WEBER STATE UNIVERSITY

2012-2013 PROGRAM REVIEW **EXECUTIVE SUMMARY**

DEPARTMENT OF MATHEMATICS

December, 2012

● Introduction

The Program Review Evaluation Team members are:

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The visit to campus will take place in February or March 2013.

● Mathematics at WSU

There are two departments that are responsible for mathematics instruction at Weber State University. The Developmental Mathematics Program (Dev Math) oversees the courses Intermediate Algebra (Math 1010) and below. Only Math 1010 gives credit toward a student's degree. The Mathematics Department (Math) oversees the courses Math 1030 and above. Although the division of teaching duties started at the beginning of Summer 2007, the two programs work together at the interface and share some resources. Each of the instructors (or lecturers) in the Dev Math Program teach one course a semester for Math as part of their contractual duties. The current Program Review is of the Mathematics Program within the Math Department.

● Curriculum

The courses offered by the Math Department can be loosely classified as having three main overlapping missions. The main mission is the education of mathematics majors and minors. The second and largest in terms of enrollment is the General Education Quantitative Literacy (QL) requirement. The third is providing foundations and methods courses for Elementary Education Majors.

The QL requirement was stipulated by the State Board of Regents as being at least one course beyond high school Intermediate Algebra. There are four main QL courses at WSU. Math 1030 and 1040, Contemporary Mathematics and Introduction to Statistics are terminal in the sense that they are not prerequisites for other Math courses. College Algebra and Pre-calculus are also QL courses. Finally, besides testing out, any MATH course with a College Algebra or Pre-calculus pre-requisite can serve to satisfy the QL requirement. These courses (and their prerequisites) are virtually the same across the state, as per Regents Articulation agreements.

All Elementary Education Majors must take Math 1050, College Algebra, and the two course sequence Math for Elementary Teachers. In addition, students can extend their license from K-6 to K-8 by taking Trigonometry, Calculus I, and four upper division Math Ed courses expressly designed for these students. These Math Ed courses are not required of other majors or minors.

Courses for the Majors and Minors start with Calculus. The Mathematics Department has three majors or emphases. The Regular Emphasis is more traditional and theoretical. It is recommended to those students

intending to go to graduate school. If they were to choose their electives properly they could still be well trained for industrial employment. The Applied Emphasis prepares majors to gain employment in industry, but again by choosing their electives properly, they could still qualify for graduate school. The Mathematics Teaching Emphasis prepares majors to teach in Utah secondary schools. All but three of the courses for the Teaching major are state requirements for certification. One of those three, Euclidean Geometry is a prerequisite for one of the state's required courses, Foundations in Euclidean and Non Euclidean Geometry. About 60% of the majors are declared for the Teaching Emphasis.

Courses required for majors/minors run at least every other year, and most run every year. Courses up through Linear Algebra (Math 2270) even run during the summer semester. There is about one upper division course a year that is taught as a "reading course". They are taught voluntarily by faculty to one student (usually) on unpaid overload. This allows students to get courses during a semester in which they are not usually offered. This is typically only done if a student needs a course to graduate before it is offered in our regular rotation. Offering upper division courses more often is desirable, and would happen, if there were more faculty.

Many of our courses provide service to other majors and minors, such as science majors, business majors, engineering and engineering technology majors. We are open to suggestions by others in regards to these courses, but most are very standard across the country.

Enrollment: Over the past four years the enrollments have been increasing in the categories: below calculus, calculus, lower post calculus and upper level math. See the data on page 15. The average enrollment in the courses below calculus have remained at about 30 per section, in calculus I and II about 27. Thus the department fits in with the statement on one of the WSU web pages "Personal attention is the hallmark of a WSU education. With a student/faculty ratio of 21:1, WSU ensures that four out of five courses have fewer than 30 students and offers attentive, comprehensive academic advisement for all its students." However, the department has not been able to do that in the courses Linear Algebra (Math 2270), Differential Equations (Math 2280), Linear Algebra and Differential Equations (Math 2250, only required by some of the engineering majors) and Statistics I, (Math 3410, calculus based). This is due to a couple of new programs in engineering and to increasing numbers of math and engineering majors.

The Developmental Mathematics Program began in 2007-2008 to oversee and help success in developmental courses. Math 1010, is a prerequisite for the QL courses.

The curriculum for each program has been the result of a thoughtful and ongoing process. We frequently review programs around the country for new ideas and to see that the current curriculum is relevant and close to what other quality institutions are offering. The curriculum for each emphasis is consistent with the department mission statement and national standards. Courses are offered frequently enough to satisfy most majors and minors, and all general education students.

● Student Learning Outcomes and Assessment

Mathematics students should enjoy resources that are sufficient for achieving their goals. While obtaining mathematical knowledge, they should also have a reasonable freedom in the choice of their courses. Mathematics service courses should meet the overall varied needs of client departments.

Students in these courses should obtain the required mathematical knowledge and skills. The overall desirable goals and learning outcomes for students of mathematics are:

- Mathematics majors should gain a substantive knowledge and comprehension of the major ideas in the core areas of their fields of study.
    - Mathematics: The main topics are modern and linear algebra and analysis of real-valued functions.
    - Applied Mathematics: The main topics are numerical and statistical analysis, linear algebra, mathematical modeling and differential equations.
    - Mathematics Teaching: The main mathematical topics are the ones contained in mathematics courses required for certification. Mathematics teaching majors should also learn effective approaches for teaching mathematics.
- All mathematics majors should learn a fundamental set of skills that will enable them to succeed in an ever changing world.
    - Problem Solving & Independent Learning: They should be adequately trained to apply their mathematical knowledge in both familiar and new situations. They should also be able to seek new knowledge to help in those endeavors.
    - Technology: They should learn to use appropriate technology, such as computers, as an aide in investigating mathematical problems and teaching.
    - Communication: They should learn to successfully communicate mathematical ideas and solutions of problems with others at the appropriate level.
- Students pursuing Mathematics Minors, Mathematics Teaching Minors, or Elementary Mathematics Endorsements should be able to effectively apply appropriate mathematical ideas and/or teaching approaches in their field.
- Mathematics service courses should meet the overall varied needs of client departments. Students in these courses should obtain the required mathematical knowledge.

The learning outcomes part of the self study gives the department's assessment plan and the current results of assessment. Each course has a set of learning outcomes. These are presented in Appendix H. Data collection has been ongoing.

Evidence of Effective Instruction

Graduate Exit survey: We continue to request graduate exit surveys from all graduates as a part of the graduation sign-off of majors and minors. These surveys continue to show that the department is doing a good job of preparing our majors for future success. The responses show that the faculty is generally doing a good job in the classroom. The results have been fairly consistent with student evaluations.

Three years ago we started a yearly afternoon seminar in which faculty members present topics for undergraduate research and undergraduate projects. As a result more majors are doing projects, giving presentations and getting publications.

Better quality will result if there are more full time faculty members. More faculty in general are needed to keep the class sizes down to a more manageable size. The core faculty is large enough to provide stability, but just barely. We are experiencing increased enrollments in calculus and the post calculus service courses due to new programs and increased enrollments in engineering and more math majors.

The Mathematics Department graduates and retains students consistent with its mission. Also, secondary school mathematics teachers are in high demand, so the department is working to make courses available to in-service teachers, as well as potential new teachers. Some departmental scholarship money is available, but much more is needed. Academic standards and quality are high, and diversity is encouraged. The number of majors has been down in recent years, but seems to be making a rebound.

● Academic Advising

Academic advising for mathematics majors and minors is sufficient for their needs. Help in advising is done by other faculty members to give students a well rounded opinion. The chair of the department is the official academic advisor for all mathematics majors and minors. Any student wishing to major or minor in mathematics need only declare this with the chair. Individual programs are planned so students can graduate in a timely manner. Career opportunities are also discussed. Each major is being assigned a faculty advisor/mentor. Students still need to see the chair to have changes made to their declarations and course of study. The chair also gives advice to students or other advisors on the university quantitative literacy requirement as needed.

● Faculty

Currently the mathematics faculty consists of 12 full-time people and one three-quarter time person. Last year there was a retirement and one non tenured faculty did not get tenure. We currently have approval to search for only one replacement. The Developmental Program has one full time director, ten full time lecturers, and one three-quarter time Assistant Professor. Each lecturer and the one professor of Development Math teaches one course (mostly QL) for the Math Department per semester. Over the last 5 years Math has employed 24 different people as adjunct instructors (developmental math employs many more). There is a group of regular adjuncts that teach at least one course per semester and several are teaching 2 or more. In addition, Faculty from the Department of Computer Science have taught 2 or 3 sections of Math 1630 per year. For the 2011-2012 academic year Mathematics taught over 17,800 student credit hours. The average "On Load" TCH per FTE was 26.44 and with overload it was 29.15 for contract faculty (14.75 FTE that year). The number of majors reported in the appendix is lower than department records. The program graduates data looks accurate. About half our graduates are teaching majors.

As of the 2012-2013 academic year the Mathematics Department has four full-time tenured full professors, one three-quarter-time tenured full professor, one full-time tenured associate professor, six full-time assistant professors (tenure-track), and one full-time instructor specialist (tenured). Thirteen faculty have Ph.D.'s and one has a Masters degree. Three of the faculty are female, eleven are male. There are no minorities, although six are from foreign countries. Areas of faculty expertise include Real Analysis, Algebra, Differential Equations, Linear Algebra, Approximation Theory, Combinatorics, Matrix Theory, Statistics, Numerical Analysis, and Mathematics Education. Years of

teaching experience vary from one year to over thirty years.

For ongoing review and development, the chair meets with each faculty member once a year in the annual faculty review, and goals are agreed on by the faculty member with the chair. Tenure track people are subject to additional reviews for tenure and promotion. All Tenure Track contract and adjunct faculty have student evaluations done in courses they teach. These reviews show that a subset of the faculty is very active in research. Reduced course schedules and an increased department travel budget would make scholarly activity more accessible.

Adjunct instructors teaching courses for the Math Department attend an orientation meeting at the beginning of the fall semester. Adjuncts are required to turn in their graded final exams for each course they instruct. The department chair reviews these finals, teaching evaluations, and grade distributions. The chair meets with each adjunct at least once every two years to discuss their courses. Plans are still being considered of how to better train adjuncts, and how to better mentor and assess them. New adjuncts require additional mentoring from the Chair.

Each Lecturer in Dev Math is reviewed each year by the Director. Every three years each undergoes a more detailed peer review by a peer committee which includes at least one faculty member from the math department.

Teaching is performed at a high level of competence. Service is performed as needed, and the Mathematics Department has been represented on University Committees and on the Faculty Senate.

● Program Support

The Department of Mathematics receives support mostly from the legislature. We have several scholarship funds that are made possible by donations. Occasionally faculty members receive grants to help them accomplish what they desire. Mostly these grants are in-state, but sometimes they are national. Our funds are not adequate for our needs, but to the extent that they are able, the Dean and the Provost provide good support.

The Dean supports the Mathematics Department very well with needed money for computers and new sections of courses when needed. Support for Developmental Mathematics is good and that provides for the full time lecturers. The Provost has also supported new sections of courses when needed. For the last three years one time money from the Provost's office has funded the remodeling of the Math Ed Lab and more classroom computers, projectors, document readers, and white boards. Library funding is adequate for most of the needs.

The Mathematics secretary is very competent and helpful. She helps immensely with the administration of the department. She provides very effective signage, is very adept at using the computer for administration, and supports the faculty and chair with data collection and analysis. She is very helpful with students.

● Relationships with External Communities

There is no official liaison mechanism between the Mathematics Department and external communities of interest. Informally we have several former students and a couple of adjuncts who work regionally. They keep us informed about how our students fair in the workplace and they let us know of upcoming

needs in their companies so that we can make certain our future students will have good employment prospects. The department is working on improving this with plans for an advisory committee. Three of our regular adjuncts are high school teachers. Our Math Education people work closely with teachers in the school districts and math supervisors. Currently one of our faculty is overseeing some in-service courses for Elementary Teachers. The administration has formed a K-16 Alliance to work with the local public school districts. Two of our faculty have been involved in the K-16 Alliance meetings to discuss various issues. A list of liaisons is in Appendix E.

Program Summary

The programs offered by the Mathematics Department have quality, consistency, qualified faculty, and are meeting students' needs. The Mathematics Department has been responsive to prior reviews. Improvements are resulting from careful planning and analysis of the mission statement, student learning outcomes, curriculum, teaching and learning efforts, and academic advising.