

Math Department WASC Rubric Assessment Plan.

MA/MS Mathematics, MS Statistics

Goal 1: The ability to read, understand, and explicate journal articles in mathematics related to students area of specialty. The assessment point for goal 6 is the required specialist Qualifying Exam.

Math 203

**12-18 units UD or GR courses → 12-18 units GR courses → Math 298,299 → thesis defense
Two semester GR sequence**

All MA/MS Math majors are required to take 30 units of upper division and graduate math classes, including 12-18 units of graduate classes. During these required classes students are required to give written explanations of their solutions of advanced upper division and graduate level homework problems and they are occasionally called on to give oral presentations of their solutions to fellow students and their instructor in class. In some graduate classes students are asked to give written or oral presentations of projects related to the class material. The required graduate units should also include one two semester sequence. The culminating requirement for an MA/MS Math student is the completion of a thesis/writing project. The work on the thesis/writing project starts after the student passes the specialist Qualifying Exam which is based on the material from two upper division courses in the student's area of specialty. Recently the Math Department changed the Qualifying Exams requirements for its MA/MS students. Students are no longer required to take a basic qualifying exam in algebra and analysis. Students are still expected to take a specialist exam in an area that is closely related to their potential thesis topic. Goal 6 is now going to be assessed by the specialist Qualifying Exam, which students are given two chances to pass. Because of the recent changes in the Math Department Qualifying Exams the assessment of Goal 6 is in the emerging stage. Data is available on the number of students passing/failing the specialist qualifying exam.

Rubric: All students should be able to answer basic questions covered in the appropriate upper division courses in their area of specialty as tested by the specialist qualifying exam. All students should be able to read journal articles in their area of specialty and explain them to their fellow students and instructors. This would best be demonstrated in the defense of their thesis/writing project. The best students might be able to do original research on appropriate problems in their area of specialty and give clear explanations of their work to fellow students and their instructors.

Goal 2: Ability to communicate mathematics effectively.

Goal 7 is assessed during the oral presentation of the thesis or writing project defense and was last assessed in Spring 2011

Specific LOs to be assessed are:

- 1) Ability to explain mathematics orally.
- 2) Ability to write clear mathematical explanations.

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after the student passes the specialist Qualifying Exam which is based on the material from two upper division courses in the student's area of specialty. The student's communication skills are assessed by the student's thesis/writing project defense committee after the student's oral presentation of their thesis/writing project. There is an assessment form that needs to be filled out by the faculty members on the student's thesis/writing project defense committee. The assessment of Goal 7 is in the developed stage.

Rubric: All students should be able to give clear explanation of their solutions to problems encountered in their graduate level courses to their fellow students and instructors. All students should be able to give clear explanations of the ideas in their thesis in the written version of the thesis/writing project and also be able to give a clear oral explanation of these ideas in their thesis defense. All students should be able to answer simple questions to demonstrate their understanding of the material in the thesis/writing project. The best students in addition to being able to give clear explanations of the results of others obtained from journal articles in their area of specialty should also be able to give clear explanations of their own independent research on appropriate level problems in their area of specialty.

Department of Mathematics

College of Science

WASC Program Outcomes Rubric, Spring 2012

Overall assessment of the MA/MS Math Assessment Plan

MA Math/MS Math Goals 6-7 are to be assessed.

Looking at MA/MS graduates we see that roughly 85% have gone on to careers as teachers at high schools (10%), community colleges (60%), and universities (15%). The remaining 15% have gone on to careers in business, government, and industry. Overall the Math Department Assessment Plan for the MA/MS Math programs is in the emerging stage. The students in the MA/MS Math programs are required to take a variety of upper division and graduate classes including 12-18 units of graduate courses and one two semester graduate sequence. They are asked to develop an area of specialty and pass a specialist qualifying exam covering the materials from two upper division math courses in this area. At this time the Math Dept. has a reasonable multi-year program planning/assessment plan. The Math Department would also need to publicize these learning objectives that students are expected to learn in course outlines, green sheets and on the Math Department web page to reach the highly developed stage.

A. The Comprehensive List

Given the flexibility of the MA/MS Math program and the many areas of mathematics that students have written theses in Goals 6-7 seems to form a comprehensive list of reasonable objectives. Students need to exhibit their depth of knowledge in one area of mathematics by first passing a specialist qualifying exam and then completing a thesis/writing project in their area of specialization and then defending this thesis to their committee. To reach the highly developed level in this area the department would also need to discuss and agree upon explicit criteria for assessing students' level of mastery of each learning outcome at future Math Dept meetings. We would hope to have this done and reach the highly developed level for this criterion by the end of Spring 2013.

B. Assessable Outcomes

All learning outcomes described in Goals 6-7 can be assessed in the agreed upon places, the specialist qualifying exam and the thesis/writing project defense. In some cases there is no agreed upon rubric that has been approved by the department for evaluating the level of student performance. This can be discussed at future department meetings. Presently this decision on how to evaluate student performance for each goal is left up to the faculty members on the student's committee. At this point the Math Dept Assessment Plan is developed but not highly developed in this area. We would hope to have rubrics discussed and agreed upon and reach the highly developed level for this criterion by the end of Spring 2013.

C. Alignment

The MA/MS Math curriculum is generally well aligned with Goals 6-7 and students have many courses in which to increase their performance for each of the goals though again there are some areas where improvement is possible. The Math department might want to consider adding additional upper division courses where students will be expected to write projects and give oral presentations to give students more chances to enhance their communication skills (Goal 2). For example, this could be done during the second course of a two-semester sequence that each student is required to take. Presently the Math Dept is developed but not highly developed in this area though again we can probably be at the highly developed level for this criterion by the end of Spring 2013.

D. Assessment Planning

At this time the Math Dept. has a reasonable multi-year program planning/assessment plan. Our last external review took place in Spring 2009 and our program planning meeting with the provost was held in Fall 2010. In Spring 2011 Goal 6 and 7 were assessed. The assessment data is gathered by the faculty members on the thesis defense committees. The data is then reviewed by the Graduate Curriculum committee and the Math Dept. chair to determine if any changes are needed in the curriculum or in the assessment plan itself and always we are looking for the points of strengths and signs of weaknesses in the curriculum and how to improve the delivery of the material in order to increase student learning. Any proposed changes are presented to the math department faculty for discussion and a vote at a department meeting. Presently the UCC is discussing potential changes to Goal 6 and the way in which it is assessed. It was last reviewed using data gathered at the thesis defense but we are consider a change to assess this goal at the required specialist qualifying exam. The department assessment planning presently is developed but not highly developed. It should be possible to reach the highly developed level for this criterion by Spring 2013.

E. The Student Experience

The department student experience is at the emerging level. Most courses have clear learning outcomes spelled out in details and students know about them but more needs to be done in this area and we intend to do this in the near future and communicate to the students all learning outcomes by advertising them on the mathematics web page and by making clear to the faculty that discussing the learning outcomes with the student should be thought of as an important component of the courses. The Math Department would need to publicize these learning objectives that students are expected to learn in course outlines, green sheets and on the Math Department web page to reach the highly developed stage. To give students some say on the assessment plan the department might want to consider giving out a survey to students who are about ready to graduate and solicit their opinions on how well the department achieved its stated goals in educating the students. For example this data could be obtained by thesis advisors when students have completed their thesis defense. It will probably take some time to do this but we hope to have this completed by end of Fall 2013.

MS Statistics

The MS Statistics program just started in Fall 2011 so the Assessment Plan for this program is in the initial stage. The MS Statistics program is has received the official designation as a Professional Science Masters by the Council of Graduate Schools. The links below give some curriculum guidelines for Professional Science Masters programs.

<http://www.siam.org/students/resources/guidelines.php>

http://www.sciencemasters.com/portals/0/pdfs/Guidelines_for_PSM_Affiliation_Revised.pdf

<http://www.sciencemasters.com/>

<http://www.cgsnet.org/>

The SIAM (Society for Industrial and Applied Mathematics) curriculum guidelines for a Professional Science Masters program suggest that the following skills are the most important for a student to learn, 1) modeling, 2) teamwork, 3) computation, 4) interdisciplinary, and 5) communication. The curriculum of the MS Statistics is closely aligned with these goals and students are able to take many courses where they would learn or enhance these skills. Statistical and mathematical modeling is important in most of the required statistics courses for this program, including Math 163, 203, 261A, 261B, 265, 266, and 269. Teamwork is a skill that would be learned and practiced in Math 203 and Math 269. Students will be using statistical software in most of their statistics courses, but computation skills are certainly the main focus in Math 167 and Math 267. Students in the MS Statistics program are encouraged to take one or more electives where they learn about applications of statistics to another field like Biology, Business, Economics, Engineering, Health Science, Psychology, and others. Students are expected to write reports and give oral presentations in various courses like Math 203 and Math 269 and they are also expected to complete a thesis or writing project. We would like to develop an assessment plan for the MS Statistics program by Spring 2013.