabled students to graduate with a B.S. degree in Computer Science, spend one quarter on the UNC campus taking more education courses, and then student teach the next quarter to receive certification for teaching at the secondary level. Mesa College also changed to the semester system with appropriate changes in the course offerings. The division of Computer Science, Mathematics and Engineering was renamed the Department of Computer Science, Mathematics and Engineering. There were 10 upper division course offerings at the time.

1980 The degree was changed to a Bachelor of Science in Physical Science and Mathematics. It required an emphasis in Computer Science, Mathematics, or Computer Science and Applied Mathematics.

1982 An arrangement, called Mesa/Metro Consortium for Teacher Education, enabled Metropolitan State College to deliver the necessary education courses on the Mesa College campus and to certify teachers at both the elementary and secondary level.

1983 A Secondary Mathematics teaching emphasis area under the B.S. in Physical Science and Mathematics degree program with certification from Metropolitan State College was introduced.

1989 Mesa College became Mesa State College via a legislative name change. There were 11 upper division course offerings at the time.

1990 The use of graphing calculators in the mathematics classes was introduced.

1991 Mesa State College received authorization to offer its own education courses and to certify prospective teachers.

1993 The names of the degrees offered by the Department of Computer Science, Mathematics and Engineering were changed to Bachelor of Science in Mathematics and Bachelor of Science in Computer Science. Concentrations in Elementary Mathematics Teaching, Secondary Mathematics Teaching, and Statistics became options for students seeking a B.S. degree in Mathematics. The Concentration in Elementary Mathematics Teaching was a new and unique program brought about by state legislation. This law required that prospective elementary teachers have a degree in an academic area.

1993 Mesa State College enacted the graduation requirement that every baccalaureate candidate must complete at least one college level mathematics course. There were 15 upper division course offerings at the time.

1994 The Department of Computer Science, Mathematics and Engineering bought a site license for the Maple computer algebra system for instructional supplementation. The department also bought site licenses for MINITAB and SAS for its instructional program in the Statistics concentration.

1995 The department was renamed the Department of Computer Science, Mathematics and Statistics. This name change reflected the fact that the Associate Degree in Engineering was transferred to the Department of Physical and Environmental Sciences.

1997 The Department of Computer Science, Mathematics and Statistics had 18 tenured or tenure-track mathematics faculty and offered 18 courses at the upper division level.

1998 The revisions recommended in the 1997 Mathematics Program Review were approved and implemented. The program modifications became official in the 1999-2000 catalog. This updated program was designed to align with the recent guidelines of the Committee on Undergraduate Programs in Mathematics of the Mathematics Association of America. Key components of the program were:

- a common core of courses fundamental to the mathematics major
- an in-depth experience in one major area of mathematics
- a selection of elective courses, allowing the student, in consultation with his or her departmental advisor, to tailor a program consistent with a specific career goal
- the integration of computer technology into all applicable parts of the program
- a senior level capstone course, requiring each student to write a paper or give a talk integrating the knowledge obtained in previous courses. This course was the program's

first attempt to introduce the emerging concept of undergraduate research in mathematics, which is very different in nature from undergraduate research in the sciences

2000 Three new courses were introduced.

- Honors Mathematics (MATH 149, 3 credit hours) was introduced to support the honors general-education program.
- Introduction to Computer Algebra Systems (MATH 147, 1 credit hour) was added in place of the computer laboratory component of the Calculus I course. This change took place because it became impossible to schedule the computer laboratory component in Calculus I due to limited access to computer labs and the fact that the typical class size of Calculus I exceeded the lab capacity (24 seats).
- Mathematics Colloquium (MATH 394, 1 credit hour) was designed to provide a weekly meeting of faculty and students. Each week a student, faculty member or guest speaker gives a talk on theoretical mathematics or an application of mathematics.

2001 The mathematics major with concentration in elementary education was eliminated (along with all other elementary education programs) as a result of new state legislation. It was replaced by the new Liberal-arts Degree with concentrations in various academic areas, including mathematics. Mathematics for Elementary Teachers (MATH 301, 3 credit hours) was added as a requirement for all students seeking licensure as elementary teachers in the Liberal-arts program.

2001 A new concentration, Computational Science, was offered within the Mathematics degree program. This concentration was designed to prepare students for the expanding career area incorporating mathematics and evolving computer technology. Computational Linear Algebra (MATH 225, 3 credit hours), Computational Abstract Algebra (MATH 425, 3 credit hours), and Mathematical Logic (MATH 430, 3 credit hours) were added to support this concentration. Mathematical Logic was also added to the approved list of courses for the mathematics major.

2001 Structured Research (MATH 397, 1-4 credit hours) was added in all subject areas in the School of Natural Sciences and Mathematics (except engineering which does not have upper division courses). Its purpose was to clearly identify undergraduate research as opposed to the former catch-all category of Independent Study. Typically, Structured Research and Independent Study courses are non-remunerated teaching overloads for faculty.

2002 Ethnomathematics (MATH 340, 3 credit hours) was added. This course was designed as an elective for prospective mathematics teachers. It addresses cultural differences in the perception and learning of mathematical concepts.

2003-2007 For changes to mathematics program requirements, see subsection E.iii.

2006 Three new tenure-track faculty members were hired, one in each of the areas of pure mathematics, mathematics education and statistics. These hires filled vacancies caused by retirement or resignation.

2006 The Mathematics Project Laboratory (MPL) was established. The lab gives mathematics majors a place to work individually or in groups on class projects. The MPL has computers with specialized software installed. Having a dedicated lab like this reduces the cost of software site licenses.

2006 A new site license for the Maple software package was obtained. This was the first upgrade in over ten years.

2006 Control of all remedial mathematics courses was moved from the Department of Computer Science, Mathematics and Statistics to the Western Colorado Community College. The department no longer controls the hiring or supervision of instructors of these courses.

2006 The Office of Academic Affairs decreed that placement requirements for courses would be advisory rather than mandatory. Prior to this, the standard was that each student had to pass a prerequisite course or to obtain a passing score on a placement test. To bypass this requirement the student had to meet with the course instructor or department chair and obtain a signed waiver of the requirement. There is concern that this new policy has had a severe detrimental effect on the success of students in introductory mathematics courses and that it may also adversely affect retention of students.

2006 Mesa State College was one of eleven institutions in the country chosen (out of over 80 applicants) to participate in the Mathematical Association of America's College Algebra Renewal Project, funded by the National Science Foundation. The goal of the Project (led by Dr. Cathy Bonan-Hamada and Dr. Tracii Friedman) was to investigate the impact of a modeling-oriented college algebra course on student learning and student success. The Project was motivated by low pass rates in college algebra courses across the nation, including at Mesa State College. In 2006, students from twelve sections of college algebra at MSC participated in the study. Six of those sections of college algebra were taught from a modeling perspective and six were traditionally taught. More students successfully completed (C or better) the modeling course (60.9%) than the traditionally taught control sections (46.6%). Students who chose to participate in the study were followed for two semesters in subsequent mathematics courses in order to compare the performance of the students who took a modeling based course to those who took a traditionally taught section of college algebra. A budget request for funds to continue the study was denied. There are no plans to continue teaching the modeling-oriented version of college algebra unless funds can be obtained for this purpose.

2007 The Mesa State, Middle School, Math & Science (MS^3) Program is a 'No Child Left Behind' federally-funded partnership grant program between Mesa State College, The Western Colorado Math & Science Center, and five high-need school districts in Western Colorado. MS^3 is a professional development program for middle school math and science teachers designed to increase student achievement by providing content and pedagogy classes in order to allow teachers to become "highly qualified". Teachers are provided with numerous teaching manipulatives and assessment materials while creating a support network. Approximately 40 teachers participate each year. MS^3, a half million dollar program, is currently in its second of three years. The math program at Mesa State provides the content teacher (Dr. Cathy Bonan-Hamada) for the summer institute. Dr. Bonan-Hamada also shares in the planning and execution

of two professional development weekends and a three day capstone event. The director of the program, Dr. Rick Ott, is also a professor in the math program.

B. Program goals and objectives

i.) Relationship to role and mission of Mesa State College

The mathematics faculty works to meet the liberal-arts and general-education goals addressed in the College mission as established by the Colorado Legislature [C.R.S. 23-53-101], which states "Mesa State College shall offer liberal-arts and sciences programs and a limited number of professional, technical, and graduate programs." The mathematics program also addresses numerous national and professional goals, via the different subprograms. The role of mathematics in a liberal-arts education is to provide quantitative and analytical reasoning skills, which aid students in the organization of data and in problem solving. These skills become even more important as society becomes more technologically oriented. To this end, the mathematics faculty is committed to offering the best-quality mathematics program possible.

More specifically, the courses offered by the mathematics program help to meet the statement of philosophy and goals of a baccalaureate education that is identified in the College catalog. The mathematics program works to meet these goals both in service to other programs and within the mathematics program.

For non-mathematics majors, those earning a B.S. or a B.B.A. degree must take College Algebra (MATH 113) or higher, and students earning a B.A. degree must take College Mathematics (MATH 110) or higher. Designed to meet the general education requirements of the College, students are required to think critically and analytically, and to communicate their reasoning clearly and effectively through individual and group assignments. Further, these courses engage students in a wide range of powerful ideas that have important applications to the world around us including algebra, statistics, consumer mathematics, logic, and geometry.

The mathematics program also meets the goals of the institution through its core offerings in the B.S. degree, in many of the same ways described above for non-majors. For example, after taking three semesters of calculus, students enroll in Introduction to Advanced Mathematics (MATH 240), a course in which students develop critical-thinking and communication skills that are foundational to subsequent upper level courses. The role of abstract reasoning in a liberal-arts education is one which strengthens the ability of students to think critically and communicate precisely within a variety of contexts, especially useful skills for post-graduate success and lifelong learning. Mathematical Modeling (MATH 365) is a course in which students learn how to precisely identify interesting problems and develop mathematical models of these problems. Also, History of Mathematics (MATH 380) is a required course for the concentration in secondary education in which students learn the history of mathematical thought with an emphasis on concepts and the people involved. Both of these courses help our students to further develop an awareness of mathematics and the world around them.

To these ends, the mathematics program has several goals and objectives that are outlined below.

ii.) Statement of Goal and Objectives

Mathematics Major
Goal: Provide students with an excellent liberal-arts education in mathematics
Objectives:

- Common BS Degree Objectives (see below)
- Provide students with a deep understanding in at least one area of mathematics.

Mathematics with Concentration in Secondary Education
Goal: Provide students with the breadth of mathematics content and conceptual understanding necessary to be successful high-school teachers.
Objectives:

- Common BS Degree Objectives (see below)
- Expose future teachers to the logical and historical development of mathematical ideas.
- Meet the requirements of state and national standards and provide the range of advanced coursework required by local, state, and national accrediting agencies.

Mathematics with Concentration in Statistics
Goal: Provide students with more specialized knowledge in statistics.
Objectives:

- Common BS Degree Objectives (see below)
- Develop an understanding of statistical reasoning, necessary assumptions and correct use of statistical procedures.

Common Objectives for the Three BS Degrees

- Develop problem-solving skills.
- Provide students with an understanding of the nature of proof.
- Provide students with powerful logical and critical thinking skills.
- Provide students with a broad general understanding of mathematics.
- Develop independent learning skills.
- Develop persistence and skill in exploration, conjecture, and generalization.
- Develop skills to implement and use appropriate technology, and to understand its limitations.
- Develop professional skills: oral and written mathematical communication skills, cooperative work skills, and professional deportment.
- Increase the number of people proficient in the mathematical sciences to address the crucial shortage of such people nationwide.

Mathematics Minor
Goal: Provide students an exposure to the ideas, principles and methods in mathematics.
Objectives:

- Develop problem-solving skills.
- Expose students to the nature of proof.
- Provide students with logical and critical thinking skills.

- Provide students with a general understanding of mathematics.
- Develop skills to implement and use technology, and to understand its limitations.
- Increase the number of people proficient in the mathematical sciences to address the crucial shortage of people with such skills nationwide.

Statistics Minor
Goal: Provide students an exposure to the ideas, principles and methods in statistics.
Objectives:

- Develop problem-solving skills.
- Provide students with logical- and critical-thinking skills.
- Develop an understanding of statistical reasoning, necessary assumptions and correct use of statistical procedures.

Associate Degree in Mathematics
Goal 1: Provide students with a reasonable exposure to foundational college-level mathematics.
Objectives:

- Same as those for the Mathematics minor

Goal 2: Prepare students for matriculation into a baccalaureate program.
Objectives:

- Provide sufficient coursework so that students will be able to complete a baccalaureate degree with only 60 additional hours of coursework.

Service to Other Disciplines: Liberal-Arts Majors with Elementary- Education Concentration in Mathematics
Goal: To acquire a coherent fundamental understanding of mathematics concepts in a way that reflects the students' future employment, where they will teach mathematics knowledgeably, have confidence in their abilities, and be empowered to present and discuss mathematics as well as answer a wide range of student questions.
Objectives:

- Common Service Objectives (see below)
- Provide students with a broad general understanding of mathematics.
- Develop in students a deep and coherent understanding of the mathematical principles underlying elementary curricula.
- Develop both oral and written expository skills appropriate for effective communication as teachers.
- Develop professional skills such as cooperative work skills and professional deportment.
- Provide experience in mathematics of sufficient depth to have a real appreciation of the necessity for rigor and precision.
- Grow the program toward meeting the crucial nationwide shortage of mathematically well-qualified teachers.
- Increase the number of graduates who can become math specialists and lead teachers in elementary schools.

Service to Other Disciplines: General Education

Goal: Support the liberal-arts mission of Mesa State College by developing students' proficiency in elementary mathematics, logical-thinking and critical-reasoning skills for all courses of study.

Objectives:

- Common Service Objectives (see below)
- Provide students in other disciplines with the necessary mathematics background for their major coursework.

Common Objectives for Service to Other Disciplines

- Develop problem-solving skills.
- Develop mathematical language skills.
- Provide students with logical- and critical-thinking skills
- Develop skills to implement and use technology, and to understand its limitation.

iii.) Analysis of Effectiveness of Meeting the Program Goals and Objectives

The goals and objectives of the mathematics program, as stated above, reflect its dual purpose within the institution: support of the mathematics degree programs and support of other programs at Mesa State College.

Within the mathematics program, students may choose to pursue a concentration in mathematics, statistics, or secondary-education. The curriculum for each is designed to help the mathematics program meet its goals, as detailed below.

Develop problem-solving skills. Problem solving is inherent in every mathematics course, and hence the skills to solve problems are cultivated from the first mathematics course a student takes through to the last upper-level course completed. For example, in the calculus sequence students use definitions of key concepts and understand and apply theorems and techniques towards the solution of problems. Mastery of problem-solving skills in this context is developed and assessed regularly by assignments and exams.

Provide students with an understanding of the nature of proof, and provide students with powerful logical- and critical-thinking skills. All students majoring in mathematics take Introduction to Advanced Mathematics (MATH 240). In this course, students are immersed in a rigorous mathematical proof-writing experience. Students must develop strong critical-thinking skills in this course, where logical and sequential construction of ideas and precise communication is essential. These skills are foundational to subsequent upper level courses, such as Abstract Algebra (MATH 490-491) and Introduction to Real Analysis (MATH 452-453), in which rigorous abstract reasoning and proof writing skills are developed even further.

Provide students with a broad general understanding of mathematics. These objectives are met by the curricular design of the mathematics program. Students in all three mathematics BS degree programs are required to take core courses representing a broad overview of mathematics.

Develop independent learning skills. Students progressing through the mathematics major program are required to take courses that increasingly foster independent learning skills. For

example, students in the mathematics program typically start with a three-semester calculus sequence, which is largely computational. Students then take Introduction to Advanced Mathematics (MATH 240), a very conceptual course with an emphasis on elementary proof writing skills. This course is followed by several upper-division mathematics courses including Abstract Algebra (MATH 490 and MATH 491) and/or Introduction to Real Analysis (MATH 452 and MATH 453) both of which are proof-based and rigorously conceptual, requiring clear understanding of abstract concepts and precision in communication. The major culminates in the Senior Seminar sequence (MATH 484 and MATH 494). These courses provide students with a capstone experience focusing on the development of research and communication skills. Students work with a faculty mentor to investigate, in-depth, a topic of their choosing and are required to write a paper and give a presentation to the mathematics faculty on their results. To successfully complete such a program, it is crucial that students develop independent-learning skills, which in turn requires dedicated mathematics faculty providing excellent guidance and appropriate assistance to ensure proper development of student skills.

Develop persistence and skill in exploration, conjecture, and generalization. This objective is met in all mathematics courses offered in the program. Like problem-solving skills, persistence and skill in exploration, conjecture and generalization is inherent in the college mathematical experience. Students in calculus are frequently challenged by problems and projects embodying these objectives. Students in Geometries (MATH 386) work through geometrical constructions using Geometer's Sketchpad software in order to explore, formulate and test conjectures. Students in the proof-based upper-level core courses are continually challenged to make conjectures and generalizations. Instructor-guided classroom discussions center on cultivation of these essential skills in our majors.

Develop skills to implement and use technology, and to understand its limitations. Nearly all mathematics faculty use some form of technology in some or all of their courses. It is also a shared belief that technology should be used only when appropriate and that students need to understand the limitations of technology in order to use it effectively. Further, the mathematics faculty generally believes that technology should be used as a computational tool or as an aid to investigation and understanding. Technology use is, therefore, secondary to the development of necessary skills and reasoning in the mathematics curriculum. The most common form of technology used in mathematics coursework is a graphing calculator. A singular advantage of calculators over computers is that they enable classroom use of technology without the need for computer labs. A graphing calculator performs all of the traditional functions of a classic scientific calculator; however, it is the graphing and data analysis features that make it particularly useful in mathematics, statistics and mathematics education. Other forms of instructional technology are often used (as appropriate), such as SPSS, Geometer's Sketchpad, Excel, Maple, and the internet, as well as text-editing and presentation tools, such as MS Word and PowerPoint. All forms of instructional technology are used in a way that is consistent with the mathematics faculty view on appropriate use of technology as described above.

Develop professional skills: oral and written mathematical-communication skills, cooperative- work skills, and professional deportment. Many of the courses offered in the mathematics program incorporate extensive individual assignments as well as group work and presentations. These basic activities help students develop responsibility and accountability,

which in turn cultivate professional deportment. A primary goal for MATH 484 (Senior Seminar I) is to obtain proficiency in the skills required to conduct mathematical research. In that course students become adept at using library and online resources as well as using a mathematics typesetting tool such as LaTeX or Word Equation Editor. Additionally, students learn how to read mathematics research papers and how to disseminate the information they learn in written reports as well as oral presentations. MATH 494 (Senior Seminar II) serves as the capstone course for the mathematics major. Students complete an in-depth mathematical research experience under the guidance of their assigned mentor, exhibiting the skills and knowledge obtained in their previous mathematics courses including the research skills developed in MATH 484. Students write a paper describing their semester-long work and results and also give a 20-minute presentation summarizing their project in our Mathematics Colloquium.

Increase the number of people proficient in the mathematical sciences to address the crucial shortage of such graduates nationwide. The mathematics faculty is active in recruiting and retaining majors. Some specific steps that the faculty has taken include creating, sponsoring and mentoring the Math Club, sponsoring a local chapter of Kappa Mu Epsilon (a national mathematics honor society) and mentoring and assisting students through difficult course work. Faculty members also participate in SOAR (Student Orientation Advising and Registration) and Scholar's Day, working with potential, as well as admitted, freshmen to ensure that they are starting with proper courses.

Additional Mathematics Objectives: In addition to meeting the general objectives above, the mathematics major is designed to provide students with a deep understanding in at least one area of mathematics. Majors pursuing a BS degree in mathematics choose a year-long sequence in either abstract algebra or real analysis. In addition, Senior Seminar II (MATH 494) is a course that requires mathematics majors to complete an in-depth study of a mathematical topic.

Additional Secondary Education Objectives: In addition to meeting the general objectives above, the concentration in secondary education is designed to achieve the following objectives: (1) provide professional skills in methods and content to pre-service teachers and (2) expose future teachers to the logical and historical development of mathematical ideas. The secondary-education students receive a solid background in mathematics content from the strong mathematics program discussed in previous paragraphs. The secondary-education students also take Methods of Teaching Secondary Mathematics (EDUC 497C, taught by mathematics faculty) and History of Mathematics (MATH 380). In EDUC 497C, pre-service teacher candidates develop professional skills in method and content, as well as participating in extensive field work in a local school district. In MATH 380, students examine the logical and historical development of mathematical ideas at great length. Further, these students are exposed to the logical development of mathematical ideas as well as historical perspectives in the mathematics core requirements.

Additional Statistics Objectives: In addition to meeting the general objectives above, the concentration in statistics is designed to develop an understanding of statistical reasoning, necessary assumptions and correct use of statistical procedures. In particular, it is designed to (1) provide students with a large array of statistical analysis procedures, (2) develop an understanding of the necessary assumptions and correct use of statistical procedures, (3) provide

students with an understanding of statistical reasoning and of measures of uncertainty, (4) develop skills in the use of statistics software and (5) develop an understanding of the summarization of statistical findings and necessary communication skills, especially when interacting with other professionals. These objectives are addressed in each of the courses leading to the degree in this concentration. For example, students in these courses get an introduction to a wide spectrum of basic statistical procedures and the necessary assumptions for their appropriate use. Students also learn how to use graphing calculators and MSExcel Data Analysis Toll Pack to enter and plot data, as well as to analyze data using elementary statistical procedures. Further, students combine these two aspects of their coursework by writing brief summaries of their analyses in assignments and projects. In upper division coursework, students continue to learn more sophisticated statistical methods, such as design of experiments, sampling techniques and statistical modeling of data, as well as using higher levels of mathematics and gaining expertise in software programs such as SPLUS and R.

C. Analysis of Need for the Program

i.) Enrollment, graduation rates and other relevant data

The Bachelor of Science degree programs in mathematics have faired reasonably well or are at least consistent with trends nationwide in four-year college mathematics and statistics programs. The Conference Board of the Mathematical Sciences (CBMS) has sponsored a study of undergraduate mathematics and statistics in U.S. colleges and universities every five years since 1965. The most recent study, CBMS2005[1] was completed for data collected between the 1999-2000 and 2004-2005 academic years and can be found at http://www.ams.org/cbms/cbms2005.html

Highlights of the study relevant to this review are:

- The total number of degrees in mathematics and statistics dropped by about 2% between 1999-2000 and 2004-2005 and by about 6% between 1994-1995 and 2004-2005.
- The number of mathematics-education degrees granted through mathematics departments dropped by about a third between 1999-2000 and 2004-2005.
- Between fall 2000 and fall 2005, total course enrollments in the mathematics and statistics departments of the nation's four-year colleges declined slightly, and lagged far behind total enrollment growth. In fact, in fall 2005 there were many more American college students taking substantially fewer mathematics and statistics courses than did their predecessors a decade earlier.

[1] David J. Lutzer, Stephen B. Rodi, Ellen E. Kirkman, and James W. Maxwell, 2007. *Statistical Abstract of Undergraduate Programs in the Mathematical Sciences in the United States*, Fall 2005 CBMS Survey, American Mathematical Society.

- The decline in enrollments in mathematics and statistics courses is attributed primarily to a sharp decrease in computer science enrollments in mathematics departments. In fact the number of bachelors degrees in computer science awarded through mathematics and statistics departments declined by about 21% between the 1999-2000 and 2004-2005 academic years.

Though the results for the 2005 CBMS Survey are for the five year period from 1999-2000 to 2004-2005, we feel that there is sufficient overlap with the review period for this program review to include them here.

At Mesa State College, while the number of declared mathematics majors was approximately constant (see Tables 1A in the Appendix) during this review period, the total number of program graduates for this review period has increased over the total number of program graduates during the previous five year period. During the five year period including years 1998 through 2002 there were 35 program graduates. During the five year period including years 2003 through 2007 there were 42 mathematics graduates, an increase of 20%.

Academic Year	2003	2004	2005	2006	2007
Declared Majors (fall term)	70	73	75	71	70
Program Graduates	10	3	12	9	8

It should be noted that we anticipate approximately 16 more mathematics program graduates by May 2009.

Mathematics enrollment data for academic years 2003 and 2007 are shown in the table below. The upper-division figures primarily represent credit hours generated within the mathematics degree programs, while the lower-division figures primarily reflect the general education and service components of the program

	2003-2004		**2007-2008**		**Credit Hour Change**	
Course Level	**Registrations**	**Credit Hours**	**Registrations**	**Credit Hours**	**#**	**%**
100	1630	6276	1707	6570	294	4.68
200	899	2739	788	2388	-351	-12.81
300	208	613	166	493	-120	-19.58
400	52	146	55	155	9	6.16

The increase in credit hours generated by 100-level courses can be attributed primarily to the increase in enrollment at Mesa State College. Decreases in the credit hours generated by 200-level and 300-level courses follow the national trends mentioned above. It should be pointed out that in 2004, the computer science program eliminated the requirement that computer science majors take either Discrete Structures II (MATH 370) or Numerical Analysis (MATH 361). In

academic year 2003, MATH 370 enrollments generated 33 credit hours. That course has not been offered since spring 2005. In addition, the number of credit hours generated by Discrete Structures I (MATH 369), which is a required course for computer science majors, decreased by 24 credit hours between academic years 2003 and 2007 partly due to the decrease in the number of computer science majors over that time period. There was a decrease of 99 credit hours generated by Sampling Techniques (STAT 313) from spring 2004 to spring 2008. In spring 2004 there was an unusually high enrollment in STAT 313 and there was an unusually low enrollment in spring 2008. If one took the average enrollment for that course over the three springs prior to 2004 and the three springs prior to 2008, one would have found an increase of 6 credit hours generated instead of the actual decrease of 99 credit hours. Hence the decrease in credit hours generated by 300-level courses can be attributed primarily to the three courses mentioned above. The majority of credit hours generated by 200-level courses are from Probability and Statistics (STAT 200) and, in academic year 2003, also by Business Statistics (STAT 214). In 2005, Business Statistics, which generated 885 credit hours in academic year 2003, was eliminated from our course offerings. It should be noted, however, that many programs who required Business Statistics changed their requirement to Probability and Statistics.

ii.) Note on the need for concentrations

As mentioned above, students may major in mathematics or may major in mathematics with a concentration in either secondary education or statistics. The secondary-education concentration is strong and provides an essential service to the community by preparing our students to teach mathematics at both the middle-school and high-school levels. The statistics concentration is designed to prepare students for graduate work in statistics or to develop the student's statistical and mathematical skills to enter the job force. Students entering the job market, with some additional job-specific training, could function as applied statisticians working, for example, in areas such as actuarial science, wildlife management, marketing, quality control and epidemiology. An additional benefit of this program is that by having a statistician in the department, we provide much needed expertise in this area to the College as well as to the larger community, The concentration has virtually no cost associated with it, while the benefits to our students and to the community are very high.

D. Narrative Summary of Resources

i.) Unique characteristics of the program influencing the need for resources

The Mathematics Projects Lab

The Mathematics Projects Lab (MPL) has been a crucial resource for many of the courses in our program. It provides nearly round the clock access to all technology they may need for their mathematics coursework (including software that is not available elsewhere on campus), as well as a place where students can bounce their ideas off of other students and faculty (the MPL is a very popular place with both). Students can work independently or in small groups to develop their mathematical and computational skills. Having such a gathering place and workroom

specifically designed for the mathematics majors undoubtedly has a positive effect in terms of recruitment, retention and development of majors.

Having the MPL available has permitted the integration of appropriate software in many courses, for example: mathematics courses such as Senior Seminar (Math 384-484), Differential Equations (Math 260), Mathematical Modeling (Math 360), Topics: Fourier Analysis (Math 396); statistics courses such as Statistical Methods (Stat 311); mathematics education courses such as Euclidean Geometry (Math 305) and Non-Euclidean Geometries (Math 386). Many of these courses actually have some or all of their class meetings in the MPL. These courses include the use of software such as Maple, Excel, MATLAB, LaTeX, Word, R, and Geometer's Sketchpad. Some of these software titles are updated via the campus network and the IT budget, while updates for others are paid for out of department money. Current software is critical for the knowledge and skill acquisition of our students, and software must be routinely updated for compatibility and serviceability purposes. Further expenses for the MPL include paper and printer-related costs, as well as white board pens. Computers will also need replacement every five years or so, and that time is approaching for the computers currently in the MPL.

Finally, the Math Club has taken full advantage to the MPL, holding regular meetings there and using the technology for its big community event, Math Extravaganza! (which brings local high schools on campus for fun with math) and also for social events (like game nights). Since the MPL is such a popular place for our mathematics students to work and gather, the Math Club has seen a large increase in participation by holding meetings there.

The Tutorial Learning Center

The Tutorial Learning Center (TLC) is a very important resource for students taking Mathematics classes, especially at the developmental and general education level. Recent contact hour sheets from the TLC show that there has been more demand for Mathematics and Statistics tutoring than for any other subject. It is essential that space be allocated for the TLC as remodeling and new construction projects continue on campus.

Mathematics Education Concentration

In addition to those discussed above, there are some resources that are unique to the mathematics education concentration (both elementary and secondary).

The mathematics education faculty maintains a large collection of materials (purchased over many years) that are designed to make mathematics concepts more concrete. These items are largely used in the teaching of the three-course mathematics content sequence for pre-service elementary teachers, as many of the items are the same as those being used in the elementary schools. This collection of manipulatives, geometry tools, calculators, and reference sources is housed in locked cabinets in Wubben 140, where all of the mathematics education courses are currently taught. The collection is reasonably complete, but there are ongoing minor replacement and enhancement costs. Also, any future move to a different classroom will require similar storage facilities.

The need for the latest version of Geometer's Sketchpad is stated above. Additionally, some of the mathematics education courses that use this software are too large for the MPL. Therefore, occasional access to a larger computer lab equipped with this software is necessary.

ii.) Faculty and staff

Current Tenured and Tenure-track Faculty of Mathematics

Name	Degree	Expertise	Position	Year (Start)
Cathy Barkley	PhD	Math Education	Professor	1988
Catherine Bonan-Hamada	PhD	Complex Analysis	Professor	1996
Ed Bonan-Hamada	PhD	Logic and Foundations	Assoc. Prof.	1997
James Brock	MS	Engineering	Assoc. Prof.	1986
Harold Davenport	PhD	Lie Theory	Professor	1988
Theresa Friedman	PhD	Functional Analysis	Professor	2002
Philip Gustafson	PhD	Approximation Theory	Professor	1998
Philip Kavanagh	PhD	Combinatorial Matrix Theory	Assoc. Prof.	1994
Rick Ott	PhD	Statistics	Asst. Prof.	2006
Erik Packard	PhD	Number Theory	Assoc. Prof.	1996
Lori Payne	PhD	Numerical Analysis	Professor	1986
Markus Reitenbach	PhD	Discrete Mathematics	Asst. Prof.	2006
Dan Schultz-Ela	PhD	Geology/Math Education	Asst. Prof.	2006
Zhong Wu	PhD	Applied Mathematics	Professor	1989

Current Full-time Temporary Mathematics Faculty

Name	Degree	Expertise	Position	Year (Start)
Maryl Case	M.Ed	Mathematics Education	Lecturer	2008
Mark Rogers	MS	Mathematics Education	Lecturer	2004

Current Part-time Temporary Mathematics Faculty

Name	Degree	Expertise	Position	Year (Start)
Clark Childers	MS	Math, Aerospace Engineer	Lecturer	2008
Jo Dee Childers	MS	Math	Lecturer	2008
Diane Krieg	MS	Mathematics Education	Lecturer	2008
Cliff Moore	MA	Industrial Arts/Education	Lecturer	2001
Chris Tubbs	MA	Mathematics Education	Lecturer	2003
Jerry Wethington	MS	Computer Science	Emeritus	1979

iii.) Physical facilities

In addition to describing the physical facilities available to the mathematics program, shortcomings of those facilities and the impact on instructional effectiveness will be addressed. It should be pointed out that Wubben Hall, the building which houses the mathematics faculty offices and where the majority of mathematics courses are taught, is scheduled to be remodeled in the near future. Priorities for improving the physical facilities and instructional equipment may be addressed with that remodel and are detailed in section H.ii) of this document

Classrooms

Mathematics instruction is done primarily in Wubben Hall, Houston Hall and Medesy Hall. Class size ranges from between 4 and 20 students in most 200, 300 and 400 level mathematics classes to between 30 and 45 in lower level classes (for example MATH 110, MATH 113 and STAT 200). Regardless of the level of mathematics being taught, classrooms for mathematics instruction need to have ample board space for computations or proofs to be displayed so that students can easily and clearly see what the instructor wishes to communicate. Rooms in Houston and Medesy Halls suffer from being too deep which requires instructors to write large so that students sitting in the back of the classroom can see. This results in insufficient board space to keep complete computations on the board. Although there is sufficient board space for most rooms in Wubben, a few of the rooms suffer from being too wide for students seated on the far left and right to adequately see what is written on the opposite side of the board hence limiting useable board space. In addition, classrooms in Wubben have long desks that are attached to the floor and cannot be moved to accommodate group activities. Upper level classes that are proof-based and taught in Houston and Medesy often do not have enough board space for the instructor to exhibit an entire proof. Furthermore, instructors that engage the students by having them work at the board during class find access to the board or board space insufficient in most rooms in Medesy and Houston Halls. Rooms in Medesy and Houston Halls have chalk boards whereas rooms in Wubben have whiteboards which allow for the use of color to displaying graphs and make distinctions between different parts of a computations, mathematical expressions or proofs. Temperature regulation and loud heating and cooling systems are other significant problems in Wubben Hall.

Students with disabilities, especially wheelchair-bound students, find some rooms and restrooms unaccommodating. For example, desks designated for wheelchair-bound students in Wubben classrooms are too high and three classrooms in Medesy used for mathematics instruction have only one door with the desk used for wheelchair-bound students in close enough proximity to the door that the wheelchair would obstruct evacuation from the room.

It should be noted that classroom doors in Wubben open into the hallway and cannot be barricaded in the event of a lockdown scenario.

The Mathematics Education program currently uses a single classroom, Wubben 140, for most of its needs. This room contains locked cabinets for our large collection of manipulatives, geometry tools, calculators, and reference sources. The classroom is otherwise similar to other mathematics classrooms with an overhead projector and computer projection system.

The collection of physical materials in the math ed classroom is adequate, but the classroom itself and the technology available are woefully inadequate. The classroom capacity is 24 students, but that assumes four students seated in touching chairs at each of the six lightweight plastic tables. Little room is available for spreading out books, activities manuals/worksheets, and the manipulatives. Furthermore, the tight spacing means that students have to make an effort to *avoid* looking at their neighbors' papers during quizzes and exams. The locked cabinets can be broken open by a hefty pull, as unfortunately demonstrated in the past, so the current (and any future) cabinets need a more secure locking mechanism.

Student Support

Currently, there is no secure, quiet area for students to make up exams or quizzes and students find themselves taking these in a makeshift area in the hallway of the main office pod.

The Mathematics Projects Lab (MPL) is used officially for classes that require specialized mathematics software and to provide computer support for mathematics majors working on senior research projects. The MPL provides a meeting place for our students, where they can work independently or in small groups to develop their mathematical and computational skills. Having such a gathering place and workroom specifically designed for the mathematics majors undoubtedly has a positive effect in terms of recruitment, retention and development of majors. This resource has helped develop a culture of higher expectations and camaraderie between mathematics majors. Besides providing a venue for group learning and team projects the MPL provides students with experiences that allow them to go beyond the theory they learn in lecture to its applications beyond the classroom and it is consistent with Mesa State's goal of providing the quintessential small college experience. It should be noted that the MPL is currently operating at its capacity. Funding to maintain the MPL, its hardware and software, is not guaranteed on a yearly basis. It should be noted that initially a faculty member gave up their computer in order to resource the MPL with an adequate number of computers.

Faculty/Staff Needs

Faculty offices can accommodate at most 2 or 3 students at a time during office hours. For classes that have enrollments of 40 or more, this is problematic since the number of students needing help is directly proportional to the number of students enrolled. It should be noted that upper level classes which typically have smaller enrollments often have more office visits per class than lower level classes since tutors are not always available for those classes. Furthermore, board space in these offices can only accommodate a simple computation or a very short proof. The heating and cooling problems that plague classrooms in Wubben, also plague faculty offices. Some students that are wheelchair-bound have difficulty accessing offices and faculty have trouble accommodating these students since the ability of the students to maneuver is limited.

Facilities for storage of instructional supplies are inadequate with these items currently dispersed in a cramped copy room and every nook and cranny of the administrative assistant's office. There have been security issues with items and cash stolen from locked cabinets and rooms.

There is a single dedicated conference room available in Wubben Hall and all departments housed in Wubben Hall use this room. Thus it is difficult to schedule this room at popular meeting times and during those times of the year when committees are particularly busy. Reserving rooms in the Campus Center for committee work is even more difficult due to the number of organizations using the facility.

There is only one key carded door for after-hours access to Wubben Hall where mathematics faculty members have their offices. This is a concern for faculty members working after-hours since potential attackers easily observe a single entry point. Lighting around parking areas and roadways adjacent to this key card door is inadequate.

iv.) Instructional equipment, including information technology and its use

Traditionally, equipment used in the teaching of mathematics has been simple. Blackboard and chalk comes to mind for many people. In recent years, however, the use technology has greatly enhanced mathematical instruction. For example, computing technology readily allows for the generation of graphs and other forms of illustration. Along with this capability are corresponding new perspectives in understanding equations, procedures and concepts. Students are therefore in a position to learn mathematics from several different vantage points (graphical and numerical), not just analyzing equations on paper.

A basic listing of instructional equipment includes:

(1) Supplies, such as white board pens, chalk, folders, etc.
(2) Overhead projectors
(3) Graphing calculators with an overhead projector adaptor unit.
(4) Classroom computer and computer projection unit.
(5) Internet capability
(6) Computer software, such as Maple, Excel, MATLAB, Geometer's Sketchpad, etc.
(7) Faculty computers

In the last five years, each of these items have been adequate for the mathematics and statistics programs. Faculty computers have been upgraded, as have much of the software that is used. Graphing calculators were purchased for all full time instructors.

As mentioned elsewhere in this document, the Mathematics Projects Lab (MPL) makes use of many of the above listed instructional equipment. The MPL has also been instrumental for applied courses such as Math 260 Differential Equations, Math 360 Mathematical Modeling, Math 396 Topics: Fourier Analysis. These courses use software such as Maple, Excel, MATLAB, and Word, just to name the more common ones. Current software is critical for the knowledge and skill acquisition of our students, and software must be routinely updated for compatibility and serviceability purposes. Further expenses for the MPL include paper and printer-related costs, as well as white board pens. Computers will also need replacement every five years or so, and that time is approaching for the computers currently in the MPL.

The math education classroom could benefit greatly from enhanced technology, both for presentation and learning tools. Frequent student presentations of projects and group work need a Smart Board and overhead document camera. Such presentations align with teaching methods/expectations and prepare the students for their teaching careers. MathEd students need to learn how to use or be familiar with technology common in their future careers, such as a networked calculator response system (TI-Navigator), Smart Boards, and various software (e.g., Geometer's Sketchpad) and online resources. For example, networked new-generation TI-Nspire calculators would be ideal. Computer-based learning requires regular access to well supported computer labs large enough for the classes but this has been problematic in the past. Past attempts at adding interactive distance learning to a live classroom encountered difficulties; adaptive technology in the MathEd classroom would solve some of those problems. Such a classroom needs two-way video and audio, a touch-screen computer, and a document camera. The college also needs more dedicated distance-learning support personnel who can effectively arrange all of the coordination needs for such a class, including support for the technology, arrangements for proctoring exams, transport of the educational materials, mechanisms for quickly exchanging documents (homework, projects), and agreements between administrations. It should be noted that delivery of MathEd courses in distance learning venues has problems unique to the discipline, one of which is dealing with the specialized notation and formats used in mathematics.

v.) Library

The library's collection of mathematics titles and access to journals is adequate, particularly considering our access to such resources as Prospector and interlibrary loan. For further information, please see the report in the Appendix, subsection (iii).

vi.) Unique sources of revenue and expenditures

- Since 1999, the Department of Computer Science, Mathematics and Statistics has published the annual international journal, *Communications in the Analytic Theory of Continued Fractions*. Dr. Cathy Bonan-Hamada and Dr. Phil Gustafson are the primary editors of this journal, with contributors and a readership in countries such as the U.S., Canada, Norway, Belgium, Scotland, Germany, and the Ukraine, to name a few. The annual expenses are relatively small, with mailing and publishing costs of roughly $1000 annually.

- The Mathematical Association of America's College Algebra Renewal Project supported a study, funded by the National Science Foundation, to investigate the impact of a modeling oriented (application based) college algebra course on student learning and student success. As one of eleven schools chosen to participate in the study, Mesa State College received $5000 to support their participation in project. Dr. Tracii Friedman and Dr. Cathy Bonan-Hamada used the funds to hire teaching assistants for the modeling oriented courses.

- In the spring of 2005, Dr. Jane Arledge was elected to a three-year term as Governor representing the Rocky Mountain Section of the Mathematical Association of America

(MAA). The Board of Governors oversees the national organization. Attendance at board meetings, which are held at the same time as the two national mathematics meetings each year, is required. It is at these meetings where decisions affecting the MAA are made. Dr. Arledge's travel to six meetings (Albequerque, San Antonio, Knoxville, New Orleans, San Jose and San Diego) over three years cost the department $4,112.

- Dr. Jane Arledge and Dr. Anne Spalding received an NSF grant (Program for Gender Equity Planning Grant, $30,000, National Science Foundation, HRD-0217172, 2002 – 2004) to get more females involved in mathematics and computer science (NEW AIMS program). In March 2003, they attended a National Science Foundation meeting in Washington D.C. for all gender equity grant recipients. During the summer of 2003, they helped organize and fund a "solar energy camp" for middle school girls, where the grant paid some local middle school math teachers, who were recent graduates of MSC, to teach the girls. Dr. Arledge and Dr. Spalding presented their work on NEW AIMS at the Women Count conference in Boulder, Colorado in July.

- The MAA Project NExT (New Experiences in Teaching) is a professional development program for first- and second-year mathematical sciences faculty. Every Project NExT fellow participates in seminars at three national conferences. Dr. Markus Reitenbach was accepted as a Project Next Fellow in 2006. As such, he acquired a lot of first-hand advice about efficient advising, sustained scholarship and innovative teaching. Of particular interest was a 2-day workshop on teaching a general education statistics class. A $3,000 travel reimbursement was part of his job offer, and the remaining $700 of the actual cost were covered by the departmental travel budget.

E. Effectiveness

i.) Results of alumni surveys

Summary of Mathematics Program Alumni Survey

In July 2008, the mathematics program sent out surveys to 22 students, each of whom attended Mesa State College during the time period being reviewed in this document, and who graduated with a mathematics major. Of these 22 students, 18 students responded. The questions on the survey asked for the year of graduation, the specific program concentration, how the mathematics program rates, what where the most/least helpful courses in the program (and explain), and whether the program was meeting its goals (with a list of goals supplied). On a scale from 1 to 5, with 5 being the best, the average score was 4.5 and median score was 5. These are excellent results. Also, the students tended to be very positive in response to whether we are meeting our goals. Depending on their post-graduate circumstances, different alumni desired different experiences to fill certain perceived gaps in the curriculum. Some students in graduate school expressed a desire to have more 400 level electives (and which challenge their abilities). Some students teaching in middle/high school might have preferred more "how to teach math" courses. A few students expressed desire to have more applied math courses, and there was something of a trend to suggest that more technology (besides graphing calculators) could be implemented in the curriculum. It was often mentioned that the faculty were very

helpful, and that the small class sizes combined with friendly and professional faculty was of great value.

Summary of Campus-Wide Alumni Survey

In March 2008, Mesa State College sent out a survey to all of its 2002 – 2007 graduates. This survey asked a multitude of questions, and the results are summarized in the tables below. Of all the surveys sent out, 88 were returned, with 6 from mathematics majors. This is a disproportionately high representation of mathematics alumni out of all those who graduated campus-wide. While 6 is still a small number of responses, the results are provided here regardless.

Comparison of Math with Campus: General Questions

In the following tables, observe that the mathematics majors tend to rate their education as good or better than their peers from other programs on campus.

Writing Effectively	Math	College
Very Dissatisfied	0%	1%
Dissatisfied	0%	2%
Neutral	0%	14%
Satisfied	50%	60%
Very Satisfied	50%	22%

Using Computers	Math	College
Very Dissatisfied	0%	2%
Dissatisfied	0%	3%
Neutral	17%	21%
Satisfied	33%	48%
Very Satisfied	50%	25%

Quantitative Ability	Math	College
Very Dissatisfied	0%	1%
Dissatisfied	0%	7%
Neutral	0%	24%
Satisfied	17%	46%
Very Satisfied	83%	22%

Integrate Ideas	Math	College
Very Dissatisfied	0%	1%
Dissatisfied	0%	0%
Neutral	17%	11%
Satisfied	33%	60%
Very Satisfied	50%	26%

Communicate Orally	Math	College
Very Dissatisfied	0%	1%
Dissatisfied	0%	7%
Neutral	33%	6%
Satisfied	33%	57%
Very Satisfied	33%	27%

Listen Effectively	Math	College
Very Dissatisfied	0%	1%
Dissatisfied	0%	2%
Neutral	17%	9%
Satisfied	33%	61%
Very Satisfied	50%	25%

Thinking Creative	Math	College
Very Dissatisfied	0%	1%
Dissatisfied	0%	3%
Neutral	17%	15%
Satisfied	50%	49%
Very Satisfied	33%	31%

Acquire Skills On Own	Math	College
Very Dissatisfied	0%	1%
Dissatisfied	0%	1%
Neutral	17%	8%
Satisfied	33%	50%
Very Satisfied	50%	39%

Lead Groups	Math	College
Very Dissatisfied	0%	1%
Dissatisfied	0%	9%
Neutral	50%	22%
Satisfied	33%	41%
Very Satisfied	17%	26%

Team Member	Math	College
Very Dissatisfied	0%	2%
Dissatisfied	0%	1%
Neutral	50%	15%
Satisfied	17%	44%
Very Satisfied	33%	36%

Healthy Lifestyle	Math	College
Very Dissatisfied	0%	1%
Dissatisfied	0%	9%
Neutral	0%	30%
Satisfied	100%	40%
Very Satisfied	0%	19%

Aware Social Problems	Math	College
Very Dissatisfied	0%	1%
Dissatisfied	0%	5%
Neutral	33%	28%
Satisfied	50%	42%
Very Satisfied	17%	21%

Appreciate Art	Math	College
Very Dissatisfied	0%	2%
Dissatisfied	0%	8%
Neutral	17%	41%
Satisfied	67%	34%
Very Satisfied	17%	14%

Organize Info	Math	College
Very Dissatisfied	0%	1%
Dissatisfied	0%	1%
Neutral	17%	9%
Satisfied	50%	60%
Very Satisfied	33%	27%

Decision Making	Math	College
Very Dissatisfied	0%	1%
Dissatisfied	0%	0%
Neutral	33%	15%
Satisfied	33%	51%
Very Satisfied	33%	30%

Gen Ed Insruction	Math	College
Poor	0%	0%
Below Average	0%	0%
Average	33%	44%
Above Average	33%	42%
Excellent	17%	11%

Instruction Within Major	Math	College
Poor	0%	0%
Below Average	0%	5%
Average	0%	14%
Above Average	33%	42%
Excellent	67%	39%

Faculty Available Gen Ed	Math	College
Poor	0%	1%
Below Average	0%	1%
Average	0%	41%
Above Average	33%	33%
Excellent	67%	19%

Faculty Available Major	Math	College
Poor	0%	1%
Below Average	0%	3%
Average	0%	13%
Above Average	17%	32%
Excellent	83%	50%

Course Availabilty	Math	College
Poor	0%	5%
Below Average	17%	11%
Average	50%	42%
Above Average	17%	32%
Excellent	17%	9%

Academic Advising	Math	College
Poor	0%	3%
Below Average	17%	15%
Average	17%	35%
Above Average	67%	26%
Excellent	0%	19%

Digital Environment	Math	College
Poor	0%	1%
Below Average	0%	13%
Average	50%	55%
Above Average	50%	24%
Excellent	0%	5%

Library Facilities	Math	College
Poor	0%	1%
Below Average	17%	7%
Average	17%	39%
Above Average	67%	41%
Excellent	0%	11%

Value of Education	Math	College
Poor	0%	0%
Below Average	0%	3%
Average	17%	17%
Above Average	33%	35%
Excellent	50%	42%

Attend Again	Math	College
No	0%	3%
Unsure	17%	15%
Yes	17%	39%
Definitely Yes	67%	41%

Summary of Campus-Wide Alumni Survey: Math Related Questions

Other results from the campus-wide survey are given the following tables. Again, while the number of respondents is small, the results generally provide a positive reflection of the mathematics program.

Math Quality	Percent
Average	33%
High	17%
Very High	50%
Number of respondents	6

Math Employed Related Field	Percent
Yes	50%
No	50%
Number of respondents	6

Math Position	Percent
Teacher	33%
Research Analyst	33%
Research Analyst in Numerical Analysis	33%
Number of respondents	3

Math Prepared for Position	Percent
I Was Generally Prepared	100%
Number of respondents	3

Math Why Not Employed	Percent
Have not found math related job	33%
Have not seriously looked for math job	33%
Have been attending graduate school	33%
Number of respondents	3

Math Grad School	Percent
Yes	33%
No	67%
Number of respondents	6

Math Level of Grad School	Percent
Masters	50%
Doctorate	50%
Number of respondents	2

Math Complete Grad Program	Percent
In the process of finishing	100%
Number of respondents	2

Math Prepared for Grad Program	Percent
I was generally well prepared	100%
Number of respondents	2

Math Courses for Grad Program	Percent
Missing 1 more semester Linear Algebra	100%
Number of respondents	1

Math Chance Attend Grad Program	Percent
Highly likely	33%
Somewhat unlikely	17%
Highly unlikely	17%
Number of respondents	4

Math Chance Level	Percent
Masters	100%
Number of respondents	4

Math Enroll in Same Major	Percent
No	17%
Unsure	17%
Yes	33%
Definitely yes	33%
Number of respondents	6

Summary of Campus-Wide Alumni Survey: Math Related Comments

The following comments were provided by mathematics alumni who completed the campus-wide survey. Some comments are contradictory, as they probably reflect the different postgraduate experiences of the students.

Math Classes of Most Use

- Basic math skills and complex thinking have been of most use to me. Just being able to reason through complex ideas has been a huge help. I have used some calculus and statistics.
- Linear Algebra I and II, Discrete Mathematics I and II, Calculus II
- Advanced Calculus, Abstract Algebra, Numerical Analysis
- Number Theory, Calculus
- Probability and Statistics, Knot Theory, Calculus I, Linear Algebra

Math Classes of Little Use

- History of Mathematics
- Advanced Calculus
- Game Theory

Math Classes to Add

- Math Applications. Have a class where you can apply math to various careers.
- Any upper level applied math (Computational linear algebra, numerical PDEs, etc). Though I would have probably tried to avoid these classes, it would have served me well.
- Topology

Suggestions for Mathematics Program

- Make sure students have to work for the grade they get and not pass them if they put forth a little effort. I learned the most in classes where the professor was hard on the students and actually made them work for the grade.
- It was a great program, so I don't have any suggestions!
- A course in Game Theory would be fun.

ii.) Accreditation by professional, regional or national associations

The Bachelor of Science in Mathematics Secondary Education Concentration is accredited by the National Council for Accreditation of Teacher Education (NCATE), which is assessed by the National Council of Teachers of Mathematics (NCTM). NCATE is one of two accreditation agencies recognized by the U.S. Department of Education that represent the teaching profession. Elementary education is assessed by the Association for Childhood Education International (ACEI), which is a member organization of NCATE. These assessments are submitted as SPA (Specialized Professional Association) reports.

iii.) Changes to the program since the most recent program review

Changes to subprogram requirements are listed below. Please see the program history portion of this document (section A) for additional changes affecting the program during the review period.

2003 The Associate of Science degree in Engineering was eliminated. This removed some students from the three-semester Calculus sequence and Differential Equations.

2005 Senior Seminar, the capstone course for mathematics majors, was expanded from a 1-credit course to a two-semester sequence for a total of four credit hours. In the first semester students learn to use library facilities and online research resources, how to use TeX, the mathematical typesetting program, and Maple, the symbolic computation program, and how to make presentations. In the second semester each student works with a faculty member, studying a topic not normally covered in the undergraduate curriculum. The student writes a paper and gives a presentation at the Mathematics Colloquium on his or her research.

2006 A minor program in Statistics was established.

2006 The Advanced Calculus sequence (MATH 452, 453) was renamed Real Analysis I and II to better reflect the content of the courses. A new course, Advanced Calculus (MATH 352) was added. This course consists of a thorough treatment of the calculus of one real variable. It is required for majors with the concentration in secondary teaching. The change was made since it is now common for secondary teachers to teach calculus, and while the introductory calculus sequence does not have the depth to prepare teachers, real analysis has too much abstraction to adequately supplement these courses.

2006 A minor program was added in statistics.

2006 The Concentration in Computational Science was eliminated since the program did not have enough resources to support the limited number of students pursuing this concentration.

2007 Mathematical Statistics II (STST351) was added and was made a required course for the statistics concentration.

2008 The number of credit hours for Introduction to Advanced Mathematics (MATH 240) was increased from 3 to 4 credit hours, in order to enhance student logic and proof-writing skills. This will better prepare students for the rigors of upper-division Mathematics courses.

iv.) Assessment of student academic achievements within the program

Assessment plans varied over the years, but always included the Major Field Assessment Test (MFAT). All students completing the B.S. in Mathematics, regardless of concentration, take this nationally recognized test during their senior year. The Mathematics students typically do not have a strong incentive to prepare for the MFAT or may not even take it seriously, but it is still the best indicator for student academic achievement.

The program assessment criterion for "success" has been that 75% of students score 140 or higher on the MFAT. The percentages of students scoring 140 or higher are given in the following table.

2003/4	2004/5	2005/6	2006/7	2007/8
100%	58%	92%	100%	100%

It should be pointed out that while the anticipated success rate was missed once, the actual scores for these years show that many students had a score close to 140. In particular, 83% of all students scored 137 or higher in 2004/5. We attribute the variations in success rates to small samples (i.e., small number of graduates). Individual student scores for the last three years are reported in section E.vi.

Other means of program assessment included: number of student presentations outside class, faculty ratings of students' senior seminar presentations/papers, high school mentor ratings in the case of Math Education students, and alumni surveys. Whenever sufficient data were available, program assessment criteria were met.

Among the strengths of the Mathematics program are small class sizes in upper-division classes, ample student-faculty interaction (especially through the senior seminar), and a well-designed curriculum. The latter exposes students to a list of topics considered essential for entering graduate school (in the case of Math majors) or teaching at public schools (in the case of Math Education majors). The department has traditionally had a high number of faculty holding terminal degrees. Thus, all courses from Calculus upwards are usually taught by highly qualified Ph.D. mathematicians, instead of part-time instructors.

Many faculty members are willing to work with students on individual study and research projects. This often means assisting students beyond the timeframe of their senior seminar project. Other faculty members, such as Dr. Edward Bonan-Hamada, have frequently been teaching independent study courses, or simply taught small groups of students on an unofficial basis during summer.

While not part of the actual Mathematics program, we also have a Math Club and a student chapter of Kappa Mu Epsilon (the national Mathematics Honor Society), both of which have been very successful thanks to the efforts of faculty advisor Dr. Tracii Friedman. The Math Club organizes an annual one-day recruitment event (Math Extravaganza!) in which up to 150 high school students have participated each year.

v.) Faculty success data

Teaching

The mathematics faculty is an asset to their students and to Mesa State College. They are experienced teachers who are dedicated to their teaching duties and several have been acknowledged for their efforts. In the past five years, individual mathematics faculty members have been awarded a Distinguished Faculty in Teaching Award (an award given to one MSC faculty each year), an Outstanding Educator Award from the Grand Junction Chamber of Commerce, a Certificate of Excellence in Education Award from the MSC Associated Student Government, a Dixon Scholar and Mentor Award, MSC Exemplary Faculty recognition and membership in Delta Kappa Gamma, an honor society for women in education.

Most members of the mathematics faculty regularly participate in faculty development activities. Not only do mathematics faculty participate in the faculty development workshops hosted regularly by Mesa State College, but mathematics faculty members have also participated in professional development workshops at the national level in such venues as Mathematical Association of America Professional Enhancement Programs, Mathematical Association of America College Algebra Renewal Workshop, Revitalizing College Algebra Conference, College Algebra Symposium, MathFest and Elementary Teacher Preparation in Mathematics Workshop. Mesa State College mathematics faculty have also been members of the Panel on Teaching Effectiveness at Mesa State College new faculty orientation sessions.

Three members of the mathematics faculty are Project NExT Fellows. Project NExT (New Experiences in Teaching) is a national program funded by Exxon and the Mathematical Association of America which seeks to assist first and second year faculty in the nation's colleges and universities in developing professionally, especially in the area of teaching. One of those faculty is currently a consultant and mentor for the program and as such, participates in a national listserv discussion on effective practices of teaching and other professional development aspects of concern to new faculty at teaching institutions.

Two faculty members participated in the Mathematical Association of America's College Algebra Renewal Project, funded by the National Science Foundation. The goal of the Project was to investigate the impact of a modeling-oriented college algebra course on student learning

and student success. More information is available in the history portion of this document (section A).

Service

Mathematics faculty members participate regularly in service activities at the departmental and institutional levels and also for professional organizations. Individual mathematics faculty members have been awarded the Dr. Martina Keck Wall of Fame Award from Academic Services and Certificates of Merit from Academic Services for service activities.

Many mathematics faculty members serve on campus wide committees in leadership positions. In the past five years, individual members of the mathematics faculty have served as President of Faculty Senate, Vice President of Faculty Senate (two individuals), Chair of the Academic Policies Committee, MSC representative to the Commission on Governance, Director of the Mesa State, Middle School, Math and Science Partnership, Chair of the Educational Access Services Committee, Chair of the Teaching and Learning Center Advisory Committee, Chair of an NCA Study Subcommittee, Chair of the Distinguished Faculty Committee, and Chair of the Curriculum Subcommittee on Program Reviews.

Several mathematics faculty are members of profession organizations such as the Mathematical Association of America and have held leadership positions in those organizations. A MSC mathematics faculty member is currently a member of the Mathematical Association of America Board of Governors. Others positions held by mathematics faculty include Mathematical Association of America BIGSIGMAA Vice President for Programs, Session Chair/Organizer for the Joint Mathematical Association of America/American Mathematical Society National meetings, Mathematical Association of America Panel Selection Committee, Mathematical Association of America Science Policy Committee, Mathematical Association of America Nominating Committee, Mathematical Association of America Program Committee Chair for the Rocky Mountain Section and Mathematics Co-chair for the Colorado Faculty-to-Faculty Conference.

Two mathematics faculty members are involved with the Mesa State, Middle School, Math & Science (MS^3) Program , a 'No Child Left Behind' federally-funded partnership grant program between Mesa State College, The Western Colorado Math & Science Center, and five high-need school districts in Western Colorado. One faculty member is the director of MS^3 and the other is a content instructor.

Scholarship

Mesa State College mathematics faculty members participate in scholarly activities. In fact, one mathematics faculty member was recently awarded the Distinguished Faculty in Scholarship Award (an award given to one MSC faculty each year). Commitment to strong scholarship benefits not only students, but also contributes to the reputation of the institution. Since 2003, mathematics faculty members have published over 15 articles in refereed or reviewed journals and have given over 60 presentations. Local forums for presentations include the MSC Mathematics Colloquium, MSC Physics Colloquium and the MSC Faculty Colloquium. Of the sixty plus presentations given, 15 have been at the regional or national level and 3 were

international presentations. One presentation received the George C. Matson Award for the Best Paper at an American Association of Petroleum Geologist meeting.

Faculty mentoring of students in undergraduate research has resulted in dozens of poster presentations and talks and has also yielded one publication. It should be noted that publishable undergraduate student research in mathematics is rare.

Mesa State College mathematics faculty members have been instrumental in obtaining or administering several grants including a U. S. Department of Education's No Child Left Behind Grant to work on alignment of MSC courses with state and national standards for teacher education, a National Science Foundation Program for Gender Equity Planning Grant, the Mathematical Association of America's National Science Foundation Renewal of College Algebra Grant and the Colorado Department of Education's Mesa State, Middle School, Math and Science Partnership.

Other highlights of scholarship by mathematics faculty include 9 referee reports or book reviews, authoring and co-authoring of manuscripts, editing proceedings of conferences, editing and reviewing an international journal, writing supplements for texts and designing and running regional workshops.

Advising

Competent advising and/or mentoring of students contribute to student success and should be a positive experience for students. Most mathematics faculty advise students regularly whether it is on prerequisites and/or placement in mathematics courses or on seeking help from tutoring services and/or improving study skills. In addition to advising students at SOAR (Student Orientation Advising and Registration) sessions, individual faculty members in mathematics have served on the Freshman Year Programs Assessment Committee, the SOAR Committee and the Retention Techniques Committee in an attempt to improve advising and placement in entry-level mathematics courses. In addition, one faculty member was recently awarded the Distinguished Faculty in Advising Award (an award given to one MSC faculty each year). Several faculty members also attended the CAPP (Curriculum Advising and Program Planning) sessions in an effort to keep up to date on accessing student information in the context of advising.

vi.) Student success data

Mathematics majors at Mesa State College follow a rigorous course of study which results in a well-rounded mathematics education including both the computational and theoretical aspects of the field. As part of their course of study, mathematics majors are encouraged to give presentations. Since 2003, students have given 32 presentations at the MSC Mathematics Colloquium, 14 oral or poster presentations at the MSC Student Scholars Symposium (one of which won an award for the most outstanding presentation), two presentations at regional Mathematical Association of America meetings and two presentations at national Mathematical Association of America meetings, one of which won an award for an Outstanding MAA Talk. One student has had a paper published in the College Mathematics Journal. It should be noted

that publishable undergraduate student research in mathematics is rare. Of notable interest is that mathematics majors have participated in three REU (research experience for undergraduates) programs. There are only approximately 20 REUs in the United States each summer and competition for positions is fierce.

Nearly all mathematics majors who have earned a degree in mathematics with secondary certification who have sought teaching positions in mathematics have found employment. Program graduates have attended graduate school in mathematics, statistics, computer science, aeronautical engineering and architecture. One program graduate is currently in medical school. Others have found employment elsewhere.

All students completing the BS in mathematics, regardless of concentration, take the nationally recognized Major Field Assessment Test (MFAT) during their senior year. Scores for the MFAT are summarized in the table below. Individual student scores not available for all years during review period. However, summary data for those years can be found in the assessment portion of this review. It should be noted that not all students take the MFAT exam during the year that they graduate, some take it the previous year.

MFAT Scores for Mesa State College Mathematics Majors

Year	**05-06**	**06-07**	**07-08**
Individual Student Scores	184	187	200
	175	181	178
	169	166	161
	166	166	155
	164*	166*	152*
	155	158	149*
	149*		149*
	143*		143*
	143*		140*
	140*		140*
	134*		
Mean	157	171	157

* Indicates Mathematics with Secondary Education Concentration

National statistics from the Educational Testing Service (ETS) for the Major Field Test in Mathematics can be found on the ETS website (www.ets.org). The statistics are based on data from domestic institutions from February 2004 to June 2007 and are summarized below:

Number of examinees 4936, **Mean 155.5,** Median 152, Standard Deviation 17.7
As can be seen from the table above, mean scores for MSC graduates are higher than the national mean.

Students pursuing licensure, either elementary or secondary, must take the standardized PLACE or PRAXIS II exam. Elementary education students take a multi-subject elementary education exam, whereas the secondary education students take a mathematics exam. The PRAXIS II exam is accepted by many states, but the PLACE exam is specific to Colorado. We have data on both the overall PLACE scores of elementary education students as well as their mathematics subarea scores for the last three years. Out of the eleven students taking the exam between 9/2005 and 7/2008, seven passed the exam and six achieved a passing score in the mathematics subarea. Note that students can pass the overall exam without passing each individual subarea. Both PRAXIS II and PLACE scores are available for the mathematics majors who concentrated in secondary education. Of the 17 students who took the PLACE test between 2/2005 and 5/2008, all but one passed. However, of the eleven students who took the PRAXIS II exam between 6/2005 and 12/2007, only three passed. The gross disparity in pass rates for the exams stems from the anomalously high score that Colorado specifies as passing for the PRAXIS II exam. 37 states accept that exam, and Colorado requires the highest passing score, 156, of all of them. The next highest score is 147, whereas the average required passing score is 134 and Arkansas only requires 116. Many of our students who failed the PRAXIS II exam in Colorado would have passed it in many other states. Colorado is very close to being a true statistical outlier.

Mathematics majors are some of the brightest students on campus. In fact, compared to students in other majors across campus, mathematics majors have, on average, the highest high school GPA, the second highest ACT score and the fourth highest Mesa State College GPA.

F. Strengths Identified by the Program Review

The strengths of the mathematics program include the faculty, the involvement of mathematics majors, and the curriculum itself.

Faculty Strengths

The mathematics faculty is an asset to their students and to the College. They are dedicated, experienced teachers, virtually all of whom hold terminal degrees. Although the number of contact hours breaks down to twelve hours of instruction and five office hours, mathematics faculty typically meet with students outside of these hours to provide additional assistance with coursework, to mentor students, and to direct student research. Preparing lectures and course administration (for example, grading and maintenance of course web sites) often requires two to three hours for each hour of class time. The teaching load described above, together with service requirements (for example, committee work) often translates into well over a 40 hour work week. Nevertheless, the mathematics faculty remains committed to supporting their students in a variety of ways.

Commitment to strong scholarship benefits not only students, but also contributes to the reputation of the institution. Since fall 2003, mathematics faculty members have published over 15 papers in refereed journals and have given over 60 presentations, 15 of which were talks given at national or regional conferences and 3 of which were international presentations. Faculty mentoring of students in undergraduate research has resulted in dozens of poster presentations and talks and has also yielded one publication. Other highlights of department

members' contributions in scholarship include: 9 referee reports or book reviews, authoring and co-authoring of manuscripts, editing proceedings of conferences, editing and reviewing an international journal, writing supplements for texts and designing and running regional workshops. It is important to note that active pursuit of scholarship, in general, requires time above and beyond the work week described above.

The weekly Mathematics Colloquium (MATH 394) continues to provide students with exposure to mathematics beyond their standard coursework. Presentations are made by students, faculty, and community members. For example, recent speakers have come from University of Colorado, UC Pueblo, IBM, NASA, Aridlands Natural Resource Consulting, Maya Exploration Center and local industry. Much of the subject matter deals with applications of mathematics to research and industry science. The colloquium continues to be a great success for the department. In addition to providing a forum for student presentations, it has developed a sense of community for students interested in mathematics and a culture of mathematics within that community. The colloquium also serves as a major recruiting tool for the department. Indeed, most of the students who attend the colloquium are not registered for the course.

Mathematics faculty members have also been instrumental in obtaining or administering several grants during the years 2003-2008 from granting agencies such as the U.S. Department of Education, The National Science Foundation, NASA, Mathematical Association of America, Colorado Department of Education. These grants have provided funding for innovative projects within MSC as well as community outreach projects in mathematics and mathematics education.

Involvement of Mathematics Majors

The Math Club, like the Mathematics Colloquium, has fostered student involvement in mathematics activities by developing a sense of community and mathematical culture for students interested in mathematics. It has been invaluable in promoting mathematics as an area of study. Some of the Math Club activities include hosting frequent social events, volunteer tutoring in the dorms, and organization and execution of Math Extravaganza!. This latter project is an annual event where about 100 students from regional high schools participate in mathematical games and contests. The event serves as a recruitment tool for both the college and the mathematics program. Additionally, the Math Club raises money to provide funding for students to attend national conferences and present their research through a variety of fundraisers held during the year.

Mathematics students also participate in the annual Student Scholars Symposium held here at Mesa State.

Curriculum Strengths

There have been a number of modifications since 2003 to the mathematics major that have resulted in significant, positive changes in our student's preparation. Those changes are reiterated here.

The Senior Seminar (MATH 494) has been completely redesigned so that the students receive a semester of preparation before they embark on their research project. This restructuring has been a huge success as evidenced by the marked improvement in the level of research conducted and

the professional communication of project results. Students continue to present their work in the Mathematics Colloquium, the MSC Student Scholars Symposium and some also present at national and local conferences.

Three courses, Fourier Analysis (currently a topics course), Advanced Calculus (MATH 352) and Mathematical Statistics II (STAT351) have been added to the program. Fourier Analysis is an elective course that fills a gap in our program for an applied analysis course. Advanced Calculus is a required course for the secondary education majors and is especially beneficial to those who will teach AP or Honors Calculus in the high schools. This course also provides a 300-level transition course for students struggling to make the leap from lower level Calculus to the 400-level Introduction to Analysis course.

A Statistics minor has also been developed to serve students across campus in majors that require analysis of data (for example, Environmental Science, Biology, Sociology, Psychology, etc).

A major strength of our program is the student to faculty ratio. In upper division mathematics and statistics classes, enrollment ranges between 4 and 14 students.

An emerging strength of the Statistics concentration is the opportunity to conduct undergraduate research as part of consulting projects under faculty direction. This past semester students consulted with two community members who are pursuing graduate degrees at other institutions and analyzed thesis pertinent data under the direction of Dr. Rick Ott. Upon publication, both Dr. Ott and the undergraduate student's name will appear on the paper.

As for faculty, as of summer 2008, Dr. Rick Ott will be the only professor with a PhD in statistics in the department as Dr. Tim Novotny will be retiring. Dr. Erik Packard has been teaching multiple sections of the Introduction to Statistics course in the past few years and may, if he desires, teach an upper level Statistical Methods or Sampling Course in the near future. The remaining introduction sections are taught by numerous individuals in the department. If the program grows as expected, there will be the need for a second tenure-track statistician to help with the variety of upper level courses and senior projects.

G. *Areas Needing Strengthening Identified by the Review*

- Support for faculty scholarship should be strengthened. Faculty members in the department have heavy workloads that make it very difficult to attend meetings, read journals, and work with other mathematicians around the country. Such activities are important professional development, leading toward better teaching and more meaningful student research projects.

- The proof writing skills of our majors need to be strengthened. The mathematics major is unavoidably a very challenging program. The upper-division courses are largely proof-based, culminating in the two most difficult courses, Abstract Algebra and Introduction to Real Analysis. In the past, these two courses have been offered only in alternate years, resulting in some students taking them with very little mathematical maturity. To address this concern, the mathematics faculty decided that the courses should be offered more

often, and that other upper-division courses should be strengthened, particularly in terms of proof writing requirements, in order to better prepare students for the harder courses.

- In the past, the prerequisite course work required for Calculus has been either College Algebra and Trigonometry or Precalculus. As the mathematics faculty discussed possible changes to the College Algebra course, there was concern about how this might affect the students planning to take Calculus.

- The new mechanical engineering partnership with University of Colorado, Boulder has introduced other issues with prerequisites for the Calculus course. Students may enter the program with differing levels of preparation, including those who took the Calculus prerequisite courses some time ago. Such students will need some refresher before taking Calculus.

- The mathematics minor needs to be reexamined. The mathematics faculty wants to make the minor more attractive while maintaining its rigor.

- In 1997, there were 18 tenured or tenure-track mathematics faculty members in the department. In the fall of 2008, there are 14 such faculty members. However, one of those faculty members is currently working in administration and teaches one mathematics course per year. Another teaches primarily computer sciences classes. From 1997 to 2007, the number of mathematics majors increased by 52% (from 46 to 70). Although the faculty has managed to maintain the quality of the program during this time, retention of faculty has become a problem. In the past five years, the program has lost four experienced and valued faculty members. Even when replaced by talented new faculty members, losing experienced faculty members is costly.

- The mathematics faculty members believe that in order to offer our students the best possible tutoring experience at the Tutorial Learning Center, tutors should be highly qualified, having earned an A or B in the course *subsequent* to the one they are tutoring. The current model used is a student may tutor any course (in their major or not) in which they have earned an A or B. Also, higher-level classes for majors should not be tutored, but instead students should be encouraged to seek help from their instructors instead. This would ensure proper "tutoring" by qualified faculty, provide valuable feedback to faculty regarding student understanding, intensify desirable student-faculty communication at the upper division level, and free up resources for tutoring high-demand lower division classes. These issues have been brought up in the recently formed Tutorial Services Advisory Committee, but are as of yet unresolved.

- Although the B.S. degree in Mathematics with a Concentration in Statistics is relatively young having granted only two such degrees, there are currently 5 students that are pursuing the Statistics concentration. The degree program includes the fundamental courses of Statistical Methods, Mathematical Statistics I & II (II is new as of 2008), Regression Analysis and Linear Models, Design of Experiments, and Sampling besides the traditional Calculus based mathematics courses. Currently one criticism of the program is its lack of versatility. There are not many electives built in the program. In

the next couple of years this is expected to change especially with the introduction of new courses on topics such as biostatistics, actuarial science, and statistical process control.

- Currently there is no specific assessment tool for the statistics portion of the degree.

H. Vision

i.) Proposals for strengthening the program

The department decided to make Precalculus a prerequisite for Calculus I, while still leaving the class open to students who have instructor permission. Together with the expected inflow of Engineering majors, this should result in better prepared students and a more homogeneous student body in Calculus I and subsequent Calculus courses.

We are currently working on a re-structuring of the requirements for the Mathematics minor in order to make it more attractive for students from other disciplines, especially in view of the new Engineering program partnership with University of Colorado, Boulder.

The Statistics concentration is being re-organized in order to prepare students equally well for Statistics graduate programs and Bachelor's level statistics jobs. The Mathematics with Statistics concentration program includes the fundamental courses of Statistical Methods, Mathematical Statistics I & II (II is new as of 2008), Regression Analysis and Linear Models, Design of Experiments, and Sampling besides the traditional Calculus based mathematics courses and Numerical Analysis. Currently the program lacks versatility. There are few electives built in the program compared to the mathematics program. This is expected to change especially with the introduction of new courses such as biostatistics, actuarial science, and statistical process control. Currently the program does not require a student to produce a senior project and paper, but this year many students will do so as an elective. Upon success a senior project will likely be required in the near future. The proposed changes with justification are as follows:

- The option to take Beginning Programming (CSCI 110) will not be allowed due to the extensive programming requirements in the upper division statistics courses.

- Replace Numerical Analysis with Linear Algebra to be more in line with traditional statistics degree programs throughout the country.

- Allow additional 400 level Math courses to be counted besides Real Analysis I and Abstract Algebra I since, for instance, Complex Analysis and Linear Algebra II are also useful courses in the field of statistics.

- Eliminate the requirement to take the second semester of Real Analysis (MATH 452) or Abstract Algebra (Math 490) course due to the recent addition of Mathematical Statistics II (STAT 351) as a required course.

- Replace the requirements of Statistical Methods (STAT 311), Sampling Techniques (STAT 313), and Design of Experiments (STAT 425) with the requirements of taking 3 STAT course elective with at least one of them at the 400 level. This allows for versatility in the program as new courses become available on topics such as biostatistics, actuarial science, and statistical process control.

- Require the students to take Senior Seminars I & II (MATH 484 & 494). In the future, if a 4 credit hour internship program can be established, the internship can substitute for the Senior Seminar series. This gives the student research and/or consulting experience under the direction of a faculty member. It may also lead to a beneficial collaboration between our department and many local institutions such as St. Mary's Hospital, Mesa County Health Department, energy companies, and insurance companies that have a need for data analysis. This may also lead to a "foot in the door" for our future graduates as they seek employment.

Current Program Major Requirements

MATHEMATICS – STATISTICS MAJOR REQUIREMENTS
(44-45 semester hours) A 2.5 GPA is required in the major courses. No more than one "D" may be used in completing major requirements.

Core Classes

CSCI 110	Beginning Programming			
OR		3-4	____	____
CSCI 111	Computer Science I			
MATH 152	Calculus II	5	____	____
MATH 240	Intro to Advanced Mathematics	4	____	____
MATH 253	Calculus III	4	____	____
MATH 361	Numerical Analysis	4	____	____
STAT 351	Mathematical Statistics II	3	____	____
STAT 311	Statistical Methods	3	____	____
STAT 313	Sampling Techniques	3	____	____
STAT 350	Mathematical Statistics I	3	____	____
STAT 412	Correlation and Regression	3	____	____
MATH 452	Introduction to Real Analysis I			
OR		3	____	____
MATH 490	Abstract Algebra I			
MATH 453	Introduction to Real Analysis II			
OR		3	____	____
MATH 491	Abstract Algebra II			
STAT 425	Design and Analysis of Experiments			
OR		3	____	____
STAT 496	STAT 496 Topics			

Proposed Program Major Requirements

MATHEMATICS – STATISTICS MAJOR REQUIREMENTS
(45 semester hours) A 2.5 GPA is required in the major courses. No more than one "D" may be used in completing major requirements.

Core Classes

CSCI 111	Computer Science I	4	____	____

MATH 152	Calculus II	5	____	____
MATH 240	Intro to Advanced Mathematics	4	____	____
MATH 253	Calculus III	4	____	____
MATH 325	Linear Algebra	3	____	____
STAT 351	Mathematical Statistics II	3	____	____
STAT	300 Level or Above	3	____	____
STAT	300 Level or Above	3	____	____
STAT 350	Mathematical Statistics I	3	____	____
STAT 412	Correlation and Regression	3	____	____
MATH	400 Level	3	____	____
STAT	400 Level	3	____	____
MATH 484*	Senior Seminar I	2	____	____
MATH 494*	Senior Seminar II	2	____	____

* In the future, if a 4 credit hour internship program is developed, an internship can substitute for MATH 484 & 494

ii.) Program priorities requiring additional resources

The mathematics program requires at least two, and ideally three, additional tenure-track positions. There is currently only one active mathematics education faculty member. The department could use another mathematics education faculty member to share the responsibilities for teaching the education courses, advising the more than 30 students and supervising student teachers. Currently, Dr. Rick Ott is the only statistician in the department. With the strengthening of the statistics concentration and the recent relatively large number of students interested in that concentration, another tenure-track position in statistics is required to cover the necessary upper-division statistics courses. The resignation in spring 2008, of mathematics professor Dr. Jane Arledge, left us with an open position in Mathematics.

Wubben Hall, the building which houses the mathematics faculty offices and where the majority of mathematics courses are taught, is scheduled to be remodeled in the near future. The following priorities for improving the physical facilities and instructional equipment may be addressed with that remodel. Based on the problems described in section D.iii) of this document, the following bulleted items would greatly enhance development of a mathematics culture that has high expectations, is supportive and encouraging of achievement and is responsive and capable of change within the disciplines encompassed by our department.

- Have 7-10 classrooms friendly to mathematics instruction having adequate board space.
- Expand the Mathematics Project Laboratory.
- Include an open area near faculty offices that can be used as a student study area or a place for faculty to work with students when office space is inadequate. This area should include a Smart Board that allow those students to download what is written on those boards and bookshelves for reference texts donated by faculty for student use.
- Two conference rooms under the control of the Computer Science, Mathematics and Statistics Department with Smart Boards and bookshelves.
- A re-designed dedicated math education classroom that addresses the following items:
  The highly interactive and group-oriented approach to most of our mathematics education courses could benefit greatly from additional technology in the

classroom, such as a SmartBoard and overhead document camera. This equipment would allow students to present their work, both from their written documents and from other media sources. Such presentations prepare the students for their teaching careers and are an integral part of our courses.

The only education-oriented mathematics course taken by our Secondary Education mathematics concentrators is Methods of Teaching Secondary Mathematics (this course is taught by mathematics professors but is listed in the education department). In addition to the technologies mentioned in the previous paragraph, this course would be greatly improved by a networked calculator response system that would expose our students to technology that is currently being used in some of the local secondary schools.

The third course in the mathematics sequence for Elementary Education majors has been piloted as a live-feed interactive distance-learning version. We encountered numerous problems coordinating with the satellite sites but the approach appears to be sound and will likely be repeated in the future. The classroom requires two-way video and audio, a touch-screen computer, and a document camera. Although the MSC library has such a classroom, we would greatly benefit from that communication technology in the mathematics education classroom so that the manipulatives and other teaching materials would be readily accessible. We also need a college-level distance-learning staff person who can effectively arrange all of the coordination needed for such a class, including support for the technology, arrangements for proctoring exams, transport of the educational materials, mechanisms for quickly sending documents back and forth (homework, projects), and agreements between administrations.

- A dedicated exam/quiz room for students making up exams.
- Expanded storage areas for supplies associated with instruction.
- A waiting area incorporated into the department chair and administrative assistant office area.
- Heating and cooling of all rooms that is consistently comfortable and easily adjusted.
- Easier access for challenged students.
- More keycard access points for after-hour use of facilities.

Appendix A

Program Statistics

Table 1A Undergraduate Enrollment by Major Code, Fall Terms 2003 - 2007

Mesa State College

Level	Major Code	Program Name	Academic Year 2003	2004	2005	2006	2007
Baccalaureate							
	3424	Mathematics					
		New Majors	11	15	15	5	16
		Continuing Majors	29	27	24	25	19
			40	**42**	**39**	**30**	**35**
	3428	Mathematics, Elementary Cert					
		New Majors	0	0	0	0	0
		Continuing Majors	1	1	0	0	0
			1	**1**	**0**	**0**	**0**
	3430	Mathematics, Secondary Cert					
		New Majors	13	12	11	17	10
		Continuing Majors	14	15	23	24	24
			27	**27**	**34**	**41**	**34**
	3434	Mathematics-Statistics					
		New Majors	2	0	2	0	0
		Continuing Majors	0	3	0	0	1
			2	**3**	**2**	**0**	**1**
		All Math					
		New Majors	26	27	28	22	26
		Continuing Majors	44	46	47	49	44
			70	**73**	**75**	**71**	**70**

Table 1B Undergraduate Enrollment By Major Code And Student Level

Undergraduate Math Majors, Fall Terms 2003-2007

Level	Major Code	Program Name	Academic Year 2003	2004	2005	2006	2007
Freshman							
	3424	Mathematics	8	14	10	5	7
	3428	Mathematics, Elementary Cert	0	0	0	0	0
	3430	Mathematics, Secondary Cert	10	12	11	15	8
	3434	Mathematics-Statistics	0	0	2	0	0
			18	**26**	**23**	**20**	**15**
Sophomore							
	3424	Mathematics	9	3	9	6	8
	3428	Mathematics, Elementary Cert	0	0	0	0	0
	3430	Mathematics, Secondary Cert	6	5	8	9	9
	3434	Mathematics-Statistics	1	0	0	0	0
			16	**8**	**17**	**15**	**17**
Junior							
	3424	Mathematics	8	10	6	7	8
	3428	Mathematics, Elementary Cert	0	0	0	0	0
	3430	Mathematics, Secondary Cert	3	4	4	6	8
	3434	Mathematics-Statistics	1	0	0	0	0
			12	**14**	**10**	**13**	**16**
Senior							
	3424	Mathematics	15	15	14	12	12
	3428	Mathematics, Elementary Cert	1	1	0	0	0
	3430	Mathematics, Secondary Cert	8	6	11	11	9
	3434	Mathematics-Statistics	0	3	0	0	1
			24	**25**	**25**	**23**	**22**
All Classes							
	3424	Mathematics	40	42	39	30	35
	3428	Mathematics, Elementary Cert	1	1	0	0	0
	3430	Mathematics, Secondary Cert	27	27	34	41	34
	3434	Mathematics-Statistics	2	3	2	0	1
			70	**73**	**75**	**71**	**70**

Table 2 Headcount and Credit Hour Distribution By Term By Course Level

Math and STAT Registrations and Credit Hours by Academic Year - AY 2004 - AY2008

	AY 2004		AY 2005		AY 2006		AY 2007		AY 2008		5 Yr Change (Cr. Hrs)	
	# Students	Credit Hrs	# Students	Credit Hrs	# Students	Credit Hrs	# Students	Credit Hrs	# Students	Credit Hrs	#	%
Remedial - 000	1149	3987	1329	4663	1512	5168	1353	3870	1467	4165	178	4.46%
Lower - 100	1630	6276	1686	6502	1720	6654	1714	6622	1707	6570	294	4.68%
Lower - 200	899	2739	899	2727	782	2385	818	2484	788	2388	-351	-12.81%
Upper - 300	208	613	168	479	113	325	186	546	166	493	-120	-19.58%
Upper - 400	52	146	61	159	54	151	44	122	55	155	9	6.16%
	3938	**13761**	**4143**	**14530**	**4181**	**14683**	**4115**	**13644**	**4183**	**13771**	**10**	**0.07%**

Table 4. Degrees by Level by Program Code
Academic Years 2003 - 2007
Mesa State College

Level	Major Code	Program Name	Degree Attainment				
			2003	2004	2005	2006	2007
Baccalaureate							
BS	3424	Mathematics	4	3	9	7	5
BS	3428	Mathematics, Elementary Cert	2	0	0	0	0
BS	3430	Mathematics, Secondary Cert	4	0	2	2	3
BS	3434	Mathematics-Statistics	0	0	1	0	0
			10	**3**	**12**	**9**	**8**

Table 5A. ONE-YEAR RETENTION RATE By Major code For First-Time Students

Fall 2002 - Fall 2006

Mesa State College

Level	Major Code	Program Name	Retained or Graduated		Not Retained Subsequent Fall		Total	
			#	%	#	%	#	%
Baccalaureate								
	3424	Mathematics	19	82.6%	4	17.4%	23	100.0%
	3428	Mathematics, Elementary Cert	0	-	0	-	0	-
	3430	Mathematics, Secondary Cert	19	70.4%	8	29.6%	27	100.0%
	3434	Mathematics-Statistics	2	100.0%	0	0.0%	2	100.0%
TOTAL			**40**	**76.9%**	**12**	**23.1%**	**52**	**100.0%**

Table 5B. Headcount and Average Cumulative Credit Hours to Degree for Math Majors Graduating AY 2003 - 2007

Type of Entry into MSC	Headcount		Average Cumulative
Baccalaureate			
Student Type			
Began at MSC	27	64.3%	144.2
Transferred in to MSC	15	35.7%	154.2
All Students	**42**	**100.0%**	**147.8**

Table 6. Faculty FTE by Tenure Status, 2005-2008
Mesa State College

	Math	2004-2005 FTE		2005-2006 FTE		2006-2007 FTE		2007-2008 FTE	
		FTE	%	FTE	%	FTE	%	FTE	%
Status									
	Tenure	6.9	35.8%	8.0	37.6%	9.8	66.7%	8.9	61.8%
	Tenure-Track	0.6	3.1%	1.0	4.7%	2.0	13.6%	1.9	13.2%
		7.5	**38.9%**	**9.0**	**42.3%**	**11.8**	**80.3%**	**10.8**	**75.0%**
	FT Instructor	6.0	31.1%	7.0	32.9%	1.9	12.9%	2.1	14.6%
	PT Instructor	5.8	30.1%	5.3	24.9%	1.0	6.8%	1.5	10.4%
All Faculty		**19.3**	**100.0%**	**21.3**	**100.0%**	**14.7**	**100.0%**	**14.4**	**100.0%**

Table 7/8 B. Aggregate Faculty Workload by Appointment Status And Course Type

Mathematics WORKLOAD 2007 - 08

Rank	Course	Instructor	Track	Enrollments	Course CH	Student CH	FTEF	FTES	FTES/FTEF
1 - T/TT	MATH 113	Arledge , Jane	A	30	4.000	120			
1 - T/TT	MATH 151	Arledge , Jane	A	23	5.000	115			
1 - T/TT	MATH 310	Arledge , Jane	A	12	3.000	36			
1 - T/TT	MATH 152	Arledge , Jane	A	10	5.000	50			
1 - T/TT	MATH 380	Arledge , Jane	A	5	3.000	15			
1 - T/TT	MATH 113	Arledge , Jane	A	31	4.000	124			
1 - T/TT	MATH 113	Bonan-Hamada , Catherine	A	34	4.000	136			
1 - T/TT	MATH 152	Bonan-Hamada , Catherine	A	29	5.000	145			
1 - T/TT	MATH 490	Bonan-Hamada , Catherine	A	14	3.000	42			
1 - T/TT	MATH 113	Bonan-Hamada , Catherine	A	41	4.000	164			
1 - T/TT	MATH 119	Bonan-Hamada , Catherine	A	24	5.000	120			
1 - T/TT	MATH 325	Bonan-Hamada , Catherine	A	7	3.000	21			
1 - T/TT	MATH 113	Bonan-Hamada , Edward	A	35	4.000	140			
1 - T/TT	MATH 113	Bonan-Hamada , Edward	A	31	4.000	124			
1 - T/TT	MATH 113	Bonan-Hamada , Edward	A	40	4.000	160			
1 - T/TT	MATH 296	Bonan-Hamada , Edward	A	9	3.000	27			
1 - T/TT	MATH 110	Bonan-Hamada , Edward	A	33	3.000	99			
1 - T/TT	MATH 240	Bonan-Hamada , Edward	A	10	3.000	30			
1 - T/TT	MATH 365	Bonan-Hamada , Edward	A	10	3.000	30			
1 - T/TT	MATH 110	Brock , James	A	40	3.000	120			
1 - T/TT	MATH 110	Brock , James	A	36	3.000	108			
1 - T/TT	MATH 110	Brock , James	A	31	3.000	93			
1 - T/TT	MATH 130	Brock , James	A	13	3.000	39			
1 - T/TT	MATH 110	Brock , James	A	36	3.000	108			
1 - T/TT	MATH 110	Brock , James	A	22	3.000	66			
1 - T/TT	MATH 110	Brock , James	A	33	3.000	99			
1 - T/TT	MATH 119	Davenport , William	A	29	5.000	145			
1 - T/TT	MATH 369	Davenport , William	A	17	3.000	51			
1 - T/TT	MATH 113	Davenport , William	A	44	4.000	176			
1 - T/TT	MATH 113	Davenport , William	A	28	4.000	112			
1 - T/TT	MATH 113	Davenport , William	A	27	4.000	108			

1 - T/TT	MATH 386	Davenport	, William	A	4	4.000	16
1 - T/TT	MATH 113	Friedman	, Theresa	A	27	4.000	108
1 - T/TT	MATH 151	Friedman	, Theresa	A	16	5.000	80
1 - T/TT	MATH 394	Friedman	, Theresa	A	5	1.000	5
1 - T/TT	MATH 484	Friedman	, Theresa	A	6	2.000	12
1 - T/TT	MATH 152	Friedman	, Theresa	A	16	5.000	80
1 - T/TT	MATH 119	Friedman	, Theresa	A	24	5.000	120
1 - T/TT	MATH 494	Friedman	, Theresa	A	4	2.000	8
1 - T/TT	MATH 361	Gustafson	, Philip	A	9	4.000	36
1 - T/TT	MATH 119	Gustafson	, Philip	A	36	5.000	180
1 - T/TT	MATH 240	Gustafson	, Philip	A	12	3.000	36
1 - T/TT	MATH 260	Gustafson	, Philip	A	18	3.000	54
1 - T/TT	MATH 113	Gustafson	, Philip	A	37	4.000	148
1 - T/TT	MATH 146	Gustafson	, Philip	A	13	5.000	65
1 - T/TT	MATH 151	Kavanagh	, J	A	20	5.000	100
1 - T/TT	MATH 325	Kavanagh	, J	A	9	3.000	27
1 - T/TT	MATH 151	Kavanagh	, J	A	34	5.000	170
1 - T/TT	MATH 113	Kavanagh	, J	A	34	4.000	136
1 - T/TT	MATH 460	Kavanagh	, J	A	9	3.000	27
1 - T/TT	MATH 253	Reitenbach	, Markus	A	12	4.000	48
1 - T/TT	MATH 113	Reitenbach	, Markus	A	36	4.000	144
1 - T/TT	MATH 452	Reitenbach	, Markus	A	15	3.000	45
1 - T/TT	MATH 110	Reitenbach	, Markus	A	35	3.000	105
1 - T/TT	MATH 151	Reitenbach	, Markus	A	28	5.000	140
1 - T/TT	MATH 394	Reitenbach	, Markus	A	4	1.000	4
1 - T/TT	MATH 453	Reitenbach	, Markus	A	3	3.000	9
1 - T/TT	MATH 105	Schultz Ela	, Daniel	A	21	3.000	63
1 - T/TT	MATH 205	Schultz Ela	, Daniel	A	14	3.000	42
1 - T/TT	MATH 205	Schultz Ela	, Daniel	A	19	3.000	57
1 - T/TT	MATH 105	Schultz Ela	, Daniel	A	15	3.000	45
1 - T/TT	MATH 121	Schultz Ela	, Daniel	A	16	3.000	48
1 - T/TT	MATH 113	Schultz Ela	, Daniel	A	33	4.000	132
1 - T/TT	MATH 301	Schultz Ela	, Daniel	A	27	3.000	81
1 - T/TT	MATH 121	Wu	, Zhong	A	17	3.000	51
1 - T/TT	MATH 130	Wu	, Zhong	A	13	3.000	39
1 - T/TT	MATH 110	Wu	, Zhong	A	27	3.000	81
1 - T/TT	MATH 360	Wu	, Zhong	A	8	3.000	24

1 - T/TT	MATH 253	Wu	, Zhong	A	12	4.000	48			
1 - T/TT	MATH 113	Wu	, Zhong	A	37	4.000	148			
				A Total	1,509	250.000	5685	**10.42**	**189.50**	**18.19**
1 - T/TT	MATH 397	Arledge	, Jane	B	1	3.000	3			
				B Total	1	3.000	3	**0.13**	**0.10**	**0.80**
1 - T/TT Total					1,510	253.000	5688	**10.54**	**189.60**	**17.99**
3 - FT Temp	MATH 113	Becker	, Robert	A	30	4.000	120			
3 - FT Temp	MATH 113	Becker	, Robert	A	32	4.000	128			
3 - FT Temp	MATH 110	Becker	, Robert	A	34	3.000	102			
3 - FT Temp	MATH 113	Gergely	, Robert	A	34	4.000	136			
3 - FT Temp	MATH 113	Rexroad	, James	A	19	4.000	76			
3 - FT Temp	MATH 113	Rexroad	, James	A	20	4.000	80			
3 - FT Temp	MATH 110	Rexroad	, James	A	7	3.000	21			
3 - FT Temp	MATH 301	Rogers	, Marcus	A	18	3.000	54			
3 - FT Temp	MATH 105	Rogers	, Marcus	A	14	3.000	42			
3 - FT Temp	MATH 113	Rogers	, Marcus	A	26	4.000	104			
3 - FT Temp	MATH 301	Rogers	, Marcus	A	4	3.000	12			
3 - FT Temp	MATH 301	Rogers	, Marcus	A	2	3.000	6			
3 - FT Temp	MATH 301	Rogers	, Marcus	A	2	3.000	6			
3 - FT Temp	MATH 113	Rogers	, Marcus	A	42	4.000	168			
3 - FT Temp	MATH 205	Rogers	, Marcus	A	21	3.000	63			
3 - FT Temp	MATH 105	Rogers	, Marcus	A	20	3.000	60			
				A Total	325	55.000	1178	**2.29**	**39.27**	**17.13**
3 - FT Temp Total					325	55.000	1178	**2.29**	**39.27**	**17.13**
5 - Admin	MATH 340	Barkley	, Cathy	A	2	3.000	6			
5 - Admin	MATH 396	Barkley	, Cathy	A	1	3.000	3			
				A Total	3	6.000	9	**0.25**	**0.30**	**1.20**
5 - Admin Total					3	6.000	9	**0.25**	**0.30**	**1.20**
6 - PT	MATH 113	Kupelian	, Suzanne	A	35	4.000	140			
6 - PT	MATH 110	Moore	, Clifford	A	22	3.000	66			
6 - PT	MATH 110	Moore	, Clifford	A	16	3.000	48			
6 - PT	MATH 113	Pfeufer	, Gary	A	21	4.000	84			
6 - PT	MATH 110	Wethington	, Jerry	A	28	3.000	84			
6 - PT	MATH 110	Wethington	, Jerry	A	31	3.000	93			
				A Total	153	20.000	515	**0.83**	**17.17**	**20.60**
6 - PT Total					153	20.000	515	**0.83**	**17.17**	**20.60**
Grand Total					1,991	334.000	7390	**13.92**	**246.33**	**17.70**

Table 9. COURSES BY COURSE LEVEL BY TERM AY 2008

Level/Course Level	Summer Courses		Fall Courses		Spring Courses		Total Courses	
Undergraduate								
Remedial - 000	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Lower - 100	4	66.7%	34	54.0%	30	51.7%	68	53.5%
Lower - 200	1	16.7%	15	23.8%	14	24.1%	30	23.6%
Upper - 300	1	16.7%	11	17.5%	10	17.2%	22	17.3%
Upper - 400	0	0.0%	3	4.8%	4	6.9%	7	5.5%
	6	**100.0%**	**63**	**100.0%**	**58**	**100.0%**	**127**	**100.0%**
Graduate								
Graduate - 500	0	0.0%	0	0.0%	0	0.0%	0	0.0%
	0	**0.0%**	**0**	**0.0%**	**0**	**0.0%**	**0**	**0.0%**
All Levels	**6**	**100.0%**	**63**	**100.0%**	**58**	**100.0%**	**127**	**100.0%**

Appendix B

Finance and Budget

Table 10. 5 Year Budget Data for 1465 - Mathematics & Statistics

Expenditures	Banner Acct #	2004-2005 $	2004-2005 FTE	2005-2006 $	2005-2006 FTE	2006-2007 $	2006-2007 FTE	2007-2008 $	2007-2008 FTE	2008-2009 $	2008-2009 FTE
Classified Salaries - Reg FT	5006	34,879	0.83	35,750	0.83	36,535	0.83	29,998	1.00	30,917	1.00
Classified Salaries - Reg Pt	5026										
Retirement Classified Staff	5166	3,627		3,718		3,982		3,480		4,004	
Worker's Compensation Insurance	5196										
Tuition Reimbursement (Other Benefits)	5246										
Insurance Classified Staff	5216	3,942		4,351		5,483		3,771		4,943	
Contractual - Reg FT	5256	712,251	15.00	788,916	16.00	813,683	16.20	837,822	16.00	864,227	16.00
Contractual - Summer Faculty	5266										
Contractual - Reg PT	5276										
Contractual - Temp FT	5286	77,300	2.20	108,974	3.00	7,026	0.20	58,174	1.60	29,901	0.80
Contractual - Temp PT	5296	91,390	3.83	75,759	2.81	40,000	0.93	7,800	0.40	7,800	0.40
Retirement Contractual	5466	99,498		109,587		97,375		104,629		106,216	
Insurance Contractual	5516	132,527		126,891		88,438		94,767		102,882	
Worker's Compensation Insurance	5496										
Unemployment	5486										
Wellness (Other Benefits)	5476										
Tuition Reimbursement	5546										
Student Worker's Compensation Ins.	5556										
Federal Workstudy Match	5606										
Student Assistants	5706	1,500		1,545		1,545		1,545		1,545	
Professional Fees	6100										
Employee Travel - In State	6150	9,000		9,600		9,600		10,400		10,400	
Student Travel - In State	6155										
Faculty Supervisory Travel - In State	6151										
Emplloyee Travel - Out of State	6160										

Table 10. 5 Year Budget Data for 1465 - Mathematics & Statistics

Expenditures	Banner Acct #	2004-2005 $	2004-2005 FTE	2005-2006 $	2005-2006 FTE	2006-2007 $	2006-2007 FTE	2007-2008 $	2007-2008 FTE	2008-2009 $	2008-2009 FTE
Student Travel - Out of State	6165										
Software Maintenance	6196										
Supplies	6201	6,209		6,607		6,607		6,607		6,607	
Lights & Gels	6205										
Software Maintenance	6211										
Printing Off Campus	6230										
Telecommunications	6255										
Subscriptions & Books	6310										
Telephone Calls	6401	532		532		532		532		532	
Telephone Equipment	6410	10,944		10,944		10,944		10,944		10,944	
Postage	6430	228		228		228		228		228	
Dues & Membership	6470										
Advertising	6480										
Equipment Repair & Maint.	6501	375		375		375		375		375	
Maintenance Supplies	6550										
Rent/Lease Equipment	6760	5,625		5,625		5,625		5,625		5,625	
Official Functions	6850										
Other Costs	6980										
Professional Development	7150										
Capital Equipment	8090										
Equipment	8100										
Computer Equipment	8101										
Transfer PC replacement	8950										
Restricted Reserve - Course specific fees	8980										
Total Expenditures		1,189,827	21.86	1,289,402	22.64	1,127,978	18.16	1,176,697	19.00	1,187,146	18.20

Table 10. 5 Year Budget Data for 1465 - Mathematics & Statistics

Expenditures	Banner Acct #	2004-2005 $	2004-2005 FTE	2005-2006 $	2005-2006 FTE	2006-2007 $	2006-2007 FTE	2007-2008 $	2007-2008 FTE	2008-2009 $	2008-2009 FTE
Total Classified Salaries		34,879	0.83	35,750	0.83	36,535	0.83	29,998	1.00	30,917	1.00
Total Classified Benefits		7,569		8,069		9,465		7,251		8,947	
Total Exempt Regular Salaries		712,251	15.00	788,916	16.00	813,683	16.20	837,822	16.00	864,227	16.00
Total Exempt Temporary Salaries		168,690	6.03	184,733	5.81	47,026	1.13	65,974	2.00	37,701	1.20
Total Exempt Benefits		232,025		236,478		185,813		199,396		209,098	
Total Hourly		1,500		1,545		1,545		1,545		1,545	
Total Travel		9,000		9,600		9,600		10,400		10,400	
Total OCE		12,437		12,835		12,835		12,835		12,835	
Total Internal Charges		11,476		11,476		11,476		11,476		11,476	
Total Utilities											
Total Learning Materials											
Total Transfers											
Total Capital.											
Grand Total		1,189,827	21.86	1,289,402	22.64	1,127,978	18.16	1,176,697	19.00	1,187,146	18.20

Appendix C

Library Assessment

Library Assessment

(provided by the Library)

Library Program Assessment
John U. Tomlinson Library
Mesa State College

Date of Assessment: April 1, 2008

Purpose of Assessment: Analysis of Library Resources

Program under review: Mathematics

Program Level/s: A. S. and B. S. with 3 concentrations plus 2 minors

Liaison Signature: Assessment done by Paul Rolland

1. Collection Assessment

This program serves a large number of students but has a relatively small amount of majors. The reason for this is the majority of courses offered by the Mathematics Department are designed to fulfill General Education and Science requirements for students in other College programs. For example, of the 90-100 individual courses offered each semester in Math and Statistics, perhaps only 10-20 of them are geared toward majors. Upper division courses (300 and 400 level) account for approximately 5-6% of total credit hours. At any given time the Department has approximately 100 declared majors.

The 3 concentrations for the Bachelors degree are 1) Mathematics, 2) Secondary Teaching of Mathematics, and 3) Statistics. The minors offered are in Mathematics and Statistics. Library resources for this program would include materials on the subjects of mathematics, statistics, algebra, geometry, trigonometry, calculus, linear algebra, differential equations, Euclidean geometry, number theory, ethno-mathematics, numerical analysis, mathematical modeling, discrete structures, mathematics history, topology, abstract algebra, logic, variables, and real analysis.

a. Reference Support

The Library has an adequate number of Reference print titles in mathematics and its related subjects. There are 98 math-related titles on the Reference shelves, 30% are 10 years old or less. In addition, there is excellent reference coverage of the related subject disciplines of physics (34 titles) and computer science (44 titles).

b. Monographic Sources

The circulating book collection has good coverage for the Mathematics program. In the combined subject areas of mathematics, statistics, and their related fields, there are 3,500-4,000 items with over 20% being 10 years old or less.

c. Periodicals

The Library has 20 print periodicals on various aspects of mathematics and statistics, 7 are open subscriptions and 13 are closed. There are also titles in the related areas of physics and computer science. Access to online periodical titles is substantial. There are 500+ online mathematical periodicals available through the Journal Finder. Online databases providing 100% full-text resources for mathematics include OmniFile Select and JSTOR, a repository containing archival coverage of 15 major math journals, some dating back to the 1800s.

d. Electronic Resources

The Library's electronic resources provide excellent coverage for Mathematics subjects. There is a current subscription to MathSciNet, an American Mathematical Society product which provides comprehensive indexing and reviews to literature in mathematics. The general databases Academic Search Premier and Science Direct contain ample current and comprehensive information on the main subject areas of this program. All of these resources are available to students 24/7 from any Internet computer.

2. Evaluation of the total collection

a. Strengths

The Library currently has adequate to good print resources in the subjects relevant to this degree program. It is very strong in electronic resources. The faculty in this Department are very active in selecting new books to add to the Library collection.

b. Weaknesses

No significant weaknesses.

3. Recommendations

Library support of the Mathematics program is extensive. Updating of the print collection with new titles should continue through current budget allocations and faculty recommendations.

Library Director: Elizabeth Brodak Date: 4/1/08

Appendix D

Most Recent Program Review Summary

Summary of 2003 Program Review

Summary of the 2003 Mathematics Program Review

To provide a context for summarizing the previous program review, we begin by listing the previous program goals and supporting objectives. This listing is followed by a brief summary of the discussion given in the previous program review in regards to how the program meets its goals and objectives. Then a review of the strengths and weaknesses outlined in the previous program review is given, followed by the recommendations given at that time and whether these recommendations have been met since then.

Program Goals and Objectives

Note that goals and objectives are included for the mathematics program, the secondary education concentration, the statistics concentration, and for the non-major service component to the mathematics program. The length of this listing reflects the extensive depth and breadth of the role of the mathematics program within the campus and community.

Mathematics Major

Goal: Provide an excellent liberal-arts education in mathematics.

Objectives:

- Develop problem-solving skills.
- Provide students with an understanding of the nature of proof.
- Provide students with powerful logical and critical reasoning skills.
- Provide students with a broad general understanding of mathematics.
- Provide students with a deep understanding in at least one area of mathematics.
- Develop independent learning skills.
- Develop persistence and skill in exploration, conjecture, and generalization.
- Develop skills to implement and use technology, and to understand its limitations.
- Develop professional skills – oral and written mathematical communication skills, cooperative work skills, and professional deportment.
- Increase the number of people proficient in the mathematical sciences to address the crucial shortage of such graduates nationwide.

Mathematics Secondary Education Concentration

Goal: Provide students with the mathematics content and conceptual understanding required to be successful high school teachers.

Objectives:

- Provide professional skills in methods and content to pre-service teachers.
- Expose future teachers to the logical and historical development of mathematical ideas.

Statistics Concentration
Goal: Provide students with more specialized knowledge in statistics.
Objectives:

- Provide students with the ability to utilize a large array of statistical analysis procedures.
- Develop an understanding of the necessary assumptions and correct use of statistical procedures.
- Provide students with an understanding of statistical reasoning and measures of uncertainty.
- Develop skills in the use of statistical software.
- Develop an understanding of the summarization of statistical findings and necessary communication skills, especially when interacting with other professionals.

Non-Majors
Goal: Provide a significant role in support of the liberal-arts mission of Mesa State College by developing students' logical thinking and critical examination skills for all courses of study.
Objectives:

- Provide students with basic numeracy and basic algebraic skills.
- Develop problem-solving skills.
- Develop mathematical language skills.
- Develop logical and critical thinking skills.
- Develop skills to implement and use technology, and to understand its limitations.
- Provide students in other disciplines with the necessary mathematics background for their major coursework.
- Provide students with basic statistical skills.

Summary of Discussion Regarding Goals And Objectives
The 2003 Program Review discusses the ways in which the program addresses each of these goals and objectives. For example, many courses are shown to meet the various objectives and goals. In this way, it is demonstrated that the program is active and vital in fulfilling its role on campus.

Assessment and Analysis of the Program
Certain national assessments are cited regarding the program. For math majors, their MFAT scores are on target with national averages, and steps were recommended (and followed) for better preparing math majors for the MFAT exams. For the math secondary education majors, PLACE scores were used during the review period for content assessment, and pass rates were very favorable. No information was given for the statistics concentration majors, probably because very few students had selected this curriculum route during the review period. The assessment of non-majors was also favorable, as pass rates of Math 113 College Algebra and Math 110 College Mathematics students exceeded national averages for ACT Math cut scores of 18.

The analysis of the program demonstrated a clear demand for the program. Also, the program received overwhelmingly positive reviews from external sources, including an outside review from CU Boulder, and from alumni survey responses.

Strengths Identified in the Program Review

The dedicated and professionally active faculty members were cited as the main strength of the program. A commitment to instruction, both in the classroom and outside, was a demonstrated strength. The alumni reviews collected at that time indicated that each and every respondent specifically acknowledged the high quality and caring faculty. Additionally, the program review pointed out that a large number of refereed publications (21) and presentations (over 100), by both faculty and students, were produced. An international research conference was also hosted by Mesa State and organized by two mathematics faculty members. Grants totaling over $220,000 were obtained by faculty members during the review period. The faculty also was very active in updating and managing the various programs, with demonstrated positive results. The largely student run Math Club was shown to be an active and vital asset to the department.

Weaknesses Identified in the Program Review

The main weaknesses cited stem from lack of resources to conduct the program to its fullest potential. Support for faculty scholarship had diminished, as had the number of faculty since the prior program review period. Meanwhile, the class sizes had increased significantly. These inverted trends clearly made it difficult to give the individual attention and educational opportunities that our students identify with Mesa State College. Software and computing tools were also outdated and in limited supply. Several changes in the program curriculum were also identified as necessary.

Recommendations

Recommendations were given in the program review, falling into two categories: faculty workload and program revisions. These recommendations are listed below, along with a brief statement or description of whether these recommendations have been implanted.

Faculty Workload Recommendations

1. Hire a minimum of two tenure-track faculty members in mathematics education and two tenure-track faculty members in mathematics.

   This recommendation has not been met. One mathematics education tenure-track faculty member was hired, and one mathematics tenure-track faculty member has been hired. There has been a third tenure-track hire, in statistics, but there has also been a corresponding retirement of a tenured statistician in the department.

2. Increase salaries and benefits so that they are more comparable to those of peer institutions.

   This recommendation has been partially met. The college has made an effort to increase salaries.

3. Increase financial support of faculty participation at conferences and workshops.

This recommendation has been met.

4. Provide a projects room for mathematics faculty and their students.

   This recommendation has been met. The Mathematics Project Lab is an easily identifiable success for the mathematics program, as outlined in other places in this review.

5. Provide current technology for both faculty and students.

   This recommendation has been largely met. Some software upgrades have been made, such as with the software Maple. Most faculty members have had a new or upgraded computer and monitor put in their office since the last program review.

Mathematics Program Revisions

1. Eliminate the concentration in computation sciences and the associated courses Math 225 Computational Linear Algebra and Math 425 Computational Abstract Algebra.

   This recommendation has been met.

2. Introduce a Statistics minor.

   This recommendation has been met.

3. Introduce two new courses, a 300-level calculus-based probability course and a 300-level analysis course. The analysis course would be required for students in the secondary education concentration.

   This recommendation has been met. Stat 350 - 351 Mathematical Statistics I & II were introduced, as was Math 352 Advanced Calculus. The Math 352 Advanced Calculus is required for students in the secondary education concentration.

4. Increase the Senior Seminar capstone course (Math 494) from 1 credit hour to 4 credit hours.

   This recommendation has been met. Math 484 and Math 494, at 2 credit hours each, comprise the two-semester Senior Seminar experience required of mathematics majors. This two-semester course has been a big success, for both the students and faculty mentors.

5. Rename the Math 452-453 (currently Advanced Calculus I & II) as Introduction to Real Analysis I & II.

   This recommendation has been met.

Appendix E

Assessment Plan and Results

2002-3 Summary of Assessment Reports & Data for Mathematics & Statistics

Intended Education (Student) Outcomes	Means of Assessment	Results	Use of Results
Students will be prepared to pursue a graduate degree in pure or applied mathematics	1) 75% of students taking MFAT exam will score 140 or above	73% met goal	Consider changes to Secondary Ed concentration, as these were students scoring low
	2) 75% of students applying to grad school will be accepted	Not met since no students applied to grad school in mathematics	N/A
Students will demonstrate the ability to plan and carry out undergraduate research	1) 100% of senior math students will present an undergraduate research project to math faculty	45% met goal	Senior Seminar developed to meet the goal, and tweaking the faculty assessment of the projects needs to be done
	2) A minimum of one publication or presentation at regional or national level will result from project	40% presented at national conference	Determined this means of assessment wasn't adequate, more accessible venue will be considered.
Students will demonstrate skills that enable them to obtain professional licensure	1) 75% of students will pass PLACE exam on first try, 100% on second try	71% passed on first try, 14% passed on second try but some did not try again	Work on a review (formal or informal) for teachers planning to teach
	2) Students will receive ratings from mentor teachers in their field of experiences	100% of students received an A.	N/A

Appendix F

Faculty Vitae

Cathy A. Barkley
P.O. Box 118
Loma, Colorado 81524
eyesofawe@aol.com
cbarkley@mesastate.edu (preferred)

Evening (970)-858-3404/Day (970)-248-1914/Cell (970)-260-8492

EDUCATION

Ph.D., Curriculum & Leadership, Mathematics Education, University of Denver, 1995
M.S., Mathematics Education, Purdue University, 1977
B.S., Mathematics, Southern Nazarene University, 1973

EXPERIENCE

2006-present	Assistant Vice President of Academic Affairs, Mesa State College
2003 – 2006	Director, Center for Teacher Education, Mesa State College
2001 – 2003	Department Chairman, Computer Science, Mathematics & Statistics, Mesa State College
2000 – 2001	Professor of Mathematics, Mesa State College
1995 – 2000	Associate Professor of Mathematics, Mesa State College
1988 – 1995	Instructor of Mathematics, Mesa State College
1985 – 1988	Mathematics Teacher, Department of Defense
1985 – 1988	Mathematics Instructor, Hampton University Extension
1985 – 1988	Mathematics Instructor, City Colleges of Chicago Extension
1984 – 1985	Instructor of Mathematics, Mesa State College
1979 – 1984	Mathematics Teacher, Jefferson County Schools, Colorado
1982 – 1983	Mathematics Instructor, Arapaho Community College, Colorado
1978 – 1979	Mathematics Teacher, Elbert County Schools, Colorado
1977 – 1978	Substitute Teacher, Aurora Schools, Mapleton Schools, Colorado
1975 – 1977	Mathematics and Art Teacher, Benton County Schools, Indiana
1973 – 1974	Mathematics and Art Teacher, Cross High School, South Carolina

PROFESSIONAL MEMBERSHIPS

National Council of Teachers of Mathematics (NCTM)
National Council of Supervisors of Mathematics (NCSM)
North American Study Group for Ethnomathematics (NASGeM)
Treasurer, NASGEM, 2002 – 2005
Association for Supervision and Curriculum Development (ASCD)
National Council for the Accreditation of Teachers of Education (NCATE)
Phi Delta Lambda Honor Society
Kappa Mu Epsilon Mathematics Honor Society
Utah Rock Art Research Association

PROFESSIONAL LICENSE

State of Colorado Professional Teacher License, Secondary Mathematics
Certified Grant Reviewer, Grants Associates, Inc.

HONORS AND AWARDS

Mesa State College Exemplary Administrator Incentive (2007)
NSF Chautauqua Research Participant (2004)
NSF Chautauqua Research Participant (2003)
Mesa State College Outstanding Faculty Member Nomination (2003)
NSF Outstanding Teaching Scholar Nomination (2002)
Department of Defense Outstanding Teacher Merit Award (1988)
Department of Defense Outstanding Teacher Merit Award (1987)
Department of Education National Merit Award (1984)
Arapaho Community College Outstanding Teacher Award (1983)

GRANTS AND FUNDED PROJECTS

Reviewer for Native American and Alaska Native Children in School Program, Department of Education, Office of English Language Acquisition (February 2008).

Reviewer for Alaska Native Education Grants, Department of Education (September 2007).

Primary author, Office of English Language Acquisition (OELA), Department of Education, 5-year funded grant, "Language Acquisition Skills: Professional Development" $1.2 million (Funded July 2007).

Primary author, Colorado Department of Education, 3-year funded grant, (MS3)=Mesa State x Math x Science x Middle School", $165,933 (Funded May 2007).

Reviewer for Native Hawaiian Education Program Grants, Office of Elementary and Secondary Education (May 2007).

Reviewer for Professional Development Grants, Indian Education Discretionary Grants, Department of Education (April 2007).

Reviewer for Teacher Incentive Fund, Department of Education, (September 2006).

Reviewer for Native American Language Acquisition Programs, Office of English Language Acquisition (OELA) , Department of Education (March 2006).

USDA Rural Initiative Distance Learning Grant, $338,000 (2005)

Primary author and principal investigator, Colorado Commission on Higher Education Grant: Foundations of Geometry for Middle School Teachers, $78,000 (2005)

Shideler Center for Experiential Learning: Summer Institute for Teachers: Geology & Geometry of the Colorado Plateau (2005)

Colorado Commission on Higher Education Grant: Foundations of Algebra for Middle School Teachers, $75,000 (2004)

Shideler Center for Experiential Learning: Summer Institute for Teachers: Math & Science in the Mountains (2003)

Department of Education Western Colorado Rural Teacher Preparation Initiative, $115,000 (2003)

Primary author and principal investigator, NSF Calculus Teachers Institute, $50,000 (2003)

Primary author and principal investigator, Colorado Commission on Higher Education Grant: Fostering Liberal Arts Mathematics Education (FLAME), $75,000 (2001)

Primary author and principal investigator, Colorado Commission on Higher Education Grant: A Match Made in Standards, $75,000 (2000).

Utah Mineral Lease Grant, Invited Participant (2000)

TEACHING INTERESTS

Undergraduate Mathematics
Geometries
Ethnomathematics
STEM Initiatives for Education
Teacher Education and In-Service
Integrated Math & Science Studies
Mathematics for Native American Students

RESEARCH INTERESTS

Ethnomathematics
Mathematics for Native American Students
Solstice and Sun Markers of the Fremont
Symmetry Patterns in Ute Beadwork
Geometry of the Maya
Geometry Elements of Native American Traditional Arts

SCHOLARLY PRESENTATIONS

"Navajo Students and Higher Education", Ganado High School, Ganado, Arizona, March 2008.

Panel participant, Rocky Mountain PBS: Colorado State of Mind: "Graduation Requirements and Access to College", August 16, 2007.

"Sun Calendars of the Ancient Puebloans", Gateway Canyons 2007 Academy of Learning, Gateway, CO, July 2007.

"Mathematics is an Attitude", Ethnomathematics Workshop for Navajo Students, Mesa State College, Grand Junction, CO, May 2007.

"Art & Mathematics of the Maya in the Chiapas Region of Mexico," Association of American University Women, Grand Junction, CO, January 2007.

"Strategies for Closing the Achievement Gap in Mathematics for Native American Students," Western Washington State University NSF-funded grant, 2005.

"Using Native Beadwork to Teach Geometry Principles," Western Washington State University NSF-funded grant, 2005.

"Solstice Markers of the Fremont World," Kappa Delta Honor Society, 2005.

"Shideler Center for Learning: Summer Experiences 2005," Western Colorado Math & Science Regional Institute, 2005.

"Sacred Geometry in the Cross Group at Palenque," Mesa State College Mathematics Brown Bag Seminar Series, 2004.

"Shideler Center for Learning: Math in the Mountains," Western Colorado Math & Science Regional Institute, 2004.

"Measurements of the Ancient Maya," Mesa State College Chapter, Sigma Xi, 2003.

"An Evening of Ethnomathematics," Blanding Campus, San Juan Community College, Utah, 2003.

"The Top Five Most Interesting Numbers," Mesa State College Mathematics Brown Bag Seminar Series, 2003.

"Exploring Possibilities to Enrich School Mathematics Experiences Using Ethnomathematics," NCTM National Conference, 2002.

"Fostering Liberal Arts Mathematics for Elementary Teachers," Fifth Annual Mathematics Institute Mini-Conference, NMSU, 2002.

"Cultural Influences in the Teaching and Learning of Mathematics with Native American Students," with James Barta, NCTM National Conference, 2001.

PUBLICATIONS

"The Definition of Mathematics", **The Dictionary,** www.polimetrica.eu, First ed., February 2007.

"Perlen fur gespiegelte Muster", **Spektrum Der Wissenschaft Spezial,** 2006.

"Symetries de perles indennes", **Les Mathematiques Exotiques,** 2005.

Study of Solstice Marker Pictograph Canyon Pintado East Fourmile Draw Site, **Journal of Ethnomathematics**, 2003, 2 – 8.

Other Ways to Count: Aztec Mathematics. **National Council of Teachers of Mathematics Student Math Notes**, 2003, November.

Native American Patterns. In **Perspectives on Indigenous People of North America**, 2002.

A Match Made in Standards: A Professional Development Program for Practicing Elementary Teachers. **National Council of Supervisors of Mathematics Journal of Mathematics Education Leadership**. 2002.

Using Beadwork Designs to Teach Geometry Principles. **International Study Group of Ethnomathematics Newsletter**, 2001, Vol. 16 No. 1.

Geometry Through Beadwork Designs. **National Council of Teachers of Mathematics Teaching Children Mathematics**. 2001, Vol. 7 No. 6.

Honoring Ute Ways: Elementary Mathematics Activities Incorporating Ute Culture, **Utah State University Press** with James Barta. 2001.

Symmetry Patterns of Ute Beadwork. **International Study Group of Ethnomathematics Newsletter**. 1998, Vol 13, No. 2

Native American Patterns. **National Council of Teachers of Mathematics Student Math Notes**. 1997, Vol. 34 No. 2.

ACT Mathematics Item Writer for College Level Exams, 2000 – 2007.

ACT K-12 Mathematics Item Reviewer for State Level Exams, 2004.

Curriculum Vita

Dr. Catherine May Bonan-Hamada

Professor
Department of Computer Science, Mathematics and Statistics
Mesa State College

Education

• Ph.D.	University of Colorado, Boulder	1994	Mathematics
• M.S.	Colorado State University	1988	Mathematics
• B.S.	Colorado State University	1986	Applied Mathematics

Academic Positions

- 2006 - present: Professor, Department of Computer Science, Mathematics, and Statistics, Mesa State College, Grand Junction, Colorado
- 2000 - 2006: Associate Professor, Department of Computer Science, Mathematics, and Statistics, Mesa State College, Grand Junction, Colorado
- 1996 - 2000: Assistant Professor, Department of Computer Science, Mathematics, and Statistics, Mesa State College, Grand Junction, Colorado
- 1994 - 1996: Assistant Professor, Department of Mathematics, Western Oregon State College, Monmouth, Oregon
- 1989 - 1994 Boulder,: Graduate Teaching Assistant, Department of Mathematics, University of Colorado, Colorado
- 1988 - 1989: Visiting Instructor, University of Southern Colorado, Pueblo, Colorado
- 1986 - 1988 Fort: Graduate Teaching Assistant, Department of Mathematics, Colorado State University, Collins, Colorado

Courses Taught

- Mesa State College: College Mathematics, College Algebra, Trigonometry, Precalculus, Honors Mathematics, Calculus I, Calculus II, Introduction to Advanced Mathematics, Linear Algebra I, Linear Algebra II, Complex Variables, Topics: Knot Theory, Calculus Skills and Pedagogy (graduate class for educators), Abstract Algebra I, Abstract Algebra II

- Western Oregon State College: Skills for Life: Mathematics and Technology, College Algebra, Elementary Functions, Introduction to Probability and Statistics, Calculus I, Calculus II, Differential Equations, Linear Algebra I, Linear Algebra II, Complex Analysis, Abstract Algebra II (graduate class for educators), History of Mathematics (graduate class for educators)

- University of Colorado: Calculus I, Calculus II, Calculus III, Mathematics Module Program Lecturer and lab tutor, University Learning Center Instructor for Intermediate Algebra and College Algebra

- University of Southern Colorado: College Algebra, Mathematics for Engineering Technology, Pre-Calculus and Calculus I

- Colorado State University: Calculus for Biologists

Teaching Recognition

- Outstanding Educator Award, Grand Junction Chamber of Commerce, 2005.
- Certificate of Excellence in Education, Associated Student Government, Mesa State College, 2004.
- Outstanding Educator Award, Grand Junction Chamber of Commerce, 2002.
- Burton W. Jones Graduate Student Teaching Excellence Award, University of Colorado, 1992.

Miscellaneous Teaching

- As a member of Alpha Mu chapter of Delta Kappa Gamma Society International, an honor society for teachers, I have had the opportunity to meet once a month with k-12 teachers and discuss the teaching profession. The society has several purposes, some of which are to unite women educators of the world, to advance the professional interest and position of women in education, and to initiate, endorse, and support desirable legislation in the interests of education and of women educators.

- Throughout the year I attended select meetings for the Mesa State, Middle School, Math and Science Partnership, a federally funded (No Child Left Behind) grant through the Colorado Department of Education. The work has been in preparation for my role as a content instructor for middle school teachers participating in the grant in the summers of 2008 and 2009.

Research Publications

- *Stieltjes Continued Fractions for Polygamma Functions; Speed of Convergence* (with W.B.Jones), Journal of Computational and Applied Mathematics, 179, (2005), 47-55.

- *Stieltjes Continued Fractions and Special Functions: A Survey* (with W. B. Jones), Communications in the Analytic Theory of Continued Fractions (eds. C. Bonan-Hamada and P. Gustafson), Volume XII, Summer 2004, 5-68.

- *Para-Orthogonal Laurent Polynomials and the Strong Stieltjes Moment Problem* (with W. B. Jones), Journal of Computational and Applied Mathematics, 105, (1999), 175-185.

- *A Class of Indeterminate Strong Stieltjes Moment Problems with Discrete Distributions* (with W.B. Jones, Olav Njastad and W.J. Thron), Orthogonal Functions, Moment Theory and Continued Fractions: Theory and Applications (eds. W.B.Jones and A. Sri Ranga), Marcel Dekker, New York, (1998), 31-55.

- *Natural Solutions of Indeterminate Strong Stieltjes Moment Problems Derived from PC-Fractions* (with W.B. Jones and Olav Njastad), Orthogonal Functions, Moment Theory and Continued Fractions: Theory and Applications (eds. W.B.Jones and A. Sri Ranga), Marcel Dekker, New York, (1998), 15-30.

- *Observations on Indeterminate Stieltjes Moment Problems* (with W.B. Jones and W.J. Thron), Nonlinear Numerical Methods and Rational Approximation II (ed. Annie Cuyt), Kluwer, (1994), 395-408.

- *Discrete Distribution Functions for Log-normal Moments* (with W.B. Jones, A. Magnus and W.J. Thron), Continued Fractions and Orthogonal Functions: Theory and Applications (eds. S. Clement Cooper and W.J. Thron), Marcel Dekker, (1993), 1-22.

- *Para-orthogonal Laurent Polynomials and Associated Sequences of Rational Functions* (with W.B. Jones, A. Magnus and W.J. Thron), Numerical Algorithms vol.3, (1992), 67-74.

- *Para-orthogonal Laurent Polynomials* (with W.B.Jones and A. Magnus), Approximation Theory (ed. G. Anastassiou), Marcel Dekker, New York, (1992),125-135.

Contributed and Invited Talks

Mathematics Papers Presented

- *Stieltjes Continued Fractions and Special Functions*, August 12, 2003, Conference on Orthogonal Functions and Related Topics, Roros, Norway

- *Numerical Stability in Evaluating Continued Fractions*, May 31, 2001, Handbook project group, University of Antwerp

- *Para-Orthogonal Laurent Polynomials and the Strong Stieltjes Moment Problem*, June 24, 1997, Continued Fractions and Geometric Function Theory Conference, Norwegian University of Science and Technology, Trondheim, Norway

- *More on Natural Solutions of Indeterminate Strong Stieltjes Moment Problems*, June 26, 1996, Workshop on Orthogonal Functions, Moment Theory, Pade Approximants and Applications, Universidade Estadual Paulista, Sao Paulo, Brazil

- *Observations on Indeterminate Stieltjes Moment Problems*, July 27, 1994, Analytic Theory of Continued Fractions and Related Subjects Conference, University of Colorado, Boulder

- *A Special Class of Indeterminate Strong Stieltjes Moment Problems*, September 10, 1993, Nonlinear Numerical Methods and Rational Approximation Conference, University of Antwerp, Belgium

- *A Special Class of Indeterminate Strong Stieltjes Moment Problems*, July 22, 1993, Workshop on the Analytic Theory of Continued Fractions and Related Topics, University of Colorado, Boulder

- *Discrete Distribution Functions for Log-normal Moments*, June 25, 1992, Workshop on Continued Fractions and Orthogonal Functions: Theory and Applications, Loen, Norway

- *Para-orthogonal Laurent Polynomials and Associated Sequences of Rational Functions*, January 16, 1992, International Congress on Extrapolation and Rational Approximation, Tenerife, Canary Islands, Spain

- *Para-orthogonal Laurent Polynomials*, July 3, 1991, Summer Workshop on Pade Approximants and Continued Fractions, University of Colorado, Boulder, and Colorado State University

- *Para-orthogonal Laurent Polynomials*, March 14, 1991, Sixth Annual Southeastern Conference on Approximation Theory, Memphis State University

Other Presentations

- *Teaching College Algebra from a Modeling Perspective*, (with Dr. Tracii Friedman), April 13-14, 2007, 2007 Spring Meeting of the Rocky Mountain Section of the Mathematical Association of America, Colorado State University at Pueblo.

- *Modeling Oriented College Algebra* (with Dr. Tracii Friedman) April 4, 2007, Faculty Colloquium, Mesa State College.

- *To be Continued...Fractions,* October 20, 2006, Mathematics Colloquium, Department of Computer Science, Mathematics and Statistics, Mesa State College.

- *Progress report on Chapters 5, 10, 11, 12, 13*, August 7-8, 2003, Continued Fraction Handbook Workshop IV, Norwegian University of Science and Technology, Trondheim, Norway

- *Progress report on Chapter 5*, January 27-28, 2003, Continued Fraction Handbook Workshop II, Norwegian University of Science and Technology, Trondheim, Norway

- *Why Knot?*, September 13, 2002, Mathematics Colloquium, Department of Computer Science, Mathematics and Statistics, Mesa State College

- *An Introduction to Continued Fractions*, March 8, 2002, Mathematics Colloquium, Department of Computer Science, Mathematics and Statistics, Mesa State College

- *How to be a Great Math Student* (with Phil Gustafson), October 22, 2001, CSEMS Scholarship seminar, Department of Computer Science, Mathematics and Statistics, Mesa State College

- *Rational and Irrational Numbers Using Continued Fractions,* February 15, 1999, District 51 Conference Ensuring the Future with Standards and Assessment, Grand Junction, Colorado

- *A Taste of Continued Fractions*, October 2, 1998, Mathematics Colloquium, Department of Computer Science, Mathematics and Statistics, Mesa State College

- *To Be Continued...Fractions*, October 18, 1996, Mathematics Colloquium, Department of Computer Science, Mathematics and Statistics, Mesa State College

- *An Introduction to Continued Fractions*, Spring 1992, Slow Pitch Colloquium, Department of Mathematics, University of Colorado, Boulder

Conferences/Workshops Attended

- Professional development workshops given by Dr. Linda Nilson, Mesa State College. The titles of the workshops were "The 10 best and 10 worst Teaching Practices" and "Fast and Fair Grading," May, 2007.

- 2007 Spring Meeting of the Rocky Mountain Section of the Mathematical Association of America, April 13-14, 2007, Colorado State University at Pueblo.

- 2006 Spring Meeting of the Rocky Mountain and Intermountain Sections of the Mathematical Association of America, April 7-8, 2006, Mesa State College.

- CRAFTY Workshop: Redesigned College Algebra, Mathematical Association of America, August 1-3, 2005, University of New Mexico, Albuquerque, New Mexico.

- 2004 Spring Meeting of the Rocky Mountain Section of the Mathematics Association of America, April 16-17, 2004, Colorado College, Colorado Springs, Colorado

- Conference on Orthogonal Functions and Related Topics, August 12-15, 2003, Roros, Norway

- Continued Fraction Handbook Workshop IV, August 7-11, 2003, Norwegian University of Science and Technology, Trondheim, Norway

- 2003 Spring Meeting of the Rocky Mountain Section of the Mathematics Association of America, April 25-26, 2003, United States Air Force Academy, Colorado Springs, Colorado
- Java Workshop, April 25, 2003, United States Air Force Academy, Colorado Springs, Colorado
- Continued Fraction Handbook Workshop II, January 27-31, 2003, Norwegian University of Science and Technology, Trondheim, Norway
- State Colleges in Colorado Fall 2002 Professional Development Conference, September 27-28, Mesa State College, Grand Junction, Colorado
- MAA PREP Workshop on Know Theory, June 24-28, 2002, Wake Forest University, Winston-Salem, North Carolina
- State Colleges in Colorado Fall 2001 Professional Development Conference, September 28-29, Holiday Inn, Frisco, Colorado
- 2001: A Mathematics Odyssey, August 6-10, 2001, Mesa State College, Grand Junction, Colorado
- 2001 Joint Mathematics Meetings, January 10-13, 2001, New Orleans, Louisiana
- State Colleges in Colorado Fall 2000 Professional Development Conference, September 29-30, Holiday Inn, Frisco, Colorado
- 2000 Annual Meeting of the Rocky Mountain Section of the Mathematics Association of America, April 7-8, 2000, Colorado State University, Fort Collins, Colorado
- MATHFEST 99, the 1999 Annual Meeting of the Mathematical Association of America, July 31-August 2, 1999, Providence, Rhode Island
- Continued Fractions, Orthogonal Functions and Related Topics: A Celebration of the 80th Birthday of W.J. Thron, May 26-June 4, 1998, University of Colorado, Boulder
- 1998 Annual Meeting of the Rocky Mountain Section of the Mathematics Association of America, April 17-18, 1998 Arapahoe Community College
- Continued Fractions and Geometric Function Theory, June 24-28, 1997, Norwegian University of Science and Technology, Trondheim, Norway
- 1997 Annual Meeting of the Rocky Mountain Section of the Mathematics Association of America, April 11-12, 1997, Metro State College/University of Colorado, Denver
- Workshop on Orthogonal Functions, Moment Theory, Pade Approximants and Applications, June 19-28, 1996, Universidade Estadual Paulista, Sao Jose do Rio Preto, SP, Brazil
- 1996 Annual Meeting of the Pacific Northwest Section of the Mathematics Association of America, March 9, 1996, Reed College, Portland, Oregon
- Analytic Theory of Continued Fractions and Related Subjects, July 18-29, 1994, University of Colorado, Boulder
- Nonlinear Numerical Methods and Rational Approximation, September 5-11, 1993, University of Antwerp, Belgium

- Workshop on the Analytic Theory of Continued Fractions and Related Topics, July 19-23, 1993, University of Colorado, Boulder

- Workshop on Continued Fractions and Orthogonal Functions: Theory and Applications, June 21-July 4, 1992, Loen, Norway

- International Congress on Extrapolation and Rational Approximation, January 13-17, 1992, Tenerife, Canary Islands, Spain

- Summer Workshop on Pade Approximants and Continued Fractions, June 24-July 5, 1991, University of Colorado, Boulder and Colorado State University

- Sixth Annual Southeastern Conference on Approximation Theory, March 14-16, 1991, Memphis State University

Senior Seminar Projects

- 2005-2006, I directed the senior seminar project for Christopher Mowrer. Chris studied applications of complex analysis to fluid flow and presented his results at the Brown Bag Seminar on May 5, 2006
- 2006-2007, I directed a senior seminar project for Caisa Sanburg. Caisa studied some of the classic convergence theorems in the analytic theory of continued fractions. Caisa presented her results at the Brown Bag Seminar on April 27, 2007.
- 2007-2008, I am directing a senior seminar project for Eric Miles. Eric is studying conformal mappings and fluid flow and should complete his project in May, 2008.
- 2002, I mentored Jeff Fowler as he studied the mathematics of the Mandelbrot set for his Senior Seminar research project. Jeff presented his results at a Brown Bag seminar on April 26, 2002.
- 2001, I mentored Murray Fischer as he studied the mathematics of sound for his Senior Seminar research project. Murray presented his results at the poster session of the Student Scholar's Symposium on April 23, 2001. He also gave an oral presentation to the mathematics faculty.

Other Scholarly Activity

- **Referee:** *Computing Orthogonal Rational Functions with Poles Near the Boundary* by J. van Deun, A. Bultheel and Pablo Gonzalez-Vera for Journal of Computers and Mathematics with Applications, 2006.

- **Reviewer**: *College Algebra*, 4th edition, by Stewart, Redlin, Watson for Brooks/Cole Wadsworth Group, May, 2006.

- **Co-Author/Contributor:** Handbook of Continued Fractions, in progress

- **Co-Editor:** *Communications in the Analytic Theory of Continued Fractions*, 1998-present

- **Referee:** *A Christoffel-Darboux formula and a Favard's Theorem for Orthogonal Laurent Polynomials on the Unit Circle* by Ruyman Cruz-Barroso and Pablo Gonzalex-Vera for Journal of Computational and Applied Mathematics, 2004.

- **Co-Editor:** Proceedings of the conference 2001 Mathematics Odyssey, Rocky Mountain Journal of Mathematics, Summer 2003.

- **Conference Co-Organizer:** 2001 Mathematics Odyssey, Mesa State College, August 2001

- **PI NSF Grant:** NSF Proposal requesting funding for *2001 Mathematics Odyssey*, an international research conference that was held at Mesa State College in August 2001. Proposal not funded.

- **Grant Recipient:** 2000 OSC Reallocation Funds, Faculty development summer stipend

- **Referee:** *Inversely Symmetric Interpolatory Quadrature Rules* by E.X.L. de Andrade, C. F. Bracciali and A. Sri Ranga for Acta Applicandae Mathematicae, October 1999

- **Grant Recipient:** 1999 OSC Reallocation Funds, Faculty development summer stipend

- **Conference Co-Organizer:** Continued Fractions, Orthogonal Functions and Related Topics, University of Colorado, Boulder, May 26-June 4, 1998

- **Grant Recipient:** 1998 OSC Reallocation Funds, Faculty development summer stipend

- **Referee:** *Remarks on Canonical Solutions of Strong Moment Problems* by Olav Njastad, for Orthogonal Functions, Moment Theory and Continued Fractions; Theory and Applications, May 1997

- **Grant Recipient:** 1997 Faculty Professional Development Grant to attend the conference Continued Fractions and Geometric Function Theory that was held June 24-28, 1997, in Trondheim, Norway

- **Applicant:** 1996 Travel Grant from the Association for Women I Mathematics, not funded

- **Referee:** *Solutions of the Strong Stieltjes Moment Problems* by Olav Njastad for Methods and Applications of Analysis, February 1995

- **Applicant:** 1994 NSF-NATO Postdoctoral Fellowship to Trondheim, Norway, not funded

Service Highlights

- **Program Review Committee**, Department of Computer Science, Mathematics and Statistics, 2007-2008.

- **Program Review Mathematics Subcommittee** (PRMS), Chair, Department of Computer Science, Mathematics and Statistics, 2007-2008.

- **Course Reorganization Committee** (this task has become one of the charges of the PRMS), Department of Computer Science, Mathematics and Statistics, 2007-2008.

- **Minor in Applied Mathematics Committee** (this task has become one of the charges of the PRMS), Department of Computer Science, Mathematics and Statistics, 2007-2008.

- **Panel on Teaching Effectiveness**, New to Mesa State Orientation, August 13, 2007.

- **Outstanding Mathematics Graduate Selection Committee**, Department of Computer Science, Mathematics and Statistics, 2002-present.

- **MAA Program Committee Chair**, organizational committee for 2006 Spring Meeting of the Rocky Mountain and Intermountain Sections of the Mathematics Association of America. The meeting was hosted by Mesa State College, April 7-8, 2006

- **Grant Participant**, NSF funded grant received by Mathematical Association of America. MSC was chosen as one of eleven colleges and universities in the United States to participate in a study to look at a modeling based approach to teaching College Algebra. I will be teaching both modeling based and traditional lecture sections of College Algebra during Spring and Fall of 2006 as part of this study.

- **Search Committee Chair**, Mathematics Education position, Department of Computer Science, Mathematics and Statistics, Fall 2004-Spring 2005

- **Calendar Committee**, Mesa State College, 2005

- **Judge**, Senior Finals, Mesa State College Science Fair, March 2005

- **Commission on Governance**, an advisory committee to the Board of Trustees of the State Colleges in Colorado, 2001-2003

- **Academic Master Plan Oversight Committee**, Mesa State College, 2001-2004

- **NCA Self-Study Committee on Criterion V: Integrity**, Mesa State College, 2002-2003

- **Handbook Committee**, committee to merge OSC, MSC and UTEC Handbooks, 2004

- **Tenure Committee,** School of Natural Sciences and Mathematics, 2001-2004

- **Advisory Committee**, CSEMS scholarship program, School of Natural Sciences and Mathematics, 2001-2003

- **Member Advisory Committee**, Western Rockies Federal Credit Union, 2002-present

- **Library Mission Statement Committee,** Mesa State College, 2003-2004

- **Member**, Delta Kappa Gamma Society International (honor society for teachers), participate in fund raising activities for scholarship awarded annually to woman seeking degree in education at Mesa State College, 1999-present

- **Club Co-advisor** for Ho'o'lokahi, the MSC Polynesian Club, 1997-present

- **Mentor** for several students who are recipients of the CSEMS Scholarship, 2000-2003

- **Judge**, Junior Finals, Mesa State College Science Fair, March 2001, March 2003

- **Search Committee**, Fall 2001-Spring 2002, Mathematics position, Department of Computer Science, Mathematics and Statistics

- **Faculty Senate Vice President**, Fall 2000-Spring 2001

- **Faculty Senate Representative**, Department of Computer Science, Mathematics and Statistics, Fall 1997-Spring 2001

- **Member of FACT** (Faculty Advisors to the Trustees), Fall 2000-Spring 2001

- **Member**, 2001 and 2002 Interview and Selection Committees for Boettcher Scholarship. The Boettcher Scholarship is the most prestigious merit based scholarship in the state of Colorado, January 2001 and January 2002

- **Calendar Committee**, Mesa State College, 2000-2001
- **Technology Council,** Mesa State College, 1999-2000
- **Advisory Committee,** reorganization of Department of Computer Science, Mathematics and Statistics, 2000-2001
- **Other Committees** for Department of Computer Science, Mathematics and Statistics: Evaluation Criteria Committee, Senior Seminar Committee, Honors Class Committee, Book Committees, Computational Science Program Brochure Committee, Math Graduate Reception
- **Cohort group** participant for *A Match Made In Standards,* a program to provide local elementary teachers with specific mathematics content, 1999-2000
- **Mentor,** Partnership Masters Program for three women who were working on their Masters Degree in Elementary Education with an Emphasis in Mathematics or Science, 1998

Curriculum Vita

Dr. Edward K. Bonan-Hamada
Associate Professor
Department of Computer Science, Mathematics and Statistics
Mesa State College

Education

- **Ph.D.** University of Colorado, Boulder 1996 Mathematics
  Dissertation: *A Bounded Compactness Theorem for L^1-embeddings*
  Advisor: Jerome Malitz
- **M.A.** University of Hawai'i, Manoa 1985 Mathematics
  Advisor: Dale Meyers
- **B.A.** University of Rochester 1977 Biology

Academic Positions

- **2001 - present Associate Professor**, Department of Computer Science, Mathematics, and Statistics, Mesa State College, Grand Junction, Colorado
- **1997 - 2001 Assistant Professor**, Department of Computer Science, Mathematics, and Statistics, Mesa State College, Grand Junction, Colorado
- **1996 - 1997 Adjunct Professor**, Department of Computer Science, Mathematics, and Statistics, Mesa State College, Grand Junction, Colorado
- **Summer 1996 Lecturer**, Department of Mathematics, Western Oregon State College, Monmouth, Oregon
- **Spring 1996 Lecturer**, Department of Social Sciences, Western Oregon State College, Monmouth, Oregon
- **1989 - 1994 Graduate Teaching Assistant**, Department of Mathematics, University of Colorado, Boulder, Colorado
- **1985-1988 Lecturer,** Department of Mathematics, University of Hawai'i, Manoa, Hawai'i
- **1980-1984 Graduate Teaching Assistant**, Department of Mathematics, University of Hawai'i, Manoa, Hawai'i

Courses Taught

- **Mesa State College**: Intermediate Algebra (MATH 091), College Mathematics (MATH 110), College Algebra (MATH 113), Trigonometry (MATH 130), Precalculus (MATH 119) Calculus for Business (MATH 121), Calculus for the Biological Sciences (MATH 146), Introduction to Computer Algebra Systems (MATH 147), Calculus I (MATH 151), Calculus II (MATH 152), Calculus III (MATH 253), Computational

Linear Algebra (MATH 225), Introduction to Advanced Mathematics (MATH 240), Mathematical Modeling (MATH 365), Discrete Structures I (MATH 369), Discrete Structures II (MATH 370), Geometries (MATH 386), Independent Study (MATH 395), Introduction to Topology (MATH 420), Computational Abstract Algebra (MATH 425), Mathematical Logic (MATH 430), Complex Variables (MATH 450), Abstract Algebra I (MATH 490), Abstract Algebra II (MATH 491), Introduction to Statistics (STAT 200) Topics: Computational Mathematical Biology, Logic for Computer Science, Mathematical Logic

- **Western Oregon State College**: Statistics for the Social Sciences, College Algebra
- **University of Colorado**: Calculus I, Calculus II, Calculus III, Quantitative Reasoning and Mathematical Skills 1010, lab tutor Math Modules, University Learning Center Instructor for Intermediate Algebra and College Algebra
- **University of Hawai'i**: College Algebra I and II, Calculus I, Calculus II

Grants

- **OSC Professional Development Fund(1998-1999):** The stipend was used to study theories of truth and their role in the foundations of mathematics
- **OSC Joint Activities Fund (2000-2002):** Part of this grant was used to support activities that linked MSC science and mathematics programs to the MESA/GOAL 5 partnership, which tries to interest District 51 middle school students in mathematics and science. The rest was used to fund the MCM competitions and promote the computational science concentration.
- **OSC Special Incentive Fund (2000-2002):** Stipends for students working on projects, demonstrations and workshops were funded by this grant. Out of this, two workshops were given for middle school students at the Western Slope Science and Mathematics Center; one in chemistry and the other in robotics. Students that were part of this program put on the chemistry workshop. The robotics workshop featured Drs. Macevoy, McCallister and Rybak who were interviewed on local television stations. Students involved in the projects also created displays for the Western Slope Science and Mathematics Center one of which was cellular automata simulation software

Conferences/Workshops Attended

- **2008 Workshop on Logic, Language, Information and Computation,** Heriot-Watt University, Edinburgh, Scotland, UK
- **2007 Spring Meeting of the Rocky Mountain Section of the MAA,** CSU-Pueblo, Pueblo, Colorado
- **2006 Spring Joint Meeting of the Rocky Mountain and Intermountain Sections of the Mathematical Association of America,** Mesa State College, Grand Junction, Colorado

- **2004 Spring Meeting of the Rocky Mountain Section of the Mathematical Association of America, April 16-17, 2004,** Colorado College, Colorado Springs, Colorado
- **2003 Spring Meeting of the Rocky Mountain Section of the Mathematical Association of America, April 25-26, 2003**, United States Air Force Academy, Colorado Springs, Colorado
- **Java Workshop, April 25, 2003,** United States Air Force Academy, Colorado Springs, Colorado
- **North American Summer School in Logic, Language and Information (NASSLLI), June**, Stanford University, Palo Alto, California
- **State Colleges in Colorado Fall 2001 Professional Development Conference, September 28-29**, Holiday Inn, Frisco, Colorado
- **2001: A Mathematics Odyssey, August 6-10, 2001**, Mesa State College, Grand Junction, Colorado
- **2001 Joint Mathematics Meetings, January 10-13, 2001**, New Orleans, Louisiana
- **State Colleges in Colorado Fall 2000 Professional Development Conference, September 29-30**, Holiday Inn, Frisco, Colorado
- **2000 Summer Meeting of the Association for Symbolic Logic, June**, University of Illinois, Champaign-Urbana
- **2000 Annual Meeting of the Rocky Mountain Section of the Mathematics Association of America, April 7-8, 2000**, Colorado State University, Fort Collins, Colorado
- **1998 Annual Meeting of the Rocky Mountain Section of the Mathematics Association of America, April 17-18,** 1998 Arapahoe Community College
- **1997 Annual Meeting of the Rocky Mountain Section of the Mathematics Association of America, April 11-12**, 1997, Metro State College/University of Colorado, Denver

Other Scholarly Activity

- **Directed Student Research:** I have directed Senior Research Projects for six mathematics majors. The last project applied some ideas from cognitive science to refining the notion of 'similarity' in group theory.

Service Highlights

- **District 51 Vertical Alignment Team:** Served as the Mesa State College representative on a team of District 51 teachers attempting to align the mathematics curriculum.
- **SWARM Conference:** I produced the "What is Mathematics " session of the SWARM Conference held at MSC and brought in the keynote speaker for the conference, Dr. Keith Devlin.
- **Advisor Mathematical Contest in Modeling (1998-2003):** 1998 was the first year that MSC fielded a team to compete in the MCM, an international competition where students attempt to create a mathematical model of real-life problems in a weekend. Over the years MSC teams have garnered four Honorable Mentions and one Meritorious ranking.

- **Member of the GOAL5/MESA Partnership (1997-2001):** This business-education partnership with District 51 was committed to improving the participation of students in mathematics, science and engineering by providing opportunities for middle school students to participate in mathematics, science and engineering activities.

RESUME'

JAMES (Jim) R. BROCK

ADDRESS: **729 Shore Circle, #A, Grand Junction, CO 81505**
Home: (970) 245-9157 jnjingj@yahoo.com
Work: (970) 248-1693 jbrock@mesastate.edu

EMPLOYMENT:

1986 - PRESENT

ASSOCIATE PROFESSOR OF ENGINEERING AND ENVIRONMENTAL RESTORATION TECHNOLOGY (Tenured), Mesa State College, Grand Junction, Colorado. Current teaching assignment is within the Math Department. Previous academic assignments included teaching in engineering and math.

Past administrative assignments as Director of Planning (!996 to present) included providing planning services for all areas of the College – academic, administrative, and auxiliary. Work includes producing academic and facilities master plans, program plans for college construction projects, maintaining the campus space inventory, updating existing building and site plans, assisting with campus accreditation activities, managing installation of a computer aided advising program, and coordinating planning with College Trustees and the Colorado Commission on Higher Education. Prior planning assignments also included writing campus wide assessment reports and coordinating with the College Trustees and the Colorado Commission on Higher Education.

1980 - 1986

PROJECT MANAGER, Armstrong & Associates, Inc., Grand Junction, Colorado. Responsible for project management and structural design of industrial, commercial, residential, and civil engineering projects. (Size to $6,000,000)

1977 - 1980

PROJECT MANAGER, Lockwood, Andrews & Newnam, Inc., Houston, Texas. Responsible for project management and structural design for industrial projects. (Size to $20,000,000) Supervised large multi-disciplined design teams and coordinated project activities from beginning design through construction management.

1967 - 1970
1971 – 1974
1976 – 1977

SENIOR PROJECT ENGINEER, Caudill, Rowlett, Scott, Houston, Texas. Responsible for structural design and construction administration of educational, commercial, medical, and residential projects. (Size to $2,000,000,000) Supervised structural design teams for architectural projects and resolved construction problems through both field and office interaction.

1974 - 1976

PROJECT ENGINEER, K/M Associates, Inc, Elkhart, Indiana. Responsible for structural design of educational, commercial, and industrial projects. (Size to $5,000,000)

EDUCATION:

Bachelor of Architecture, University of Illinois, 1967
MS, Architectural Engineering, University of Illinois, 1971
Continuing course work: Mesa State College, 1987 - Present
Colorado State University, 1987 – 1990

LICENSES & REGISTRATIONS:

Architect - Colorado, No. 202134
Engineer - Colorado, No. 17681
5 Year Vocational Credential, Colorado, 2005 - 2010

PROFESSIONAL SOCIETIES & MEMBERSHIPS:

Colorado Independent Publishers Association

INTERESTS:

Cartography, Photography, Painting, Dance, Music

RESUME' **JAMES (Jim) R. BROCK** (continued)

AWARDS:

1st Prize, University of Illinois Student Design Competition, 1963
1st Prize, 1965-1966 Special Competition, National Institute for Architectural Education, University of Illinois
Research & Teaching Assistantship, 1970- 1971. University of Illinois, Department of Architecture
Educational Grant, CRS Foundation, 1970 - 1971
Certified Vocational Mentor, Teacher Induction Program, Colorado State University, 1991
Certificate of Appreciation, American Society of Engineering Education, Rocky Mountain Section, 1991

PARTIAL LIST OF COMPLETED STRUCTURAL DESIGN PROJECTS:

Kishwaukee Community College, Phase I, Malta, Illinois
Waverly Elementary School, Hartford, Connecticut
Anniston Educational Park, Anniston, Alabama
Forestville High School, Chicago, Illinois
Houston Light & Power Energy Control Center, Houston, Texas
Hutchings Sealy Bank, Galveston, Texas
Moraine Valley Community College, Phases 1A & 1B, Palos Hills, Illinois
College of Petroleum & Minerals, Daharan, Saudi Arabia
International School of Islambad, Phase I, Islambad, Pakistan
Opelika High School, Opelika, Alabama
Stephen F. Austin University Stadium, Nagadoches, Texas
Bliss Hall, Youngstown State University, Youngstown, Ohio*
Salanter Akiba Riverdale Academy, Riverdale, New York
Fodrea Community School, Columbus, Indiana
Edward C. Reed High School, Reno, Nevada*
Voc-Tech Building, Laredo Junior College, Laredo, Texas
Doctor's Hospital, Littlerock, Arkansas
Ivan G. Smith Elementary School, Danvers, Massachusetts
Danvers High School, Danvers, Massachusetts*
Elementary School No. 105, Baltimore, Maryland*
Lowell High School Addition, Lowell, Indiana
Northern Middle School, Calvert County, Maryland
Plymouth West Elementary School, Plymouth, Indiana
Walkerton Elementary School, Walkerton, Indiana
Oliver Beach Elementary School, Baltimore, Maryland
Steuben County Middle School, Angola, Indiana
Oldtown Elementary School Addition, Allegheny County, Maryland
Northern High School Addition, Calvert County, Maryland
Tinley Park Elementary School Addition, Tinley Park, Illinois
Crystal Lake Elementary School, Crystal Lake, Illinois
Johnsberg High School, Johnsberg, Illinois
King Abdulaziz Military Academy, Riyadh, Saudi, Arabia
Westinghouse H. I. M. D. Feeder Addition, Round Rock, Texas
Graves Hospital Addition, Galveston, Texas
Victoria Waste Water Treatment Plant Addition, Victoria, Texas
Operations Center, Public Service Company, Grand Junction, Colorado
Grizzly Creek Bridge, Glenwood Canyon, Colorado
* includes construction administration

RESUME' **JAMES (Jim) R. BROCK** (continued)

CONSTRUCTION ADMINISTRATION:
Northshore Medical Center & Office Building, Houston, Texas
Joliet Community College, Phase 1B, Joliet, Illinois
Faculty Office Building, Brockport, NewYork
Maple Hill Elementary School, Hackensack, New Jersey
Parkway Medical Center, Decatur, Alabama
Citizens National Bank, Austin, Texas
Mount Saini Medical Center, Milwaukee, Wisconsin
Cheery Creek, Elementary School, Denver, Colorado
Kishwaukee Community College, Phase II, Malta, Illinois
Colorado River Bridge, Mesa County, Colorado
Redlands Parkway Overpass, Mesa County, Colorado

ARCHITECTURAL PROJECT MANAGEMENT:
Capitol Development Program, American Rice, Houston, Texas
Pipe Threading Facility, NL Petroleum Services, Brian, Texas
Casing Building Complex, The Hydril Company, Houston, Texas
Kettle Restaurant, Grand Junction, Colorado
TT&C Facility, GTE Satellite Corp., Grand Junction, Colorado
Service Center, Joy Manufacturing Company, Grand Junction, Colorado

PAPERS, STUDIES, PUBLICATIONS, PROGRAMS, & PRESENTATIONS. (Author & Editor)

"Program - Casing Building Complex", for The Hydril Company, Lockwood, Andrews & Newnam, Houston, Texas, 1979.
"Planning, Control, & Measurement at LAN", Lockwood, Andrews & Newnam, Houston, Texas, 1980.
"Public Works Facilities Analysis", Mesa County, Colorado, 1987.
"Trends in Engineering Education", Mesa State College, 1988.
"Coping with Technological Change in 2 Year Engineering Technology Programs", 1989 ASEE Proceedings, Vol. 2, P. 493-495, 1989.
"1990 Report, Mesa State College Accountability Program", MSC, 1990.
"1991 Report, Mesa State College Accountability Program", MSC, 1991 . A discussion of the use of ETS (Educational Testing Service) Surveys on the MSC Campus. Printed in "ETS Higher Education Assessment News", 1992
"A Proposal for General Education Assessment at Mesa State College", MSC, 1991
"A Proposal for General Education Assessment at Mesa State College", MSC, 1992
"Proposal for a New Baccalaureate Degree, Bachelor of Science in Environmental Restoration and Waste Management", MSC, 1992
"1992 Report, Mesa State College Accountability Program", MSC, 1992.
"Proposal - Certificate of Completion in Engineering Methods", MSC, 1992
"TK Solver - The Basics", MSC, 1992 (Text)
"TK Solver - The Basics", 1993 Edition, MSC, 1993 (Text)
"1993 Report, Mesa State College Accountability Program", MSC, 1993.
"1994 Report, Mesa State College Accountability Program", MSC, 1994.
"Facilities Master Plan Amendment", MSC, 1995
"Preliminary Program Plan, Walter Walker Fine Arts Center", MSC, 1995
"New Residence Hall Facilities Program Plan", MSC, 1995

JAMES (Jim) R. BROCK (continued)

"Fine & Performing Arts Facilities Program Plan", MSC, 1995
"Assessment Plan", MSC, 1995 (Submission to North Central Association of Colleges and Schools, Commission on Institutions of Higher Education.)
"In Pursuit of Excellence", 1995 Accountability Program Report, MSC, 1995
"In Pursuit of Excellence", 1996 Accountability Program Brochure, MSC, 1996
"Development of a Constituencies Assessment Document for Mesa State College
"Back to Basics", Fourth Annual Colorado Regional Higher Education Assessment Conference, University of Colorado, Boulder, Colorado, 1996
"Elevator Addition to Albers Hall, ADA Project, Facilities Program Plan", MSC, Sept. 1996.
"Facilities Master Plan Amendment Two", MSC 1997.
"Equipment Program Plan, Trustees of the State Colleges in Colorado Mesa State College, and Grand Valley BOCES"; MSC; February 1998
"Assessment, Mesa State College", MSC, February 12 1998. (Presentation)
"Humanities and Social Sciences Program Plan", MSC, May 1998
"Preliminary Facilities Use Plan", MSC, August 1998
"Humanities and Social Sciences Program Plan Amendment One", MSC, August 1998
"Mesa State College Facilities Master Plan", MSC, Feb. 1999
"Technology Infrastructure Program Plan", MSC, May 1999
"Humanities and Social Sciences Program Plan Amendment Two", MSC, May 1999
"Trustee Program Plan, Store Acquisition", MSC, Sept. 1999
"Development Center Program Plan", MSC, December 1999
"Program Plan – Advanced Learning Center", Grand Valley BOCES, August 2001
"Role and Mission Statement", Draft, MSC, October 2001
"Academic Master Plan", MSC, November 2001
"Facilities Master Plan Amendment", MSC, January 2002
"Technology Master Plan Amendment", MSC, January 2002
"Everything You Never Wanted to Know About Assessment and Were Afraid Someone Would Ask", Presentation for Colorado Northwest Community College, Rangely, Colorado, February 2002
"Academic Master Planning – Developing a Guide for the Institution's Primary Role and Mission", Presentation for Colorado Northwest Community College, Rangely, Colorado, April 2002
"Request for Institutional Change to the Higher Learning Commission of The North Central Association of Colleges and Schools - Montrose", MSC, May 2002.
"Request for Institutional Change to the Higher Learning Commission of The North Central Association of Colleges and Schools –Colorado Mountain College", MSC, July 2002.
"Residence Hall Renovation Program Plan", MSC, February 2003
"Role and Mission, Looking Toward the Future", Presentation for the MSC Trustees, September, 2003.

RESUME' **JAMES (Jim) R. BROCK** (continued)

"Change with Excellence, A Self-Study of Mesa State College", Chapter 8 – Request for Institutional Change, and Appendix A – General Institutional Requirements. For the Higher Learning Commission of The North Central Association of Colleges and Schools, MSC, November, 2003.

"Log of Activities for the Self-Study", For the Higher Learning Commission of The North Central Association of Colleges and Schools, MSC, November, 2003.

"Resource Room Organization and Information", For the Higher Learning Commission of The North Central Association of Colleges and Schools, MSC, November, 2003.

"Credit Hour Status Comparison". Presentation developed for Financial and Administrative Services, MSC, for Presentation to the MSC Board of Trustees. March, 2004.

"Conducting a Self-Study During Multiple Institutional Changes". With Gene Starbuck and Duane Hrncir. Published in A Collection of Papers on Self-Study and Institutional Improvement, 2004, Volume 4. The Higher Learning Commission of the North Central Association of Colleges and Schools. 2004, Page 43 – 45. Also Presentation under the same title to the 109th Annual Meeting of the North Central Association March 27-30, 2004, Chicago, Illinois.

"Interim Report – Campbell College Center Expansion Project". Report for the MSC Board of Trustees. April, 2004

"Program Plan – House Demolition and Ground Recovery Project", MSC, August, 2004

The Color of Nothing, Jim Brock, 2007

REFERENCES: **On request**

Maryl B. Case

P.O. Box 195
Collbran, CO
81624
Home phone: 970-487-3252
Cell Phone: 970-260-3291
Fax 970-487-3252
mj_case@earthlink.net

OBJECTIVE

The direction I am anticipating with a new job is to complete my teaching career in your school.. In the last 7 years I have been the only high school math teacher at Plateau Valley School. I have taught all areas of math through calculus during that time. The State exam and ACT scores have increased at the school during my tenure. I was class sponsor every year which included planning the prom and graduation most years, supervising concessions during athletic events, helping with Math Counts, participating in the music program (violinist), helping with the talent show, attending the NCTM conferences in Denver, taking classes with Adams State, and holding office in the local teacher organization.

EMPLOYMENT

JOB TITLE: HIGH SCHOOL MATH TEACHER — YEARS EMPLOYED:2001-2008
Organization: Plateau Valley School District #50 — *Collbran, Colorado*
I taught all high school math courses through calculus.

JOB TITLE: MIDDLE SCHOOL MATH TEACHER — YEARS EMPLOYED: 2000-2001
Organization: Grand Mesa Middle School — *Grand Junction, Colorado*
Mesa County Valley School Dist. #51
I taught 7th grade general and advanced math, reading, and helped with the orchestra.

JOB TITLE: REGULAR AND SPECIAL EDUCATION TEACHER OF GRADES 7-12 — YEARS EMPLOYED: 1999-2000
Organization: Ariel Clinical Services (Miranda Place School) — Grand Junction, Colorado

JOB TITLE: SUBSTITUTE TEACHER — YEARS EMPLOYED: 2000-2001
Organization: Holy Family School and Bookcliff Christian School — Grand Junction, Colorado

JOB TITLE: PRIVATE STUDENTS — YEARS: 1996-1997

JOB TITLE: MATH, AND COMPUTER SOFTWARE CONTINUING ED. INSTRUCTOR — YEARS EMPLOYED:1994-1996
Organization: Western State College — Gunnison, Colorado

JOB TITLE: MATH TEACHER, JUNIOR CLASS SPONSOR, MEMBER OF COMMITTEE TO WRITE MATH STANDARDS FOR THE DISTRICT — YEARS EMPLOYED: 1994-1996
Organization: Gunnison High School — Gunnison, Colorado

JOB TITLE: FULL TIME INSTRUCTOR (MATH, SOFTWARE, EDUCATION CLASSES) — YEARS EMPLOYED: 1990-1994
Organization: Western State College — Gunnison, Colorado

JOB TITLE: MATH TEACHER (GENERAL MATH, ALGEBRA1) — YEARS EMPLOYED: 1984-1990
Organization: Daggett Middle School (Silver Valley Schools) — Yermo, California

JOB TITLE: CHAPMAN COLLEGE EXTENSION INSTRUCTOR OF STATISTICS, TEACHING STRATEGIES (Ed 421, Ed422), TEACHING STRATEGIES FOR MATH AND SCIENCE (Ed 407) YEARS EMPLOYED: 1986-1987

Organization: Chapman College of Orange, CA MCLB, Barstow, California

JOB TITLE: MATH EXTENSION INSTRUCTOR YEAR EMPLOYED: 1983

Organization: Barstow Community College Ft. Irwin, California

JOB TITLE: MATH INSTRUCTOR YEARS EMPLOYED: 1981-1983

Organizations: University of Maryland European Division, Temple University European Division, Big Bend College European Div/, DOD Schools of Bamberg, Germany subst. teacher, and BSEP (Basic Skills Math to GI's)

EDUCATION

DEGREES EARNED: BA. MED+

Institution: San Diego State University (BA), Colorado State University (MEd), Walden University (A.B.D.), University of Northern Colorado (Special Ed. Courses), Adams State College (recent courses)

The degrees were all in mathematics. The BA from SDSU included a science minor.

SKILLS

- Computer Use
- Smart Board and other hands on activities
- Instrumental Music

ORGANIZATIONS AND HONORS:

Member of NEA and CEA, CCTM, included in Who's Who in American Education 1987-1988, past member of Valley Symphony of Delta, CO, High Desert Symphony of Victorville, CA, Bamberg Koncert Orchestra of Loveland, CO, Alpine Syphony Orchestra, Western State College Community Orchestra.

Workshops: Colorado Science Teachers Convention in Grand Junction presentation on "Teaching the Metric System to Beginners" (1979), Western State College Freshman Studies Seminar in Gunnison, CO presentation on "Math Anxiety" (Sept. 3, 1993), "Girls Count" presentation on " Math Anxiety" at WSC (Spring 1995).

RESUME

PERSONAL

Name CLARK ALAN CHILDERS

Address 1516 Guston Street
Delta, CO 81416
(970) 778-5955

Place of Birth Grand Junction, Colorado

EDUCATION

* California State University at Long Beach (1974)
  Degree: Master of Science in Engineering
  Concentration: Structural Mechanics
  Masters Thesis: "Automated Nonlinear Analysis of Net-type Structures"

* California State Polytechnic University, Pomona (1968)
  Degree: Bachelor of Science in Aerospace Engineering
  Senior Project: "Optimum Shape of Cutouts in Thin Sheets Under Various Loading Conditions Using the Imposed Stress Fields as Determining Parameters"

* Nazarene Theological Seminary, Kansas City, MO (1983)
  Certificate of Graduation: Studies for Licensed Minister

* Ordained Elder in Church of the Nazarene (1983)

* Bellflower High School, Bellflower, California (1956)
  Diploma: College Preparation

TEACHING/ENGINEERING EXPERIENCE

* **Northwest Nazarene University,** Nampa, Idaho
  2003– 2008: Senior Fellow in Physics and Engineering, teaching Calculus-based and Algebra-based Physics with labs, Engineering Statics, Structural Mechanics, Survey of Civil Structural Analyses. Supervise students in their Junior/Senior Projects (Seismic Shake Table Design, Model Truss Bridge Analysis and Testing, Finite Element Analysis of Truss Bridges, 440 Acre Colorado Mountain Land Development Project)

* **MESA STATE COLLEGE,** Grand Junction, Colorado
  2001-2003: Lecturer in Mathematics
  Teaching: Beginning Algebra, Intermediate Algebra, College Algebra

* **GRAND JUNCTION FIRST CHURCH OF THE NAZARENE,** Grand Junction,

Colorado

1993-1995: Resident Project Engineer for 21000 sq. foot multipurpose church building

* **MESA STATE COLLEGE,** Grand Junction, Colorado

1992 - 1996. Lecturer in Engineering, Mathematics and Physics
Taught engineering, mathematics and Physics courses
Engineering courses taught: Thermodynamics, Statics, Strength of Materials, Graphical Design, Basic Engineering Drafting, Beginning Computer Aided Drafting, Engineering Materials II (concrete, steel, timber), Civil Drafting I (structural), Civil Drafting II (mapmaking).
Math courses taught: Intro Algebra, Intermediate Algebra, College Math, Trig.
Physics courses taught: General Physics Labs

* **THE UNIVERSITY OF TOLEDO - COMMUNITY TECHNICAL COLLEGE**
Toledo, Ohio

1990 - 1991. Adjunct faculty - Civil Engineering Technology
Duties: Taught structural design courses

* **NORTHWEST TECHNICAL COLLEGE** - Archbold, Ohio

Fall Term, 1990 (Engineering Technology)
Duties: Taught Engineering Statics

* **ENGINEERING CONSULTANT TO SPONSELLER & ASSOCIATES, INC.**
Toledo, Ohio

March 1986 - June 1986
Developed an optimum design of automotive brake system component utilizing a finite element analysis.

* **UNIVERSITY OF DETROIT**
Detroit, Michigan

August 1984 - June 1986
Assistant Professor, Mechanical Engineering Department
Duties: Taught courses in engineering graphical design and engineering mechanics

* **SPONSELLER & ASSOCIATES, INC.**
Toledo, Ohio

April 1984 - July 1984
Engineering Manager
Duties: Responsible for all "in-house" engineering projects.
Supervised office staff of design engineers and draftspersons.
Interfaced with clients.
Performed all analytical requirements for design projects (robotics, specialty machines,
process systems).

* **MONROE COUNTY COMMUNITY COLLEGE**
Monroe, Michigan

Adjunct Faculty Member
Duties: Taught engineering graphics and FORTRAN IV

* **MESA COLLEGE**
Grand Junction, Colorado
August 1982 - December 1983
Adjunct Faculty Member
Duties: Taught engineering graphical design

* **STANLEY AVIATION CORPORATION**
Denver, Colorado
June 1975 - December 1975
Senior Structures Engineer
Duties: Performed all analyses and design functions for the design of the structural requirements for helicopter escape systems including test fixtures.

* **McDONNELL DOUGLAS CORPORATION**
Long Beach, California
April 1969 - June 1975
Senior Structural Mechanics Engineer
Duties: Performed formal stress analyses on various structural components on the DC10 program that were related to the fuselage design. Developed computer programs for the sizing and analyses of the passenger floor beams and for the non-linear analyses of the cargo net for the all-cargo DC10. Performed research analysis for structural damage under an environment of flying metal projectiles.

* **NORTH AMERICAN ROCKWELL CORPORATION, SPACE DIVISION**
Downey, California
February 1967 - September 1968
Member of the Technical Staff II
Duties: Performed formal stress analyses on various structural components of the Apollo 11 Service Module.
Associate Design Engineer with the Facilities Engineering Group
Duties: Applied principles of engineering to the detail design of architectural and mechanical systems including occupancy construction and environmentally controlled "clean rooms".

* **McDONNELL DOUGLAS CORPORATION**
Long Beach, California
January 1965 - February 1967
Associate Engineer/Scientist
Duties: Applied principles of engineering to detail design of airborne equipment, including: cockpit-related secondary structures (jettisonable canopy, instrument panel), hydromechanical systems (rain repellent system), electromechanical systems (pilot control consoles, ECM and weapon delivery controls), optical display systems (extensive research and development of lighted optical displays).

*** DOUGLAS AIRCRAFT COMPANY, INC.**
Long Beach, California
September 1963 - September 1964
"A" Draftsman
Duties: Layout and design of airborne electromechanical control consoles (primarily weapons delivery console controls). Completed all related production drawings and performed required production shop coordination.

*** AUTONETICS**
Downey, California
June 1959 - June 1960
"B" Draftsman
Duties: From engineering electronic schematic layouts: designed and completed all necessary production drawings for packaging of electromechanical ground support equipment.

*** DOUGLAS AIRCRAFT COMPANY, INC.**
El Segundo, California
April 1957 - September 1958
Design Draftsman
Duties: From engineering layouts, completed all necessary production drawings for various cockpit-related equipment.

*** REFERENCES**
Available upon request.

DATA SHEET

PRESONAL

JoDee Childers
1516 Guston Street
Delta, CO 81416
(970) 778-2583

MOST RECENTLY

Teaching Developmental Math at
Northwest Nazarene University
Nampa, Idaho
2003 – 2007

EDUCATION

- University of Toledo, Ohio
  Masters Degree, Secondary Math Education
  August 24, 1991
- Metropolitan State College, Denver, Colorado (1977)
  Major Mathematics
- California State University at Long Beach (1968)
  Secondary Teaching Credential in Mathematics and History
- Pasadena College (now Point Loma), California (1964)
  Bachelor of Arts Degree
  Major: History
  Minor: Mathematics
- Paramount High School, Paramount, California (1960)

TEACHING EXPERIENCE

- Delta High School in Delta, Colorado
  August 2001 to August 2002
  Teacher College Algebra, Precalculus, Calculus, Algebra II
- Western Colorado Consortium for improving teaching in mathematics and English
  August 2000 to June 2001
  Interfaced with mathematics teachers throughout the Western Slope of Colorado on a monthly basis to promote improved delivery of high school mathematics
- Ridgway School in Ridgeway, Colorado
  August 1992 to August 2000
  Teacher of Basic Math, Pre-Algebra, Algebra I, Algebra II, Geometry, Problem Solving, Statistics, Trigonometry, Precalculus, Colorado History, History of the Western Hemisphere
- Mesa State College in Grand Junction, Colorado
  August 1991 to May 1992
  Instructor of Mathematics- Basic Mathematics, Beginning Algebra, College Algebra, College Mathematics, Trigonometry
- Monroe County Community College in Monroe, Michigan
  January 1990 to June 1990
  Instructor of Mathematics- Intermediate and College Algebra

- ❖ Whiteford High School in Ottawa Lake, Michigan
  August 1986 to June 1991
  Teacher of Trigonometry, Precalculus, Algebra I, Geometry, Consumer Math, Computer Science
- ❖ McAuley High School in Toledo, Ohio
  August 1984 to June 1986
  Teacher of Calculus, Algebra I, Algebra II, Introduction to Computers, Computer Programming in BASIC
- ❖ Grand Junction Christian School, Grand Junction, Colorado
  October 1980 to January 1984
  High School Learning Center Monitor: responsible for individual tutoring in Mathematics and Chemistry
- ❖ Mesa County Valley School District 51, Grand Junction, Colorado
  September 1978 to June 1980
  Substitute teacher in all subject areas in middle and senior high schools, but primarily mathematics
- ❖ Cerritos Community College, Cerritos, California
  January 1971 to June 1977
  Instructor of Trigonometry, Algebra I, Intermediate Algebra, and Basic Mathematics
- ❖ Pioneer high School, Whittier, California
  January 1968 to June 1970
  Teacher of Algebra, Geometry, and Basic mathematics

EXTRA-CURRICULAR ACTIVITIES

- ❖ Student Council Advisor, Class Advisor, National Honor Society Advisor, Knowledge Bowl Coach

REFERENCES:

Mark McCallum
Principal, Delta Opportunity High School
mccallum@tds.net

Bob Conder (retired)
Superintendent,
Ridgeway and Norwood Schools
comptex@gwe.net

Cathy Barkley, Vice President of Academic Affairs
Mesa State College
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CURVIT17.s08

I. **PERSONAL INFORMATION:**

A. NAME **WILLIAM HAROLD DAVENPORT**

B. ACADEMIC RANK: Professor of Mathematics

C. Address:

Office Address
CSMS
Mesa State College
Grand Junction, Colorado 81502
Telephone: (970) 248-1824
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Home Address
860 River Ranch Court
Fruita
Colorado 81521
(970) 858-3980

II. **EDUCATION**

Ph.D. Mathematics at the University of Alabama
Dissertation: the Killing form on Malcev algebras
Advisor: Oscar Richard Ainsworth & Byong-Song Chwe

M.S. Major: Mathematics-minor: physics at Texas A & M University
Masters Thesis: the structure of simple Lie algebras with some representations
Masters Thesis Advisor: Ernest Ray Keown

B.S. Engineering Physics at the University of Tennessee

III. **ACADEMIC APPOINTEMENTS AND OTHER SIGNIFICANT WORK EXPERIENCE**

9/88-present MESA STATE COLLEGE, Grand Junction, Colorado
Academic Rank: Professor of math

9/87-9/88 NORTHWESTERN STATE UNIV. OF LOUISIANA, Natchitoches, LA
Academic Rank: Associate Professor (temporary)

9/81-9/87 UNIVERSITY OF ARKANSAS AT LITTLE ROCK, Little Rock, AR
Academic Rank: Associate Professor

9/77-9/81 COLUMBUS COLLEGE, Columbus, Georgia
Academic Rank: Assistant Professor

9/72-9/77 UNIVERSITY OF PETROLEUM & MINERALS, Dhahran, Saudi Arabia
Academic Rank: Assistant Professor

8/71-8/72 U. S. ARMY MISSILE COMMAND, Huntsville, Alabama
Job Title: Mathematician
mathematical simulation techniques of missile systems, statistical analysis of sets of data, digital programming in FORTRAN IV on the CDC 6600, hybrid programming on EAI 640 computer, laser guided missile systems

1967-1971 UNIVERSITY OF ALABAMA, Tuscaloosa, Alabama
Academic Rank: part-time instructor & teaching fellow

I. **PUBLICATIONS, RESEARCH REPORTS, TECHNICAL MEMORANDUMS**

1.On Inner Derivations of Malcev Algebras, *The Rocky Mountain Journal of Mathematics*, Vol. 2, No. 4 (1972) pp. 565-568. MR46#9129

2.Algebraic Lie Algebras, *The Arabian Journal of science & engineering*, Vol. 1, No. 1, (1975) pp. 23-26. MR58#2207

3.Ideals in Simple Rings, *The Journal of the Australian Mathematical Society*, Vol. 25 (Series A), (1978) pp. 322-327. MR58#11053

4."Optical Tolerance Analysis by Statistical Simulation"; 1979 NASA/ASEE Faculty Fellow Research Report-UAH Report No. 227, Contract No. NGT 01-008-21.

5."Monte Carlo Approach to Tolerance Analysis of a Near-diffraction Limited Optical Imaging System"; 1980 NASA/ASEE Faculty Fellow Research Report-Contract No. NGT 01-002-099.

6.The Semigroup $M_2(Z_2)$, *Journal of the Elisha Mitchell Scientific Society*, Vol. 101, (1985) pp. 23-29.

II. **RESEARCH INTEREST**

1. Lie Theory of classical algebras
2. Lie Theory-Lie algebras & Lie groups
3. nonassociative algebras-Malcev, alternative, and Lie algebras
4. history of mathematics
5. representation theory of groups and algebras, in particular algebraic groups
6. number theory-Fermat's last theorem & applications in physics

7. semigroups
8. nonassociative algebra structures in Banach algebras
9. automata and formal languages
10. numerical mathematics
11. mathematical optics
12. mathematical physics

PROFESSIONAL SOCIETIES: American Mathematical Society, Mathematical Association of America, ΣΞ, the scientific research society

HONORS & AWARDS: πμε(math), ΦκΦ, ΣπΣ(physics), κμε(math), National Science Foundation Fellowships in the summers of 1968, 1969, 1970; Marquis Who's Who in Science & Engineering

SELECTED PRESENTATIONS

"Algorithms to Compute Basic and Cobasic Right Congruences", 88th annual summer meeting of AMS, Eugene, Oregon, August 1984.

"Undergraduate Student Organizations," 1990 spring meeting of Rocky Mountain section of MAA, Laramie, Wyoming, April 1990.

"Applied Mathematics", (PANEL) 1990 spring meeting of Rocky Mountain section of MAA, Laramie, Wyoming, April 1990.

"The Hubble Space Telescope: An Application of the Stone-Weierstrass Theorem", 12 April 1991 meeting of Rocky Mountain section of MAA, Greeley, Colorado.

"The Hilbert Space $L^2[a,b]$", lecture given to calculus class at Fruita Mounment high school, 15 May 1991.

"Teaching Real Analysis at a Four Year college", 1992 spring meeting of Rocky Mountain section of MAA, Colorado College, Colorado Springs, Colorado, 10-11 January, 1992.

"The Differential and Matrix Groups", lecture given in Special Session in Honor of John H. Hodges at spring meeting (2-3 April 1993) of Rocky Mountain section of MAA

"Fermat's Last Theorem - a marvelous proof" at the Rocky Mountain meeting of MAA 19 April 1996

16 April 2004 gave a presentation concerning Historical survey of the arithmetic of algebras at the Rocky Mountain section meeting at Colorado College, Colorado Springs, CO.

16 April 2005 gave a presentation concerning *Contribution of Felix Klein & Sophus Lie to Geometry* at the Rocky Mountain section meeting at University of Northern Colorado, Greeley CO.

6 January 2005 lectured on the Cayley-Dickson algebras, Lie theory and arithmetic at the 111th joint mathematics meeting of AMS & MAA in Atlanta, Georgia.

CURRICULUM VITAE

THERESA L. FRIEDMAN
Associate Professor
Department of Computer Science, Mathematics & Statistics
Mesa State College

EDUCATION

LEHIGH UNIVERSITY, Bethlehem, PA

Ph.D. in Mathematics, Functional Analysis: July 1997
M.S. in Mathematics: May 1994

SAINT JOSEPH'S UNIVERSITY, Philadelphia, PA

B.S. in Mathematics: May 1992; Minor: English

PROFESSIONAL EXPERIENCE

MESA STATE COLLEGE, Grand Junction, CO

Professor, 8/08-present, Associate Professor, 8/02-present

Courses taught: Abstract Algebra I & II, Topics in Combinatorics & Graph Theory, Senior Seminar, Introduction to Advanced Mathematics, Calculus I & II, Brown Bag Seminar, Trigonometry, Honors Mathematics, College Algebra, Modeling College Algebra

Curriculum development: Developed and taught newly structured Senior Seminar course; developed and taught restructured College Algebra course from modeling approach

Technology incorporated: Maple, Gyro, Excel, PowerPoint, Word, TeX, Graphing Calculators, and Internet

WILLAMETTE UNIVERSITY, Salem, OR

Assistant Professor, 8/01-5/02

Courses taught: Differential Equations, Introduction to Advanced Mathematics, Calculus I & II

Technology incorporated: Maple, ODE Architect, Graphing Calculators, and Internet

BENEDICTINE UNIVERSITY, Lisle, IL

Associate Professor, 8/00-5/01, Assistant Professor, 8/97-8/00

Courses taught: Real Analysis, Combinatorics & Graph Theory, Modern Geometry, Complex Variables, Calculus I, Calculus II, Calculus Tools Lab, Intermediate Algebra

Curriculum development: Developed and taught new course, Introduction to Proofs

Technology incorporated: DERIVE, WebCT, Geometer's Sketchpad, C++, Graphing Calculators, and Internet

LEHIGH UNIVERSITY, Bethlehem, PA

Lecturer, Spring 1997: Linear Algebra

Teaching Assistant, 8/92-5/95, 8/96-12/96: Calculus I and II, Pre-Calculus, Finite Mathematics

Grader, Summers 1994-1996: Linear Algebra and Differential Equations, Business Calculus, Pre-Calculus

GRANTS

- Selected participant in the Mathematical Association of America's NSF Grant "Renewal of College Algebra," 2005 – 2006
- OCEPT (Oregon Collaborative for Excellence in the Preparation of Teachers) NSF Grant (participant), 2001
- Benedictine University Faculty Research Grant, Summer 2000
- Title III Grant (contributing writer and investigator), 2000
- NALCO Faculty Research Grant, Summer 1999

HONORS and AWARDS

- MSC Distinguished Faculty Award in Advising, 2008
- MSC Exemplary Faculty Award, 2006
- Dixson Scholar and Mentor Award, 2004-2005
- Project NExT Fellow, 1997-1998
- Kappa Mu Epsilon Honor Society, 1998
- Sigma Xi Scientific Research Society, 1997
- Lehigh University Graduate School Fellow, 1995-1996
- Pi Mu Epsilon Honor Society, 1992

PROFESSIONAL DEVELOPMENT

PAPERS

Friedman, Theresa L., Klingsberg, Paul. *Combinatorial Identities by Way of Wilf's Multigraph Model.* International Journal of Mathematics and Mathematical Sciences Vol. 2006, Article ID 96327, 2006.

Friedman, Theresa L. *Relating Strictly Singular and Strictly Cosingular Operators to the Condition* $X < Y$ mod (S, T). Analysis Vol. 22, 347-354, 2002.

Corp, Wendy L., Friedman, Theresa L., Klingsberg, Paul. *Cycles in Random Permutations.* Pi Mu Epsilon Journal Vol. 11 No. 6, 299-305, 2002.

STUDENT RESEARCH COLLABORATIONS

Kitzman, Michael. "Greedy Algorithms." Brown Bag Seminar, Mesa State College: May 4, 2007.

Mowrer, Chris. "Cover Pebbling the Kneser Graphs." Brown Bag Seminar, Mesa State College: November 2004. Supported by Dixson Mentor and Scholar Award: Fall 2004 – Spring 2005.

Johnson, Stephanie. "An Improved Upper Bound for Optimal Pebbling." Brown Bag Seminar, Mesa State College: April 2004.

Mowrer, Chris. "Reaching the Vertices: One Pebble at a Time." Mesa State Student Scholar Symposium: April 2004.

Murray, Michelle. "Underneath It All." Mesa State Student Scholar Symposium: April 2004.

Puckett, Natalie. "The Center of Art." MAA National Meeting, CO: August 2003. (Awarded Outstanding MAA Talk)

Mowrer, Christopher. "Cut the Cake and Eat It Too!." Mesa State Student Scholar Symposium: April 2003.

Balaz, Jesse, Oboka, Isaac. "Music and Continued Fractions." Mesa State Student Scholar Symposium: April 2003.

Corp, Wendy. "Who Has My Hat?." Supported by HHMI and the Luce Foundation for Women in Science

Scholars Program; MAA National Meeting, LA: August 2000. (Awarded Outstanding MAA Talk)

Nijm, Grace. "The Paradox of Gabriel's Horn." Annual meeting of the Association of Colleges of the Chicago Area (ACCA): April 2000.

Powers, Colleen. "The Volume of an *n*-dimensional Sphere." Annual meeting of ACCA: April 2000.

Corp, Wendy. "A Dynamic Puzzle." St. Norbert College Pi Mu Epsilon Regional Undergraduate Math Conference: November 1999.

Panchal, Ripul. "A Study of Algorithms for RNA Sequencing." Supported by Nalco Faculty Research Grant and HHMI Grant: Summer 1999.

Rachal, Therese. "Six Degrees of Separation: The Small World Phenomenon." Annual meeting of ACCA: April 1999.

Freedman, Rachel, Rajesakar, Santhi. "The Fibonacci Numbers." Annual meeting of ACCA: April 1999

Rhodes, Maria Elena. "Parallel Knockouts." Annual meeting of ACCA: April 1999.

Abstracts and Presentations

"Modeling-Oriented College Algebra." Faculty Colloquium, Mesa State College: April 2007. A shortened version of this talk was given at the Rocky Mountain Section MAA meeting held at UC Pueblo in April 2007.

"Teaching College Algebra from a Modeling Perspective." Poster Presentation. AMS-MAA Joint Meetings, LA: January 2009.

"Mathematics and the Mystery of Infinity." Brown Bag Seminar, Mesa State College: January 2005.

"Optimal Pebbling." AMS-MAA Joint Meetings, AZ: January 2004. (Abstract published in AMS proceedings.)

"The Dinitz Conjecture: An Investigation of Partial Latin Squares." Brown Bag Seminar, Mesa State College: October 2002.

"Building a Successful Math Club." AMS-MAA Joint Meetings, LA: January 2001.

"WebCT Showcase."- a series of faculty development presentations. Benedictine University, IL: September 1999.

"The Dinitz Conjecture." Elmhurst College, IL: February 1999.

"Why Should Students Learn the Proof of the Mean Value Theorem in Calculus I—How Should We Assess?" AMS-MAA Joint Meetings, TX: January 1999. (Abstract published in MAA proceedings.)

"Using the WebCT in Calculus Courses." MAA National Meeting, Toronto CN: August 1998.

"Relating Strictly Singular and Strictly Cosingular Operators to the Condition $X < Y \bmod \mathcal{S}$" AMS-MAA Joint Meetings, CA: January 1997. (Abstract published in AMS proceedings.)

Professional Affiliations

- Mathematical Association of America
- Sigma Xi Scientific Research Society
- Pi Mu Epsilon Mathematics Honor Society
- Kappa Mu Epsilon Mathematics Honor Society

Additional Experiences

Organized and Led Invited Workshop: "How to Cultivate a Successful Undergraduate Research Program." MAA Regional Meeting, Mesa State College: April 2006.

Reviewer for the Salas, Hille, and Etgen Calculus text.

Project NExT Fellow

Note: Project NExT is an MAA program comprised of recent Ph.D.'s in the mathematical sciences with the common goal of improving the teaching and learning of undergraduate mathematics.

Session organizer, "Using the Web in Mathematics Courses." MAA National Meeting, Toronto CN: August 1998.
Continued participation in teaching enhancement sessions, workshops and list-serve discussions organized by NExT Fellows.

"Teaching Undergraduate Geometry" workshop participant; Cornell University, 1998, NSF supported.

Faculty consultant to the Educational Testing Service (AP Calculus Reader), 1999 & 2000.

Enrichment courses: Introduction to Computer Science, Data Structures and Algorithms; Benedictine University, 1999.

SERVICE

DEPARTMENT

- Chair, Travel Award Committee, Fall 2004 – Spring 2007
- Math Club Advisor, Spring 1998 – Spring 2001; Fall 2004 – present
- Course Substitution Review Committee, Fall 2004 – present
- Introduction to Advanced Mathematics Textbook Selection Committee, Spring 2006
- Search Committee: Mathematics Tenure Track Position, Fall 2005-Spring 2006
- MAA Regional Conference Planning Committee, Fall 2005 – Spring 2006
- Committee to develop Faculty Evaluation Guidelines for CSMS Department, Fall 2004
- Chair, Senior Seminar Committee, Spring 2004 – Fall 2004

  Developed plan for revised course and wrote curriculum committee proposal
- Chair, Mathematics (six year) Program Review Committee, Fall 2003 – Spring 2004
- Precalculus Textbook Selection Committee, Spring 2004
- Beginning and Intermediate Algebra Textbook Selection Committee, Spring 2004
- Calculus Textbook Selection Committee, Spring 2003
- Committee to review remedial courses, Spring 2003

UNIVERSITY

- Chair, Academic Policies Committee, Fall 2006 – present
- Parking Services Committee, Spring 2007 – present
- Student Orientation Advisor, April 2007
- Technology Governance Committee, Spring 1999 – May 2001

  Chair, Technology Access Subcommittee, Fall 2000 – Spring 2001
- Freshman Advising Program, Spring 1998 – Spring 2001
- Teacher Education Committee, Fall 1997 – Spring 2001
- Science Education Initiative Contributor, Fall 1999 – Spring 2000 (3 hr release time, Spring 2000)
- Search Committee: Mathematics Tenure Track Position, Spring 2000; 2002
- Faculty Development Committee, Fall 1997 – Fall 1999
- Search Committee: VPAA, Spring 1998

EXTERNAL

- MAA (regional) Nominating Committee, Fall 2003 – Spring 2006
  - Chair, Fall 2004 – Spring 2005
- ISMAA Board of Directors, Fall 2000 – Spring 2001
- ACCA Calculus Competition Committee, Spring 1998; 1999

EXTERNAL

- MAA (regional) Nominating Committee, Fall 2003 – Spring 2006
  - Chair, Fall 2004 – Spring 2005

SOFTWARE PROFICIENCY

- Maple, DERIVE, C++, Geometer's Sketchpad, ODE Architect, TeX, Scientific Workplace, Word, Excel, PowerPoint

Appendix G

List of Math and Statistics Courses
Course Offerings by Semester

List of Math and Statistics Courses by Level

100-level
Elem of Math I (105)
Technical Math (108)
College Math (110)
College Algebra (113)
Precalculus (119)
Calc for Business (121)
Math of Finance (127)
Trigonometry (130)
Analytical Geometry (141)
Calc for Biology (146)
Intro to CAS (147)
Honors Math (149)
Calculus I (151)
Calculus II (152)

200-level
Elem of Math II (205)
Comp Lin Alg (225)
Intro to Adv Math (240)
Calc III (253)
Differential Equations (260)
Probability and Statistics (200)

300-level
Methods for elem teach (301)
Euclidean Geometry (305)
Number Theory (310)
Linear Algebra (325)
Ethnomathematics (340)
Advanced Calculus (352)
Methods of Applied Math (360)
Numerical Analysis (361)
Math Modeling (365)
Discrete Structures I (369)
Discrete Structures II (370)
History of Mathematics (380)
Geometries (386)
Math Colloquium (394)
Fourier Series (396)
Statistical Methods (311)
Sampling Techniques (313)
Mathematical Statistics I (350)
Mathematical Statistics II (351)
Biostats (396)

400-level
Topology (420)
Comp Abstract (425)
Logic (430)
Complex Variables (450)
Real Analysis I (452)
Real Analysis II (453)
Linear Algebra II (460)
Senior Seminar I (484)
Abstract Algebra I (490)
Abstract Algebra II (491)
Senior Seminar II (494)
Correlation and Regression (412)
Design and Experiments (425)

Course Offerings by Semester

Fall (Odd)

Precalculus (119)
Calculus I (151)
Calculus II (152)

Intro to Adv Math (240)
Calculus III (253)
Probability and Statistics (200)

Number Theory (310)
Linear Algebra (325)
Methods of Applied Math (360)
Numerical Analysis (361)
Math Colloquium (394)
Fourier Series (396)
Statistical Methods (311)
Mathematical Statistics I (350)

Logic (430)
Real Analysis I (452)
Senior Seminar I (484)
Biostats (396)

Fall (Even)

Precalculus (119)
Calculus I (151)
Calculus II (152)

Intro to Adv Math (240)
Calculus III (253)
Probability and Statistics (200)

Number Theory (310)
Linear Algebra (325)
Advanced Calculus (352)
Methods of Applied Math (360)
Numerical Analysis (361)
Math Colloquium (394)
Statistical Methods (311)
Mathematical Statistics I (350)

Complex Variables (450)
Senior Seminar I (484)
Abstract Algebra I (490)
Design of Experiments (425)

Spring (Even)

Precalculus (119)
Calculus I (151)
Calculus II (152)

Intro to Adv Math (240)
Calculus III (253)
Differential Equations (260)
Probability and Statistics (200)

Linear Algebra (325)
Math Modeling (365)
Discrete Structures I (369)
History of Mathematics (380)
Geometries (386)
Math Colloquium (394)
Sampling Techniques (313)
Mathematical Statistics II (351)

Real Analysis II (453)
Linear Algebra II (460)
Abstract Algebra I (490)
Senior Seminar II (494)
Correlation and Regression (412)

Spring (Odd)

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Mathematical Statistics II (351)

Topology (420)
Real Analysis I (452)
Abstract Algebra II (491)
Senior Seminar II (494)
Correlation and Regression (412)

Math Program Review

External Reviewer Report
by
Dr. Seth Armstrong, Interim Math Chair
Southern Utah University
November 1, 2008

A. Overview and Brief History of the Program

The history and background of the program provided to me in the Self-Study sufficiently informative.

The Math Program at MSC has maintained a constant level of or a climb in program majors at a time when programs nationwide have experienced a trend of decline in Math and Science majors. Although there has been a drop in overall credit hours generated by the Math program – especially at the sophomore and junior levels – this has largely been reflective of trends in higher education generally and loss of certain classes from other programs specifically. Although some of these lost credit hours are beyond the control of the Math program, the faculty should be at the forefront in fighting to maintain rigorous math studies in programs that have used math courses in the past, not only through service to curriculum committees but through excellence in teaching.

There have been many positive changes through the history and development of the Math Program through hiring faculty with terminal degrees, addition of courses that prepare students better and hiring of faculty specializing in Math Education and Statistics which are areas of critical nationwide faculty shortage for the last several years. Addition of a Math Projects Lab is a strong positive.

There have been a few challenges as well during the process of arriving at the current program status. Though the number of distinct courses offered by the Math Program has increased and majors are benefitting by the extra exposure to mathematics, experienced faculty have retired or resigned. Even though new hires have filled these vacancies, every effort should be made to retain experienced faculty unless these are retiring. Additionally, new teaching and study facilities have been needed by the Math Program for quite some time and, thanks to an aggressive building campaign by the President of MSC, these are in the pipeline,

There has been admirable success in being chosen as one of only 11 colleges to participate in the College Algebra Renewal Project and in being a partner of the Mesa State Middle School Math and Science Program. The faculty members that have offered support to these programs are to be congratulated. It is somewhat disappointing that activities which were instigated through the College Algebra Renewal Project were curtailed despite the Project having proven worthwhile as judged by student pass rates. This is one area to consider – as mentioned below – when addressing student pass rates in College Algebra.

B. Curriculum

1. General Comments

Judging by student comments, there is perception of a high degree of non-uniformity in standards

related to the difficulty level of courses depending on who teaches them. The alumni made this claim as well as current students. (The alumni told me to ask faculty to keep their standards high!) All faculty should understand that it is a disservice rather than a benefit to the students to relax standards, especially when the course is a prerequisite to another, such as Calculus I or II, the Intro to Proofs class and the like. This is something that should be addressed as a Program and, if any faculty member giving significantly easier assignments and tests seems to continue this course unchanged, this faculty member should no longer be offered courses where he or she could be a deterrent to the success of students in the program.

On the other hand, all faculty members should avoid the desire to make students spend all of their free study time on their upper-level math class. Careful monitoring of time spent is important to all successful classes.

Second, it is a problem that students are considered to have successfully completed a course in their Math degree with a "D" grade. This is partially taken care of with the GPA requirement, but not completely. The other programs with which I am familiar require a "C" grade in each major course, including all Utah schools and Colorado State University, for example.

Third, it would probably be good to make a decision and write it in policy about acceptable use of technology in all classes where it applies. The fact is that most students will use a calculator for all computations, in their jobs, etc., and that things are changing in this respect. Do all allow calculators to be used in College Algebra? Require a graphing calculator? Teach with a calculator? There is some non-uniformity that makes it hard on the students and should be addressed.

Finally, the Self-Study conclusion that Precalculus should be the uniform prerequisite for Calculus I is positive. Especially in an environment in which faculty is encouraged or even feels pressured to help more College Algebra students get through the course successfully, it is too easy to react by watering down course content, thereby making it very difficult to cover the material, algebra, that composes some 60% of a successful calculus experience. On a case-by-case basis it may be acceptable to allow students into a calculus course after algebra and trigonometry.

Pure Mathematics Concentration

The curriculum for the Pure Math Concentration is very strong for a math program the size of MSCs. Compared to both Arkansas State University and Southern Utah University, MSC students have a real chance of coming through the program more methodically prepared for graduate school through primarily having taken a year-long sequence in either algebra or introductory analysis and through the Senior Seminar.

One weakness in the program – mentioned not only in the Self-Study but specifically by current students – is their lack of preparation for the difficult, proof-based 400-level courses. Math 240 is the proof-writing course and it appeared that several students jumped from this course into the senior-level, rigorous sequences. Based only on comments by the students, there may be a high withdrawal rate from the one-year sequence courses. If this is indeed the case, it would be a shame to lose students interested in the Math degree because of insufficient preparation.

The only *core* course required between Math 240 and the 400-level courses by Pure Math majors is Linear Algebra I (Math 325).

The problem may be resolved by one of the following suggestions.

i. Make sure advising consistently points students to proof-based 300-level courses during the junior year such as Number Theory and Geometries. Make sure that Linear Algebra is a proof-based, rigorous course as well.

ii. Change the year-long sequences of algebra and introductory analysis courses so that the first year is a 300-level course. This would mean combining Advanced Calculus into a course for all concentrations at the 300 level (Math 352 already), then offering one 400-level, continuation Introduction to Analysis course for Pure Math students; and offering an Abstract Algebra I course at the 300 level (which would be a favor to the other concentrations as well – see below) then a terminal Abstract Algebra II course at the 400 level for Pure Math students. Both of the 300-level courses could (re)introduce methods of proof specific to the disciplines then students could finish with advanced coursework in one area as desired.

iii. Switch the Linear Algebra to a 200-level course or turn Computational Linear Algebra into the "regular," now sophomore-level Linear Algebra course. (This would also be a favor to those with Statistics or Teaching Concentrations – see below – as well as a possible way to pick up students in the sciences.) The Math 240 class could then be turned into a highly rigorous, 300-level course that *will* be taken the year before the 400-level sequences. This is how the sequencing is done at Southern Utah University and other small Math programs in the state of Utah.

Statistics Concentration

No weaknesses other than those that were addressed in the Self-Study in Section H.i. were evident.

Generally speaking, students with a Statistics Concentration should be guided to those classes that will favor their computational skills while at the same time remembering that it is a Mathematics degree, meaning that sufficient rigor and proof-based materials should not be largely omitted. Should the time ever come that a B.S. in Statistics is offered at MSC, the highly theoretical math courses could be reconsidered, leaving mostly statistical theory and computation-based math classed in place.

Implementing one recommendation in the Self-Study due to staffing of the Statistics area of the Math Program is problematic: It may not be possible to put off hiring another Ph.D.-level statistician or mathematician with significant research and teaching in statistics for long. Adding Senior Seminar I-II to the Statistics Concentration may require a new faculty position in Statistics. The statistician in the Math Program is already involved in many activities both in the department and in the community (such as MS^3) and would be stretched exceedingly thin under such a change. This should wait until success in hiring another math statistician is achieved.

As I mentioned above, I believe that either recommendation ii or iii under "Pure Mathematics" would be of benefit to Statistics Concentration students as their work arena – and possibly graduate programs to which students are accepted in Statistics – will generally be more of an applied nature.

To have five students prepared for graduation this academic year is an impressive feat.

Secondary Teaching Concentration

The course offerings are sufficient and on the mark for Secondary Teaching Concentration

students.

These students would benefit by either suggestion ii or iii under "Pure Mathematics" as given above. They seem to spend their time dreading Abstract Algebra I their senior year, likely lowering retention of these students. Making them wait this far into their program is something that could be remedied by a lower-level Abstract Algebra course.

The Mathematics Education Coordinator is commended for overseeing this program, including teaching the courses for Secondary Teaching students, overseeing student teaching, and advising a large number of students in this program. He is working hard due to his many duties but still manages to push students through the program.

2. **Math 110, College Mathematics**

This seems to meet the needs of the intended majors from the little that was presented on the subject. It is a fairly standard course for non-science majors.

College Algebra

One could argue for and against direct evidence that the course is meeting the needs of the intended audience.

The fact that many students fail the course may suggest that Math faculty members are maintaining high standards despite pressure to pass students that perform below their expectations. If so, this is a tough position to be in as a faculty member. When faculty members maintain high standards the students that are able to pass are well served by learning the intended materials.

The fact that many students are failing also may attest to the partial failure of faculty to meet the needs of the students; generally, it means that students are not prepared for the rigor of the course.

My recommendations in this regard are

i. Make sure the community college remedial math classes are indeed preparing students to take College Algebra. This will probably take some oversight by a faculty member at MSC.
ii. If allowed by the State of Colorado, make "Intermediate Algebra" – a five-CH course prerequisite to College Algebra – count as an elective with college credit so parents aren't pushing their college kids to save them money by skipping directly to College Algebra. I was surprised to hear that Intermediate Algebra doesn't count for college credit; this seems to me like the single biggest factor attributing to high attrition – maybe along with parents pushing students to take the class unprepared from high school.
iii. Investigate the way the teaching was done under the grant for the College Algebra Renewal Project in which MSC Math faculty participated in 2006. If extra funds are needed, charge a student fee for College Algebra and use it to hire competent Math students as teaching assistants for the course. *Something* good happened there as attrition dropped by 14% in the grant-sponsored classes.
iv. Consider ways to make a "loose requirement" of 23 ACT to take College Algebra. Almost no one with a Math ACT of 19 is ready to take College Algebra and, frankly, this prerequisite is beyond loose. Accuplacer can also tell students/parents whether a student is ready for College Algebra.

v. Faculty should not allow students "expect" to fail. It is inappropriate for a faculty member to tell students during the first week of class that some percentage of them will fail. They are already scared enough about math (and if they weren't unreasonably so before, they would be at that point).

vi. Faculty should probably address with the Registrar and administration what can be done to ensure students aren't taking College Algebra (as an example) as many times as they like.

vii. A College Algebra committee could be established to look at all aspects of attrition. Especially it should be decided what should be the required bare minimum of sections from the common book choice and, if necessary, to establish a common final exam with each College Algebra teacher providing a couple of problems at the end of the semester for the final, then all teachers getting together to grade a problem or two each. This would make sure common standards are established and strengthen the teachers' claim that it is not completely their fault that so many students are failing.

Other courses Seemed to sufficiently meet the needs of the majors served.

3. Math faculty members demonstrate an impressive amount of work in course development. Courses are varied, useful and up-to-date. MSC offers many more distinct topics courses than has been my experience with colleges of similar size.

4. It would be good if future emphasis – only according to faculty ability to establish such a program, probably after hiring another statistics professor or math professor with a good deal of work in financial math and statistics – to have an Actuarial Science program in conjunction with the Statistics Concentration. The job of actuary is consistently ranked in the top ten jobs in the nation in the *Jobs Rated Handbook* and *Occupational Outlook Handbook*. It would be easy to create an Actuarial Math class to prepare students to pass up to two actuarial exams before they graduate. This is sufficiently many to land a job as an actuarial apprentice and work while passing through the exams.

5. No areas of emphasis in the Math Program should be given low priority or discontinued at this time. These areas are all of highest priority to the United States at present and must instead be expanded wherever possible.

6. Duplication of courses is not evident. There is only an overlap where a teaching methods course is listed with an EDUC prefix but is taught by Math faculty that might be addressed.

7. Courses are scheduled at times that work fairly well with the students and the institution. As with all smaller programs in the nation, many times students are delayed in graduating for a year due to courses only being offered every year or two. There is probably no particular way that this can be avoided besides better advising and making sure students never fail a class – an impossible task.

   One student did comment that it was a weakness of the program that faculty members were not always assigned in their Ph.D. disciplines; however, such a comment cannot always be taken at face value since students often have little insight into inner workings of a department.

   Regardless of whether this student was on the mark at all or not, it would be of great benefit to the CSM Department in general and to the Department in particular to at least have a faculty member from Pure Mathematics given a high degree of autonomy regarding scheduling, classroom visits (which the chair is doing by herself at present – a wonderful service she has taken on herself, but

unnecessarily time consuming when a chair can delegate) and program development. Such a faculty member could help decide who will teach what upcoming courses by working directly in conjunction with Program Coordinators in Math Education and Statistics Concentrations, helping free Dr. Payne up for her many other tasks. There was no one given specific responsibility to be a Pure Math Concentration liaison – only the other two concentrations.

8. In meeting with the General Assessment Coordinator that sees that courses are evaluated on three year cycles, while the others are on, at longest, five-year program review cycles, it seems that appropriate assessments are in place to provide continuous improvements as Math courses are not highly dynamic in nature. Also, periodic NCATE accreditation reviews also require consistent course evaluation and revision. One Math faculty member is serving well on the College Assessment Committee, and his continued presence would provide needed continuity there.

B. **A. Students and Student Satisfaction**

1. The numbers of degrees awarded has held relatively constant or improved during a time of decreased nationwide interest in studying advanced mathematics and the sciences. The number of degrees awarded is to be expected for a school the size of MSC. Although it is impressive that MSC's Math Program is not shrinking, it has not kept up with gains in student enrollment. As stated in the Self-Study, this is a nationwide problem.

2. The number of distinct course titles offered is large, especially for approximately 70 Math majors. This is a very nice program for teaching students in all facets of undergraduate mathematics.

3. The Math Program provides sufficiently many FTE student enrollments as per comment 2 above, though there is room for improvement.

4. The Math Program provides a great deal of students with the service courses they need and therefore generates many credit hours for MSC. Despite SUU being a larger school, the Math Department seems to generate fewer CHs from Math classes than those at MSC.

5. The courses have a very good target class size, with many students in the lower-level courses (though not so many that individual attention from faculty is impossible), thinning out into the higher levels, but then still a fairly large enrollment in the upper-level courses due to the way the Math Program staggers their offerings. In fact, they seem to have much larger enrollments in the upper-level courses than we have at SUU. In addition, the Math Faculty will take on students in the Senior Seminar courses without being paid for it – something that is a service not always performed willingly by faculty at other institutions.

6. It is to be expected that most of the Secondary Teaching Concentration students will take teaching jobs immediately after graduation. However, one alumnus, Matt, was currently working toward a M.Ed. degree. Unfortunately, the low pay in teaching is prohibitive; he is taking a job at the Fire Department next year to support a family, a real-life tragedy for his high-school students since he seems very well liked in the teaching profession.

There were other students that were highly enthusiastic about their preparation for graduate math studies. Their skill level could not be immediately ascertained, but considering the curriculum, it seemed that their enthusiasm was not unfounded. They had accomplished a lot in their years in the MSC Math Program.

7. The data were insufficient based on the alumni survey to determine the number of alumni working in a math-related field. Of the four alumni presented, three were working in their field and were highly satisfied with the results of their education, with the only negative expression being that a student wished he'd been trained much more in software and applied problems (this was a statistician).

8. Compared to alumni tracking, contact and assessment at other universities, the assessment plan provided by Math Program faculty at MSC is especially effective. It ensures that students are getting the desired competencies.

9. The assessment survey strongly suggests (with percentages of enthusiastic responses a good deal higher on average than campus-wide numbers) that students did obtain the desired competencies.

10. The Math Program faculty members are making use of assessment data collected. Since data seems to suggest for the most part that they continue to do what they are doing now, this is not difficult.

11. The Math Program might consider an exit survey and maybe an interview as students leave to help with program assessment as well. Apparently, a method is already in place to track alumni (as I commented on in #8) since they received back 18 out of 22 surveys sent out.

12. Students in and graduates of the Math Program seem highly satisfied with the results of their education, with a striking 2/3 saying they would choose this program all over again. The students of the program seem satisfied with it except for the things already mentioned, namely (a) difficulty in jumping from Math 240 into 400-level coursework and having CS 111 scheduled the same time as Math 240 sometimes, (b) Math Teaching Concentration students worries about Math 490 their senior year, (c) the sparse scheduling of necessary coursework which cannot be helped, (d) Math Ed classes are scheduled at "strange times" of the day (according to the students), and (e) the low wages for working as a tutor or grader (which should be addressed). Overall, they were very pleased with their education and the individual attention the constantly received from faculty.

13. Current students felt highly confident of their readiness for graduate work. The collected assessment data pointed to only 33% that said they were ready for graduate work directly out of the Math Program at MSC. However, there is insufficient data to judge from three respondents if this is statistically significant. It is a hard thing for students to leave a smaller math program then go directly into a graduate program; MSC does a good job given how difficult this can be.

14. The students seemed to all be able to obtain employment as desired except for a few that took the survey – with whom I didn't have a chance to meet – saying they hadn't yet found work in a math-related field.

D. Faculty

1. With the exception of the Math Education Coordinator, whose doctoral degree is not in Math Education, all faculty have a background in the topics they teach. This coordinator received his teaching certificate and has attended at least one math teaching conference since the time he was working as a geologist, and due to the difficulty of recruiting faculty in Math Education, the Math Program at MSC is fortunate to have him.

2. A good judgment on part-time faculty. It seems that MSCs standards are quite relaxed for part-time

faculty; it seems that all they need is a Bachelor's Degree with some additional experience, but that departments could make their own standards that are followed by the administration. This criterion is probably not hard to meet when hiring part-time faculty.

However, hiring adjuncts should not be the first way to go as programs immediately start losing credibility when the full-time to adjunct ratio decreases significantly.

Where there are needs in hiring Math Program faculty, it should be attempted to hire a Math Education Ph.D. or E.D. first. A Statistician would be a close second depending on continued enrollment growth in the Statistics Concentration.

3. The faculty is highly interested and exemplary in curriculum revision.

4. It seems that some Math Program faculty have done a good deal of scholarly work and research – whether it be to support teaching and learning or general scholarship. It is impressive that the department publishes a small but international journal on continued fractions. Many faculty members are impressively research-minded for a teaching-oriented university.

   Other faculty have not done much scholarly work; it does not seem to be required that they do. Departmental yearly evaluation criteria allows them to choose to have only 5% of their total evaluation be based on scholarly work, and this work can be entirely non-research (speaking in the traditional sense) oriented. Therefore, there is no reason for them to seek to be more involved in research.

   It speaks highly of many faculty members when these take an interest in overseeing students, without taking extra pay, in the Senior Seminar courses. This is a tremendous opportunity to do scholarly activity that directly affects teaching. This course should probably be balanced among all Math Program faculty equally to give all a chance to participate in research work, which can be hard at a teaching institution and when one is isolated from research groups in one's field of expertise.

5. The level of faculty service to MSC is hard to pin down directly as different ideas from different groups were presented. Faculty members that advise students take on an impressive level of service right there, especially those who are the only advisors for their concentrations. There are many others that serve on committees as asked and more. Some others do not take on as many service assignments.

   It should probably be required on annual reports that faculty give how many hours they spent serving on various committees over the academic year instead of just which committees they served on. This would help make things more uniform in spreading service opportunities across the Math faculty.

   Math Program faculty must be free to push ideas forward unimpeded that they feel (by majority) are best for the Math programs and students. If representation is lacking, it is not only a group of program faculty that suffer, but students as well. A chair can do a lot of good things for a department, but can run out of time very quickly, especially if he or she is trying to balance two disciplines and several concentrations. I am surprised that the current chair has been able to do as much as she does up to this point while still teaching half a course load.

   If CS and Math were either split into two departments (though I realize that this may be completely untenable under MSC budget constraints or other considerations) or if a Pure Math Concentration

faculty member were given a good deal of autonomy to act in the best interests of the students and Math programs at large (as I mentioned above), whatever problems there have been in the past would likely heal quickly. In such an event, Math faculty would be more easily retained, more engaged and would therefore offer service more freely if they are holding back at all now.

One of the ways the Math Program faculty could do their best service is in recruitment efforts. They put a good deal of work in retention of students through the many hours that they spend with them. Recruiting at present seems mostly to be done by a very small number of faculty members together with student efforts, such as during the Math Extravaganza.

Though students are among the best to talk to other students about the programs, faculty are at least as effective with the students and better for the parents to talk to. Additional efforts could be made on MSC campus to bring Math students to the program by

- Establishing collaborative networks with Math Education students who have graduated from MSC and gone to teach at local high schools.
- Inviting high school students on campus to participate in some high-school level mathematics challenges with good prizes and food.
- Really focusing on supporting the Math Extravaganza and making it as big a chance as possible to talk to high school students about pursuing a career in math or stats.
- Holding summer camps where the best math students from the area come and study under one of the faculty members for a week or two out of the summer, with curriculum specifically designed to their tastes with the goal of recruiting.

6. The faculty's participation in professional organizations is adequate for the focus and mission of the MSC.

7. The distribution of efforts related to teaching, professional development and service is adequate in theory from what was presented, though it was not possible to directly observe how these were carried out in practice.

8. For being part of a small university, Math Program faculty have done admirably well in getting grants to MSC. Although the major grant was brought in under one faculty member who has now left, other grants have been secured by current faculty and through MS^3 monies. This is a lot of good work at bringing in funds for a small program

9. Academic backgrounds of faculty members are sufficiently diverse.

E. Resources/Institutional Support

1. Resources seem generally to be adequate to support the goals and objectives of the program.

   a. It seems the operating budget is sufficient to pay for scholarship or travel when needed or desired. Faculty said they usually can get these funds when they want to travel.

   b. With the new building as planned, what were once very cramped quarters and less than desirable teaching locations are being replaced by state-of-the-art facilities from which faculty and students will benefit greatly.

c. The MPL will be moved to a bigger room as well, expanding the role of this very important resource. This must mean that funding is sufficient for its success.

d. Software seems to be a struggle. *Maple* is the only computer algebra system the department has a license to and yet it was ten years between updating between versions. This should be remedied, either by student fees or some other method.

e. There is adequate faculty right now, it seems, besides the need for near-future position growth first in Math Ed and then – a close second depending in enrollments – in statistics.

f. The library resources seem to be excellent, especially with online journals and interlibrary loans.

2. As the program is maintaining fairly constant numbers of students and support classes for the last several years, all indications point to sustaining the program at the current level. This does not mean, however, that no new faculty should be hired when they can be. Every effort should be made to draw new faculty lines instead of hiring adjunct instructors.

3. The faculty and administration should work toward reconciliation, if this is still an issue. This will be one of the best moves that can be made to retain faculty and move successfully into the future, will help to retain faculty and allow the Program and College to work in synchrony.

2008 Math Program Review Rejoinder

Dr. Lori K. Payne, Department Head of CSMS

December 24, 2008

I have just completed scanning the Math Program Review written by Dr. Seth Armstrong. It is generally an excellent and thorough document. However, I came across a few points which need to be clarified/corrected.

1) Dr. Armstrong makes reference to turnover, as if it is a problem in the Mathematics department. In the last five years, there have been two retirements, one after 40 years service. Three faculty left for personal reasons. While not desirable, this is hardly a high turnover rate.

2) While MSC may allow some adjuncts to have Bachelor's degrees only, all Mathematics adjuncts have been required to have a minimum of a Master's degree. That has been true for at least 20 years.

3) All colleges are concerned about College Algebra pass/fail rates, which have been roughly 50% for at least 20 years. The pass rate at MSC 2007/8 was 53% (C and above), 64%+ when D's are counted. This is at worst the same as national rates. Still, MSC math faculty are involved with trying to improve these numbers through advising, use of math software, tutoring, etc. No pressure is put on faculty to pass more students, just to find ways to help more students succeed.

4) On page 10, Dr. Armstrong refers to Maple being 10 years out of date. To the contrary, the department has been purchasing a site license for each of the last 3 or 4 years, so the most up-to-date versions were available to students and faculty.

5) Reference is made to a "Mathematics Education Coordinator" on pages 4, 7 and a "Statistics coordinator" on page 7. There are no such positions. Since we have a single T/TT faculty member in each of these areas, these faculty are included whenever there are discussions in regard to their emphases areas but they do not have any official duties beyond any other faculty member nor do they have any supervisory tasks.

   The math ed faculty member does not teach all the courses for the Secondary Education mathematics majors by himself, nor advise all students, nor does he monitor all mathematics student teachers. A full-time adjunct has been assisting for years; in fact, this adjunct's tenure preceded the current T/TT faculty. Other faculty are hired to monitor student teachers (through the Teacher Education department) and to help teach courses. The mathematics courses for the Secondary Ed math majors are taught by all the math faculty. Only one, one-credit-hour course is required for the Secondary Education Mathematics emphasis area.

6) On page 5 and page 8, there seems to be a misunderstanding on how the Mathematics department functions. The "pure" math faculty – which is the bulk of the math faculty – make the decisions on their program. A committee is formed, with any math faculty able to join, to consider changes in the program or coursework. They decide on what courses will be offered each semester and what course sequences students will be advised to take. Their decision is then put to a vote of the entire mathematics faculty.

7) Classroom visitations are part of the evaluation process. They can be delegated by the department head if he/she wishes but if used as part of the evaluation, they should be done by the evaluator.