2017-2018 WSU Five-Year Program Review
Self-Study

Cover Page

Department/Program: MATHEMATICS

Semester Submitted: FALL 2017

Self-Study Team Chair: Paul Talaga, Department Chair
                              Math Dept, WSU
                              1415 Edvalson St. Dept. 2517
                              Ogden, UTAH, 84408-2517
                              801 626 7038
                              ptalaga@weber.edu

Self-Study Team Members:

Introduction

The Mathematics Department oversees several overlapping areas.

There are three programs (emphases) leading to Bachelor Degrees, BA and BS and a fourth submitted for approval:

Applied Mathematics
Mathematics
Mathematics Teaching
Computational Statistics and Data Science (BS only, in the approval process)

There are two minors, Mathematics, Mathematics Teaching and an Associate's degree.

There are three required math courses for Elementary Education Majors and a program for the same set of majors ("Specialists") consisting of four Math Education (MTHE) courses and two math courses. The latter program allows elementary education graduates to extend their math endorsement to grades 7 and 8.

The courses meeting the General Education Quantitative Literacy (QL) requirement are housed in the department:

MATH 1030 QL, Contemporary Math
MATH 1040 QL, Introduction to Statistics
MATH 1050 QL, College Algebra
MATH 1080 QL, PreCalculus

There is a very large and growing number of concurrent enrollment courses in MATH 1030 QL, and Math 1050 QL.

Math coordinates with the Developmental Mathematics Program (Dev Math) that is responsible for courses that serve as prerequisites for QL courses including MATH 1010, Intermediate Algebra.

Math has 16 faculty members that constitute 14.75 FTE faculty. Each of the Dev Math Instructors (about 14) instructs one QL course a semester. Math employs about 18 Adjunct Instructors teaching about two courses each. The Adjunct Instructor course work is equivalent to 10 regular faculty. Depending on qualifications, adjuncts instruct mostly QL courses, Calculus I, II, and in the summer term Differential Equations.

The faculty members have a diverse set of mathematical areas that span applied math, regular math, math education, and statistics. But these are far from representing all subfields.

Math education has been very important for a very long time. Currently there are only three faculty whose areas are clearly math education, but others have made effective contributions and teach math education courses. Two members are reassigned half time to the Center for Science and Math Education (CSME). The CSME and MATH coordinate efforts to offer courses for in-service teachers

including courses for teachers instructing concurrent enrollment courses and courses that help local school teachers, elementary and secondary maintain math endorsements.

There is one Administrative Assistant and an occasional student hourly worker, about 5 hours per week.

Standard A - Mission Statements
Goals and strategic plans are in appendix three.
WSU Department of Mathematics
Mission Statement
The mathematics department mission is to provide students with the knowledge and problem solving skills necessary to competently integrate mathematics into their personal and professional lives. Faculty endeavor to create an environment that makes that possible. Quality teaching of relevant courses and supervision of student projects including undergraduate research are central objectives.

The mathematics department is committed to providing excellent opportunities for all students: students majoring in mathematics, students majoring in science or engineering fields that depend heavily on mathematics, future teachers, in-service teachers, and all students seeking to improve their quantitative literacy. The department offers curriculum that attends to the needs of the diverse educational and career goals of our students. Since mathematics is relevant to numerous fields, many of our course offerings are designed in a manner sensitive to other disciplines. A common emphasis in all our courses is the process of mathematical thinking and problem solving, as these skills will serve all students during college and for years to come.

Mathematics and mathematics education are rapidly developing fields, and since the best teachers are those who remain active in their discipline, we engage in mathematical and educational research, in service teacher training, and course and curriculum development. Professional and scholarly work is both expected and encouraged.

Updated: 11/20/2017
University Mission Statement for the General Education
QUANTITATIVE LITERACY REQUIREMENT
MISSION – It is the mission of Weber State University to produce graduates that can reason quantitatively within the context of their majors and career goals. This includes understanding information and reasoning that is numerical, geometric, algebraic, graphical, and statistical -- and at the level of sophistication of college algebra.
OBJECTIVES – A quantitatively literate person should be able to:
1. Interpret mathematical models such as formulas, graphs, tables, and schematics, and draw inferences from them.
2. Represent mathematical information symbolically, visually, numerically, and verbally.
3. Use arithmetical, algebraic, geometric, and statistical methods to solve problems.
4. Estimate and check answers to mathematical problems in order to determine reasonableness, identify alternatives, and select optimal results.
5. Recognize that mathematical and statistical methods have limits.
The above mission statement and learning objectives were developed (by the University Curriculum Committee for general education) to meet the goals stated in the 1999 report of the Regents' Task Force on General Education and current USHE policy (R470)
Established by The WSU Faculty Senate, Spring 2011.

Standard B - Curriculum

Course requirements for the Associate's and Bachelor's Degrees are listed in Appendix 2. The files were taken from the 2017-2018 WSU catalog.

Curriculum Maps

Weber State University Applied Mathematics Major (There are six different tracks) Core Courses in Department/Program	Department/Program Learning Outcomes			
	Knowledge of and the ability to apply the concepts of differentiable, integral, and multivariable calculus.	Knowledge of and ability to apply the concepts of matrices and Euclidean vector spaces, and ordinary differential equations.	Knowledge and ability to apply the concepts of several areas of applied mathematics (probability and statistics, numerical analysis, partial differential equations, etc.).	Ability to comprehend and write correct mathematical arguments.
Required lower division all tracks				
MATH 1200 Mathematics Computer Laboratory	L	L	L	M
MATH 1210 Calculus I	H	L	L	M
MATH 1220 Calculus II	H	L	L	M
MATH 2210 Calculus III	H	M	L	M
MATH 2270 Elementary Linear Algebra	M	H	L	M
MATH 2280 Ordinary Differential Equations	H	H	M	M
Each Track requires a different set of the following upper division courses, 12 to 18 credit hours and elective courses				
MATH 3280 Dynamical Systems	M	H	H	M
MATH 3410/3420 Probability & Statistics I & II	M	L	H	M
MATH 3550 Introduction to Mathematical Modeling	M	M	M	M
MATH 3610 Graph Theory	L	L	M	M
MATH 3620 Enumeration	L	L	M	M

Weber State University Applied Mathematics Major (There are six different tracks) Core Courses in Department/Program	Department/Program Learning Outcomes			
	Knowledge of and the ability to apply the concepts of differentiable, integral, and multivariable calculus.	Knowledge of and ability to apply the concepts of matrices and Euclidean vector spaces, and ordinary differential equations.	Knowledge and ability to apply the concepts of several areas of applied mathematics (probability and statistics, numerical analysis, partial differential equations, etc.).	Ability to comprehend and write correct mathematical arguments.
MATH 3710 Boundary Value Problems	M	H	H	M
MATH 3810 Complex Variables	H	L	M	M
MATH 4610/4620 Numerical Analysis I & II	M	M	H	M
MATH 4710 Partial Differential Equations	M	H	H	M

Note: The letters indicate the impact or relevance of the course for the Learning Outcome: L= Low, M= Medium, H= High

Weber State University Math Teaching Major Core Courses in Department/Program	Program Learning Outcomes				
	Knowledge of and the ability to apply the concepts of differentiable, integral, and multivariable calculus.	Knowledge of and ability to apply the concepts of matrices and Euclidean vector spaces, and ordinary differential equations.	Ability to comprehend and write proofs that are logically, grammatically, and mathematically correct.	Knowledge of basic probability and statistics, analysis, and number theory.	Knowledge of and ability to teach concepts of high school level mathematics.
MATH 1210 Calculus I	H	L	L	L	L
MATH 1220 Calculus II	H	L	L	L	L
MTHE 2120 Geometry from a Teaching Perspective	L	L	H	L	H
MATH 2210 Calculus III	H	M	L	L	L

| Weber State University Math Teaching Major

Core Courses in Department/Program	Program Learning Outcomes				
	Knowledge of and the ability to apply the concepts of differentiable, integral, and multivariable calculus.	Knowledge of and ability to apply the concepts of matrices and Euclidean vector spaces, and ordinary differential equations.	Ability to comprehend and write proofs that are logically, grammatically, and mathematically correct.	Knowledge of basic probability and statistics, analysis, and number theory.	Knowledge of and ability to teach concepts of high school level mathematics.
MATH 2270 Elementary Linear Algebra	M	H	M	L	L
MATH 2280 Ordinary Differential Equations	H	H	L	L	L
Or Math 3550 Introduction to Mathematical Modeling	M	M	L	M	L
MATH 3110 Foundations of Algebra	L	L	H	M	L
or MATH 4110 Modern Algebra I	L	L	H	M	L
MATH 3120 Foundations of Euclidean & non-Euclidian Geometry	L	L	H	L	L
MATH 3160 Number Theory	L	L	H	H	L
MATH 3410 Probability & Statistics	M	L	L	H	L
MATH 4210 Introduction to Real Analysis	H	M	H	H	L
MTHE 3010 Methods & Technology for Teaching Secondary Mathematics	L	L	L	L	H
MTHE 4110 Algebra from a Teaching Perspective	L	L	M	L	H
MTHE 4010 Capstone Mathematics for High School Teachers	M	L	M	M	M

Weber State University Mathematics Major (Regular Emphasis) Core Courses in Department/Program	Department/Program Learning Outcomes			
	Knowledge of and the ability to apply the concepts of differentiable, integral, and multivariable calculus.	Knowledge of and ability to apply the concepts of matrices and Euclidean vector spaces, and ordinary differential equations.	Ability to comprehend and write proofs that are logically, grammatically, and mathematically correct.	Knowledge of and ability to prove results in analysis and algebra.
MATH 1210 Calculus I	H	L	L	L
MATH 1220 Calculus II	H	L	L	L
MATH 2210 Calculus III	H	M	L	L
MATH 2270 Elementary Linear Algebra	M	H	M	M
MATH 2280 Ordinary Differential Equations	H	H	L	L
MATH 4110 Modern Algebra I	L	M	H	H
MATH 4120 Modern Algebra II	L	M	H	H
or MATH 4320 Topology	L	M	H	M
MATH 4210/4220 Introduction to Real Analysis I & II	H	H	H	H

Note: The letters indicate the impact or relevance of the course for the Learning Outcome: L= Low, M= Medium, H= High

Standard C - Student Learning Outcomes and Assessment

Program Learning Outcomes for Major by Emphasis

Mathematics Major (Regular Emphasis): Students who receive bachelor degrees in Mathematics at Weber State University will have:
1. Knowledge of and the ability to apply the concepts of differentiable, integral, and multivariable calculus.

2. Knowledge of and ability to apply the concepts of matrices and Euclidean vector spaces, and ordinary differential equations.

3. Ability to comprehend and write proofs that are logically, grammatically, and mathematically correct.

4. Knowledge of and ability to prove results in analysis and algebra.

Applied Mathematics Major (Applied Emphasis): Students who receive bachelor degrees in Applied Mathematics at Weber State University will have:
1. Knowledge of and the ability to apply the concepts of differentiable, integral, and multivariable calculus.

2. Knowledge of and ability to apply the concepts of matrices and Euclidean vector spaces, and ordinary differential equations.

3. Knowledge and ability to apply the concepts of several areas of applied mathematics (probability and statistics, numerical analysis, partial differential equations, etc.).

4. Ability to comprehend and write correct mathematical arguments.

Mathematics Teaching Major (Math Teaching Emphasis): Students who receive bachelor degrees in Mathematics Teaching at Weber State University will have:
1. Knowledge of and the ability to apply the concepts of differentiable, integral, and multivariable calculus.

2. Knowledge of and ability to apply the concepts of matrices and Euclidean vector spaces, and ordinary differential equations or modeling.

3. Ability to comprehend and write proofs that are logically, grammatically, and mathematically correct.

4. Knowledge of basic probability and statistics, analysis, and number theory.

5. Knowledge of and ability to teach concepts of high school level mathematics.

Five-year Assessment Summary
A summary of assessment findings and actions since last program review. Annual assessment reports for each year can be found at http://weber.edu/oie/department_results.html.

The department has been compiling and summarizing course data for a very long time. During the last five years all the pass rates (includes W's, UW's, I's, NC's, AU's as not passing) have generally been 70% or above. This is also true for previous years. There were very few times that the rates were below 70%.

Five years ago we formulated particular learning outcomes for each course. The general education QL learning outcomes were adopted for QL courses, MATH 1030, 1040, 1050, 1080. Note that Trigonometry, MATH 1060 is not a QL course.   Grades on homework assignments or questions on a test were used as direct measures for student attainment of each outcome. See our assessment plan that can be accessed via the link above for details. The data collection has been difficult and sporadic for the courses up to calculus because there are so many adjuncts for these courses. Nevertheless, we made efforts to have all instructors add a common set of questions to their final exams and then report the results.   Results were mixed. But after discussions on improvement and changes all thresholds were met and for three semesters in a row.   After that sampling a few courses started. We intend to do all courses spring 2018 since the courses are scheduled to be renewed in fall of 2018.

Summary for 2012-2013
Spring of 2013 was the third semester that the course learning outcome assessments were done for QL courses. Math 1040 was not done in the spring of 2013 since all the thresholds were met for two semesters in a row. The pass rates in all QL courses are high in comparison nationally to courses that go beyond facility with arithmetic (numeracy) to algebra and its abstraction and problem solving. There are a few learning outcomes where the completion rates are slightly low. These are being discussed by faculty. Alternate teaching methods are being discussed and tried.

Trigonometry (MATH 1060 is not a QL course), calculus 1,2, and 3; all other program required lower division courses and some of the required upper division courses were also assessed.   The objectives were mostly met.

Summary for 2013-2014
Assessments of QL courses showed that the department is doing an excellent job in the courses Math 1030, 1040, 1050 and 1080. This is in part due to the department's efforts to screen for prerequisite expirations. Spring of 2014 was the fifth semester that the course learning outcome assessments were done for QL courses. Math 1040 was not done after Fall 2012 since all the thresholds were met for two semesters in a row. The pass rates in all QL courses were high in comparison nationally to courses that go beyond facility with arithmetic (numeracy) to algebra and its abstraction and problem solving. There are a few learning outcomes where the completion rates are slightly low. These were discussed by faculty. Alternate teaching methods were discussed and tried. The assessments for courses within the major showed that the department is doing an excellent job in some courses, while there is some work to be done in courses with some low results. These were discussed and actions taken as noted in the spreadsheets.

Summary of 2014-2015
Assessments were repeated this year for 26 sections of College Algebra, all the objectives were met.

Assessment of Real Analysis 1 and 2 were done. All the objectives were met.

Summary of 2015-2016
The QL courses were not assessed during 2015-2016 since they had previously been assessed and meet the objectives for several semesters. A sampling of sections of Trigonometry (not a QL course), Calculus 1,2 and 3, linear algebra, differential equations were reassessed. All objectives were meet. Most of the program courses that had not undergone assessment previously were assessed. Some were repeats. Most courses meet their objectives. There was one that was within 1 percentage point of meeting the objective. There was another for which the instructor was directed to assess the direct measures but did not report any results (it is really difficult to get faculty to do this stuff).
Additional Results
a. Assessment- Graduates indicated that some required courses were not offered often enough. Action- Upper level courses will be scheduled more often as faculty are available. New faculty/instructor positions continue to be requested.
b. Assessment- Non STEM majors are having difficulty meeting the QL requirement due to the prerequisite course Intermediate Algebra. Action- The prerequisite course for Math 1030 and 1040 was lowered to include a Math Numeracy offered in Developmental Math.
c. Advisor board indicated that a Math Graduate with computer skills was more employable. Action- Math majors now have the option to complete a selection of programing courses instead of fulfilling a Minor.
d. Assessment- Students wanting an Associate's Degree but also interested in eventually obtaining a Math degree were not enrolling in Calculus until their 2nd or 3rd year. Action- An Associate's degree in Math was approved in 2015-2016.

Summary of 2016-2017
Only a very few of the sections of QL courses MATH 1030, 1040, 1050, 1080 assessed learning outcomes via questions on the final exams. Most of the thresholds were meet, but since the number of sections was so small the results do not seem meaningful. The results will be shared with department faculty and discussed in the spring semester. The spreadsheet with details is in Appendix 1.

Actions in the last five years and future plans:
        Faculty discussions took place in committee and department meetings,
        Some faculty are offering weekly recitation discussion/problem solving sessions,
        Calculus one and two now have common finals and test grading parties,
        We are considering common finals for College Algebra,
        One faculty has instructed a course for math tutors employed in the tutor lab "The Solution Space",
        We are planning a course for math tutors

<u>Future Learning Outcome Assessment Plan</u>
Mathematics is the most objective academic area. At the undergraduate level courses contain a large number of concepts and skills and problem solving using that knowledge and those skills. As a result there are usually hundreds of learning outcomes that students should attain. On the one hand we could list all and try to compile the data but that would entail so much effort and time we could not get funding to do it. On the other hand every homework assignment, quiz, and test question is a direct measure and subsequently scores on tests are direct measures. The most meaningful of these measures are scores on comprehensive final exams. The department is considering reporting a combined percentage score for each course based on quizzes and tests for courses Calculus and above.

Until redesign of the course learning outcomes the chair and admin will need to constantly remind the reluctant faculty to collect and submit data to the spreadsheets.

<u>Assessment of Graduating Students</u>
Graduating majors are assessed mainly by their course grades. There are courses particular to each emphasis:
Applied Mathematics:
> Each graduate must pass Math 3550, Introduction to Mathematical Modeling.
> Each graduate must pass a selection of applied mathematics courses
Mathematics, each graduate must pass:
> Foundations of Algebra, an introduction to advanced math and proof writing course,
> Real Analysis 1and 2,
> Modern Algebra 1 and either Modern Algebra 2 or Topology.
Mathematics Teaching
> Each graduate must pass courses on concepts and teaching methodology in the areas, algebra, geometry, probability and statistics, and problem solving. In addition each graduate must pass a program of required courses in the college of education including a student teaching course. The latter course is a semester long course where the student is paired with and mentored by a teacher in a junior or senior high school. In addition the student is observed and mentored by a math faculty member.

The program description in the WSU Catalog and the department flyers provide more details about course requirements.

All majors are encouraged to do a senior research project. Most of these are presented in a math club sponsored colloquium. Since many of our majors are non-traditional students that are employed and/or have families we do not require such a project or course.

Students completing an associate's degree are required to pass 18 credit hours of math courses starting with calculus. A minor in math requires 20 credit hours while a math teaching minor requires 23 credit hours of math and a math education methods course.

Standard D - Academic Advising

    <u>Advising Strategy and Process</u>

The chair and assistant chair of the department are the main academic advisors for all mathematics majors and minors.   In addition each major is assigned a faculty advisor particular to the student's career goal. Some students receive initial advising during new student orientations. Other students will call, come in, or make an appointment to talk to the chair. They are given information about the math programs and potential careers. They are declared as majors or minors in the university electronic records and they are given help planning a schedule. Students are encouraged to contact the chair when they need more advice or help planning a schedule. Some students desire a personal year by year schedule. In this case one is planned. Other questions are answered as they arise. In addition we are doing the following:

        Encouraging majors to see and adviser each year via emails and posters,

        We post and update grad maps which are generic semester by semester course schedules (grad maps can be found at https://apps.weber.edu/gradmaps/ ,

        We have handouts that list the course requirements for each major, minor, and associate's degree,

        The Math club hosts a yearly meet your adviser event,

        We have many flyers about careers and opportunities,

        We occasionally have presentations by employers or alumni.

Future elementary school teachers that want to specialize in mathematics are advised by our math education faculty on an as needed basis. These students also receive advice from the College of Education.

Advising students on QL is spread across the university:

        Each college has one or two advisors responsible for their programs and general education,

        The student success center has advisors,

        There is a lot of information on web pages,

        There are a lot of ads about QL ,

        The chair and occasionally faculty also give advice.

The Developmental Mathematics Program does the advising of students in developmental courses.

<u>Effectiveness of Advising</u>

Graduates complete an exit survey. The results indicate we are doing a pretty good job, a rating of 6 on a 1 to 7 scale. We encourage students to keep in contact with us and many do. Most graduates are finding employment or attending grad schools.

    <u>Past Changes and Future Recommendations</u>

Almost all the items listed in the first paragraph of this section were initiated during the last five years. Current and future plans include:

        Recruiting alumni to make presentations for math majors,

        Encouraging majors to consult MAA materials and journals via their free membership,

        Encouraging students to join LinkedIn.

Standard E - Faculty

<u>Faculty Demographic and Diversity Summary</u> (Appendix B contains details)

The Department has 16 faculty which constitute 14.75 FTE since one member is ¾ time and two math education faculty are assigned half time in the CSME.

Demographic Summary

Gender: 4 female, 12 male

Rank: 5 Professors, 7 Associate Professors, 4 Assistant Professors

Tenure: 12 tenured, 4 tenure track

Highest Degrees: all have doctorates

Areas of Expertise: algebra, real analysis, combinatorics, linear algebra, differential equations, differential geometry, geometry, math education, matrix theory, statistics

<u>Programmatic/Departmental Teaching Standards</u>

The department maintains a high level of academic integrity in programs and courses. To pass a course a student must receive a C.

For lower level courses department faculty generally follow and Adjunct Faculty and Dev Math instructors are required to have the policies:

> Students are not allowed to use text books, formula sheets, or notes on tests,
> Three or four midterm exams and a final exam are to be given,
> A standard grading scale is to be used,
> At most a scientific calculator may be used on exams with the exception of Math 1030, Contemporary Math and Math 1040, Introduction to Statistics where a graphing calculator is allowed,
> There are common final exams and grading parties for calculus one and two.

For upper division courses (>3000) faculty generally do the following:

> There are midterms and final exams,
> Take home exams are discouraged except when there are very time consuming calculations,
> Certain courses have papers, projects, or presentations, e.g. Modeling, Numerical Analysis, math education courses.

Elementary education majors are required to pass a set of three courses specifically designed for their degree. They also must get a score of at least 80% on a timed fluency exam on basic arithmetic calculations without a calculator.

<u>Faculty Qualifications</u>

Faculty CV's are available in an online folder by requesting access.

Be sure to include this (completed) summary graphic:

Faculty (current academic year) in Math Department, highest degree

	Tenure	Contract	Adjunct
Number of faculty with Doctoral degrees	16	0	0
Number of faculty with Master's degrees	0	0	3
Number of faculty with Bachelor's degrees	0	0	18
Other Faculty	0	0	0
Total	16	0	21

Faculty Scholarship
In the past five years faculty have published 31 papers and delivered numerous presentations. The subject areas were algebra, real analysis, matrix theory, combinatorics, approximation theory, discrete dynamical systems, math education, probability, and statistics.

Mentoring Activities
Tenure track faculty have at least one assigned faculty mentor. We encourage the mentors and mentees to get together separately or in a group for discussions on progress and policies. WSU also has new faculty activities such as a retreat.

Adjunct faculty receive very active mentoring during their first year. New adjuncts are required to have an initial meeting with the chair to go over procedures and policies. They are encouraged to email or meet with the chair if they have questions. Their course syllabus, midterms, and finals are reviewed during their first semester and possible their second. There is a yearly required adjunct faculty meeting. Course and adjunct policies are reviewed. Changes in course material and assessment are reviewed. All adjuncts must submit their graded final exams for review. The chair or the assistant chair reviews their student teaching evaluations. If there are problems there is a meeting with the chair.

Ongoing Review
Faculty are reviewed in the areas of teaching, scholarship, and service. There are online student teaching evaluations that are reviewed by the tenure promotion committee.

There are annual faculty reviews administered by the Chair. The professor provides a formal report on their teaching, scholarship and service. The chair reviews student teaching evaluations. He makes an evaluation and discusses these with the Dean. The Chair is reviewed similarly by the Dean.

Untenured faculty receive a formal review and their 3rd and 6th year. This consists of a lengthy peer review of teaching materials, classrooms observations, scholarship, and details of service. A department Tenure/Promotion committee reviews the materials and writes a report with ratings. A college committee and the Dean examine the materials and also write reports with ratings. To be a successful review the ratings must meet the standards set in the WSU Policy and Procedure Manual (PPM) and the College of Science (COS) tenure document.

Tenured faculty undergo a post tenure review every 5th year.

<u>Professional Development</u>
There many types and opportunities for regular faculty to undertake PD.

     Funds are available from the COS Dean's office to attend conferences.

     Very modest funds are available from the department budgets, usually for faculty making presentations.

     We have a weekly colloquium for faculty and students. Presentation are mostly by faculty, but occasionally there are student and outside speakers.

     The WSU Teaching and Learning Forum (https://www.weber.edu/tlf) has weekly presentations.

Standard F – Program Support
Support Staff, Administration, Facilities, Equipment, and Library

<u>Adequacy of Staff and PD</u>
The department has one Administrative Assistant on a ten month contract. She is excellent in all aspects of the position. There are many training sessions sponsored by the provost's office. She attends almost all of these.   That said the position requires more work than other departments because every student must meet the QL requirement. Her duties and responsibilities include:

     Maintaining supplies and equipment,

     Providing effective signage for courses, faculty and safety,

     Keeping updated on computer programs and administrative policies,

     Monitoring and keeping records of schedules, budgets, purchasing, p cards

     Supporting the faculty with data collection and analysis: pass rates, surveys, teaching evaluations,

     Helping students, providing information and directions.

Previous staff have not been as highly qualified nor have done as much data collection and analysis. The Dev Math Program has their own staff.

We have students working as tutors in the Solution Space (a math tutoring lab). A few students have been hired as graders, and efforts are underway to provide more.

Ongoing Staff Development: The upper administration provides regular training for all secretaries on procedures and administrative changes. There is also training on the use computer programs available to all faculty and staff.

<u>Adequacy of Administrative Support</u>
College staff include a student advisor, a development officer, and a PR person. They primarily support the Dean's Office and college operations. They seem more than adequate.

There is an Associate Dean that helps with administration.

The central administration has many divisions and staff. Student support is plentiful. In particular they operate a math tutoring lab, "The Solution Space". Tutoring through calculus is available. Student support also offers "Supplemental Instruction" for math. These are weekly recitations, usually one for pre-calculus math and one for calculus I,II.

IT support is mostly adequate.

Adequacy of Facilities and Equipment
We moved into a new building May of 2016.   Adequacy:
    The new faculty offices and furniture are great,
    Faculty receive a new computer every 5 years,
    The work room is very small, storage could be more functional, counter space is limited.

The new classrooms and furniture are mostly adequate:
    There are only 9 classrooms assigned to math, a few others may be available,
    One of these is an excellent elementary math education teaching lab with an attached store room,
    Many courses are full with 10 or more students on wait lists, but no rooms and are available,
    The "Wall Talker" boards are extremely difficult to erase and are easily damaged,
    IT is moderately adequate, but document readers are difficult to adjust and "Smart Boards" do not
seem to be operational.

The college has a computer lab with 20 desk top computers and math has a set of 24 laptops for
classroom use. These are mostly adequate.

Adequacy of budgets
Operational budgets are mostly sufficient.
Instructional wage budgets (for adjuncts and overload pay) have been sufficient and more is available,
when needed.
The travel budget is extremely small, $4K for 16 faculty, but more is usually available upon request from
the Dean. New faculty have received considerable start-up money for the first one or two years.

Adequacy of Library Resources
Library resources are mostly adequate with access to databases, journals, reviews, and new book
acquisitions.

Standard G - Relationships with External Communities

<u>Description of Role in External Communities</u>
The department relationship and presence in <u>local public schools</u> is strong. We schedule about 4 PD courses a year for in-service teachers. These are funded by state grants or by the school district and mostly instructed by department faculty. Department faculty also provide an occasional training session on a volunteer basis.

Currently there is a big initiative to start <u>concurrent enrollment</u> courses funded by a grant from the Utah System of Higher Education (USHE). Math faculty have been overloaded by the work. Efforts include training teachers, writing materials, and meetings. There is a temporary staff position directed by CSME and the department chair. (We anticipate the position will become permanent.)

Several faculty are also involved with <u>math competitions</u> for junior and senior high students.   For the next three years we will be hosting the State Math Competition.

Most faculty attend the annual meeting of the Intermountain Section of the <u>MAA</u>. We hosted the meeting in April of 2016. Kent Kidman is the department representative on the board.

<u>Summary of External Advisory Committee Minutes</u>
Meeting with representatives from the local schools, Hill Airforce Base, industry, and University of Utah:
    Many comments about our Math Education program, some complements and some advice for improvement,
    Many complements about our high standards, these improved the critical thinking of graduates,
     Several members suggested that we incorporate programming which we are doing, see curriculum.

Standard H – Program Summary
Results of Previous Program Reviews

Date of Program Review: April 2013	Recommendation	Progress Description
Recommendation 1	**Text of recommendation**	**Update Fall 2017**
Hire more faculty	**The most pressing challenge facing the Department is the need for extra faculty resources. More faculty are needed to offer required courses more routinely and to lessen the dependence on adjunct faculty. We urge the central administration to take this seriously.**	**Summary** **The department has essentially received no increase of faculty to teach courses. We were only able to replace retiring faculty. The last retirement resulted in two new math ed faculty both half time in the CSME. This is a good result since it will increase outreach.** **A history follows:**
Hire more faculty		Update-July 2013 The department hired one additional tenure track faculty who started in July of 2013. This was a replacement for a faculty that left at the end of 2011-2012.A search for a Math Ed faculty took place to replace a retirement in that area. Update-Fall 2013 The department is currently performing a search for professor to fill a position vacated during 2012-2013 due to a retirement. Update-Spring 2014

		The department performed a faculty search for a new tenure track position. Three of the top candidates had so many offers that they declined the on campus interviews. As we were in the process of making an offer to an excellent applicant he accepted an alternate position. When we wanted to make an offer to another extremely qualified applicant he was not approved by the Dean. No specific reasons for the action were given. Update-Fall 2014 The department was recently authorized to make a search again this year. This time the position is open to an applicant specializing in Statistics. Update-July of 2015 There were only a few candidates for the faculty search of 2014/15. In spite of this a qualified faculty was hired, this was a replacement for a retired faculty. Update for Year 2015-2016

		Two Math Ed faculty were sought whose duties were to be split at 50% between Math and CSME. These two each at one half time for Math amount to a replacement for a retirement to take place in Dec. of 2016. The college was able to hire one. A new search is approved for 2016-2017. Update for 2016-2017 We were able to hire a new Math Ed faculty with half time duties in the CSME.
Recommendation 2	**Text of recommendation**	**Update Fall of 2017**
Pursue Grants	**We also encourage the Department to pursue external funding opportunities, like the NSF's Noyce Grants, in order to build capacity. Writing such a large grant, particularly for the first time, is a serious, time-consuming activity, but the payoff is potentially very substantial. The College of Science should therefore consider making a small investment (in the form of faculty release time) to catalyze this process. The College should also consider bringing in consultants (for example, PIs on existing Noyce grants in Utah) to**	**Summary** **The assessment planning was charged with recommendation but we have had no extra time to even discuss it.** **A History follows.**

	guide the Department's grant-writing activities.	
Pursue Grants		Fall 2013 The Departmental Assessment Planning committee has been charged with locating grants opportunities that would be appropriate and accessible. Fall 2014 Nothing new to report. Update-Fall 2015 Nothing New to report in the area of state and national grants. A few faculty applied for internal grants. A couple of these were funded. Update for Year 2015-2016 Nothing New to report in the area of national grants. One of the Math Ed faculty received two grants from the state offices. A few faculty applied for internal grants. A couple of these were funded. Update for Year 2016-2017 Nothing new to report.

Recommendation 3	Text of recommendation	Accomplished
Increase Advising	**Increase personalized advising for the purpose of recruitment and retention. Consider hiring advanced undergrads for this purpose. Also consider hiring work-study students for some of the routine administrative tasks.**	**Spring 2013** **The department chair began assigning a personalized faculty advisor/mentor to each newly declared math major.**
		Update-Summer and Fall 2013 A faculty mentor/advisor was assigned to each active current major. These lists have been posted in the Math Student Room. Post cards were also sent to each of these majors informing them of their faculty mentor and advising them to set up an appointment to see their advisor if they had questions. Spring 2014 and Fall 2014 All majors are being assigned faculty mentors. During spring 2014 the Math Club had a meet your mentor meeting. It went well. Update-Fall 2015 The department has been assigning faculty members as additional advisers/mentors to all new majors and current majors. The majors like having additional advising

		opportunities. The Chair continues to make any exceptions to programs of study. Update for Year 2015-2016 Advisor assignments continue
Recommendation 4		
Pursue alternative approaches in Gateway courses	**Success rates are high in gateway courses such as Math 1050 and 1210, but faculty should be encouraged, possibly by being offered teaching release time, to pursue alternative approaches to these courses to further build on their strong success rates. Alternative approaches should be studied for effectiveness and then modified, discarded, or expanded as appropriate.**	**Summary** **Regular faculty are doing this, but many adjuncts make no efforts to do so. They do not have the funds nor time for PD.** **A History Follows**
		Fall 2013 Faculty have been attending conferences on math teaching methods. They have reported on those conferences. Faculty have been using and evaluating these ideas and techniques in their courses. Fall 2014

		Faculty are using and evaluating the new approaches.
		Fall 2015 Faculty continue to try alternative approaches to engage students. The success in getting students to read the material ahead of class has been low. Update for year 2015-2016 Faculty continue to try alternative approaches to engage students. The success in getting students to read the material ahead of class has been low in lower level courses.
Recommendation 5		
Consider implementing uniform final exams and possibly uniform midterm exams in courses up to and including Calculus I with multiple-choice questions for some portion.	**Implementing uniform examinations is a simple (but high-impact) strategy with multiple benefits. Uniform examinations with common grading help ensure uniform standards. Common examinations promote cooperation among the faculty and provide savings in time and effort. Instructors in courses with common exams are perceived more as a coach and mentor instead of a gatekeeper. The Department should consider using**	**Summary We have accomplished this for Calculus 1 and 2. Some Faculty believe it will improve standards. But others do not like the extra coordination to come to a consensus about the wording and content of the finals.** **We are thinking of doing this for college algebra. But may take a lot of time to coordinate the grading parties since there are so many adjuncts. A history follows.**

	multiple-choice questions for some portion of examinations as many mathematical tasks can be appropriately assessed using them. Course coordinator positions would be needed (to oversee the final exam writing and visit the classrooms of adjunct faculty). Course coordinators could be compensated with release time.	
		Fall 2013, The department curriculum committees is seriously considering common final exams in Math 1050, 1210, and 2012. It may help students retain the needed skills in subsequent courses. Fall 2014 This is still being considered but delayed due to moving to temporary quarters due to the construction of the new COS building. Fall 2015 A committee was set up to oversee this but other demands such as audits, moving to new quarters, changes in the prerequisites for

		lower level courses has made progress slow. But, this appears to be on schedule to occur in Fall of 2016, due to the need to reserve a Block of time available and record that in the Final Exam schedule. Update for year 2015-2016 Math 1210 and 1220 had common final exams in spring of 2016.
Recommendation 6		**Summary: DONE**
Mentor new faculty	**Consider instituting appropriate procedures for the orientation of new contract/adjunct faculty.**	**In Fall 2014 the department adopted guidelines for mentoring new tenure track faculty. These are being followed.**
Recommendation 7		
Rewrite Mission Statement and Strategic Plan	**The Department would benefit from the development of a better strategic plan with clear priorities.**	**Summary: In Progress and almost done** Fall 2014 The Assessment /Planning Committee has been charged with this Task, but delayed due to the move to temporary quarters during the construction of the new COS building. Update for Year 2015-2016

		A draft set of goals and a draft strategic plan were authored in Spring of 2016.

Summary Information (as needed)

Action Plan for Ongoing Assessment Based on Current Self Study Findings

Action Plan for Evidence of Learning Related Findings

Results	Action to Be Taken
1. Each course has a set of learning outcomes specific to the course. QL courses have a common set of learning outcomes adopted by the university level General Education Committee. Almost all the learning outcomes for every course were met.	Current 5 Year Program Review:
	Year 1 Action to Be Taken: Identify, discuss, and suggest changes individually and in the responsible committees as we have always done to improve learning. Adjust teaching methods, content, computer programs, texts, tutoring services, recitations. Some faculty are providing recitation type office hours by meeting students in a classroom for an hour of tutoring and problem solving.
	Year 2 Action to Be Taken: Re-evaluate
	Year 3 Action to Be Taken: Re-evaluate
	Year 4 Action to Be Taken: Re-evaluate

Results	Action to Be Taken
2. Tutors are unable to tutor students in Math 1030	Current 5 Year Program Review:
	Year 1 Training sessions for tutors have been started. We are planning a course for math tutors
	Year 2 Action to Be Taken: Re-evaluate
	Year 3 Action to Be Taken: Re-evaluate

Action Plan for Staff, Administration, or Budgetary Findings

Problem	
1. Increase the number of majors	Advertise Obtain specialized outside grants Develop cross discipline programs
2. Reduce reliance on adjuncts	An instructor position has been approved
3. The department has a bad reputation in some communities.	The provost's office has formed a "QL task force" for discussions. The committee has members from across the university. Discussions are starting.
4. Many service courses are in high demand, some students are being turned away.	The administration has been aware of the problem for some time, but new positions have not been provided until recently. We are authorized to hire a full time contract instructor starting summer or fall of 2018. The administration is requesting more funds for high impact positions. We hope to receive at least one position.

Summary of Artifact Collection Procedure

Artifact	Outcome Measured	When/How Collected?	Where Stored?
Samples of student final exams for failing, average, and excellent work.	Knowledge and skills, Are students prepared for the next course?	End of semester, after grades are recorded	electronic copies
Evidence of learning outcome spreadsheets	Are students acquiring math knowledge and skills of the course?	End of semester, after grades are recorded	Electronic copies
Chi Tester report on student teaching evaluations	Student feedback	End of semester	chi tester warehouse
All the finals for each course taught by adjunct instructor	Are the finals appropriate and comprehensive?	After finals are graded by the adjunct	Paper copies

APPENDICES

Appendix A: Student and Faculty Statistical Summary (*Note*: Data provided by Institutional Effectiveness)

Mathematics	2012-13	2013-14	2014-15	2015-16	2016-17
Student Credit Hours Total [1]	**18,253**	**18,200**	**20,685**	**21,787**	**23,975**
Student FTE Total [2]	**613**	**609**	**691**	**730**	**800**
Student Majors [3]	107	121	108	114	106
other (2nd or 3rd majors)	41	20	33	23	27
Program Graduates [4]					
Associate Degree					1
Bachelor Degree	10	16	17	14	16
Student Demographic Profile [5]					
Female	56	58	54	53	50
Male	51	63	54	61	56
Faculty FTE Total [6]	**27.2**	**26.13**	**22.71**	**24.72**	n/a
Adjunct FTE	13.89	12.82	9.4	**10.24**	n/a
Contract FTE	13.31	13.31	13.31	14.48	n/a
Student/Faculty Ratio [7]	**22.54**	**23.31**	**30.43**	**29.53**	

[1] **Student Credit Hours Total** represents the total department-related credit hours for all students per academic year. Includes only students reported in Banner system as registered for credit at the time of data downloads.

[2] **Student FTE Total** is the Student Credit Hours Total divided by 30.

[3] **Student Majors** is a snapshot taken from self-report data by students in their Banner profile as of the third week of the Fall term for the academic year. Only 1st majors count for official reporting.

[4] **Program Graduates** includes only those students who completed <u>all</u> graduation requirements by end of Spring semester for the academic year of interest. Students who do not meet this requirement are included in the academic year in which all requirements are met. Summer is the first term in each academic year.

[5] **Student Demographic Profile** is data retrieved from the Banner system.

[6]   **Faculty FTE** is the aggregate of contract and adjunct instructors during the fiscal year. **Contract FTE** includes instructional-related services done by "salaried" employees as part of their contractual commitments. **Adjunct FTE** includes instructional-related wages that are considered temporary or part-time basis. Adjunct wages include services provided at the Davis campus, along with on-line and Continuing Education courses.

[7]   **Student/Faculty Ratio** is the Student FTE Total divided by the Faculty FTE Total.

Appendix B: Contract/Adjunct Faculty Profile

Department of Mathematics
Contract Faculty Profile 2013 to 2018

NAME	GENDER	ETHNICITY	RANK	TENURE STATUS	HIGHEST DEGREE	YEARS OF TEACHING	AREAS OF EXPERTISE
Mahmud Akelbek	M	Asian	Associate Professor	Tenured	Ph.D.	7	Combinatorics; Graph Theory
Bachman, Rachel	F	Caucasian	Assistant Professor	Tenure-Track	E.ED	5	Math Education
Broderick, Shawn[1]	M	Caucasian	Assistant professor	Tenure-Track	PhD	5	Math Education, Geometry
Cai, Chloe	F	Asian	Associate Professor	Tenured	Ph.D.	10	PDE's; Math Education
Julian Chan	M	Asian	Associate Professor	Tenured	Ph.D.	6	Cohomology, Statistics
Cocos, Mihail	M	Caucasian	Associate Professor	Tenured	Ph.D.	11	Geometric PDE's; Differential Geometry
Sandra Fital-Akelbek	F	Caucasian	Associate Professor	Tenured	Ph.D.	10	Matrix Theory
Cora Neal	F	Caucasian	Assistant Professor	Tenure-Track	Ph.D.	9	Prob and Stat, Combinatorics
Ghoreishi, Afshin	M	Middle eastern	Professor	Tenured	Ph.D.	27	Applied Mathematics
Kidman, Kent	M	Caucasian	Professor	Tenured	Ph.D.	28	Linear Algebra, Matrix Theory

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[1] Half time in CSME

Kvernadze, George	M	Caucasian	Professor	Tenured	Ph.D.	20		Approximation Theory
Ondrus, Matthew	M	Caucasian	Associate Professor	Tenured	Ph.D.	14		Representation theory of quantum groups and related algebras
Peters, James	M	Caucasian	Associate Professor	Tenured	Ph.D.	30		PDE's and Numerical Analysis
Steele, T.H.[2]	M	Caucasian	Professor	Tenured	Ph.D.	24		Real Analysis
Talaga, Paul	M	Caucasian	Professor	Tenured	Ph.D.	40		Differential Equations
Walters, C David[3]	M	Caucasian	Assistant Professor	Tenure-track	Ph D.	1		Math Education
Developmental Mathematics Program Instructors, one course each				Tenure or tenure track				
Brenda Acor	Female	Caucasian	Instructor	No	MA	27		Dev Math – Calculus, Math Ed
Loyal Baker	Male	Caucasian	Instructor	No	MS	27		Dev Math, Statistics
David Imig	Male	Caucasian	Instructor	No	MS	27		Engineering Math
McKee, Deborah	Female	Caucasian	Instructor	No	BS	20		Dev Math
Darrell Poore	Male	Caucasian	Instructor	No	BS	18		Dev Math – Calculus

[2] ¾ FTE

[3] Half time in CSME

Carrie Quesnell	Female	Caucasian	Instructor	No	BS	17		Dev Math, PreCalculus
John Thaeler	Male	Caucasian	Asso Prof	Yes	Doctorate	45		Dev Math, Math Ed
Mary Ellen Yonkee	Female	Caucasian	Instructor	No	BS	15		Dev Math
Pamela Schilling	Female	Caucasian	Instructor	No	BS	10		Dev Math
Penrod, Jeanette	F	Caucasian	Instructor	No	BS	10		Dev Math
Kathryn Van Wagoner	Female	Caucasian	Director	No	Doctorate	6		Math Ed
Dunn, Christopher	M	C	Instructor	No	BS	8		Dev Math
Jones, Charity	F	C	Instructor	No	BS	4		Dev Math

Adjunct Faculty Profile 2008-2012

NAME	GENDER	ETHNICITY	JOB TITLE	YEARS OF EMPLOYMENT	Degree
Baker, Stacie	F	C	Adjunct	18	BS
Ellis, Maria	F	C	Adjunct	12	BS
Haueter, Gordon	M	C	Adjunct	15	BS
Hollopeter, W.	M	C	Adjunct	15	BS

Hunt, Corinne	F	C	Adjunct	20	BS
Quintrequeo, Jeree	F	C	Adjunct	12	BS
Ruiz, Donna	F	C	Adjunct	20	MS
Salt, Jeffrey	M	C	Adjunct	16	BS
Walthers, Philip	M	C	Adjunct	20	MS
Wheeler, Nicole	F	C	Adjunct	12	BS
Wheeler, Randall	M	C	Adjunct	12	BS
Fendrick, Kevin	M	C	Adjunct	7	BS
Kent, Randall	M	C	Adjunct	20	BS
Kocs, Christopher	M	C	Adjunct	4	PhD
Palmer, Stanley	M	C	Adjunct	6	BS
Sandoval, Susan	F	C	Adjunct	25	BS
Mau, Jarod	M	C	Adjunct	.5	BS
Rhodes, Jake	M	C	Adjunct	.5	BS
Cluff, Allison	F	C	Adjunct	5	BS
Hess, Kristen	F	C	Adjunct	7	MS
Beck, Kimberly	F	C	Adjunct	4	BS
Wilhelmsen, Diana	F	C	Adjunct	3	BS

Appendix C: Staff Profile

Name	Gender	Ethnicity	Job Title	Years of Employment	Areas of Expertise
Deborah Larson	F	C	Administrative Assistant	7	Numerous computer programs Record keeping University policies Department policies Communication Flyers News letters Art work for posters Data collection

Appendix D: Financial Analysis Summary
(This information is provided by the Provost's Office)

Mathematics					
Funding	**12-13**	**13-14**	**14-15**	**15-16**	**16-17**
Appropriated Fund	1,341,244	1,330,534	1,344,942	1,486,794	1,561,336
Other:					
Special Legislative Appropriation					
Grants or Contracts					
Special Fees/Differential Tuition					
Total	1,341,244	1,330,534	1,344,942	1,486,794	1,561,336

Student FTE	613	609	691	730	800
Cost per FTE	$2,188	$2,185	$1,946	$2,037	$1,952

Appendix E: External Community Involvement Names and Organizations

Name	Organization
Berkenpas, John	ATK-Orbits
Kubica, Kris	JBT AeroTech
Murray, April	Walquist Jr. High
Nowlin, Col Scott	HAFB
Peters, Joyce	HAFB
Redd, Andrew	U of U
Tomalino, Alan	HAFB
Willden, Shawn	Google

Appendix F: Site Visit Team (both internal and external members)

Name	Position	Affiliation
Dr. Kathy Andrist	Prof. Department of Math	Utah Valley University
Dr. Kirk Hagen	Chair of Engineering	Weber State University
Dr. Uwe Kaiser	Assistant Chair Math	Boise State University