

Assessment and Improvement Report: AY 2013-14

Department: Mathematics

Assessment Coordinator: Hartenstine

Departmental Mission:

In accordance with the mission of Western Washington University and the College of Sciences and Engineering, we aim to provide high quality education in mathematics meeting the needs of students and the state at both the undergraduate and graduate levels, providing a wide range of effective courses for math majors and students in other units; to equip our students with the conceptual understanding and computational skills to use quantitative reasoning and analysis effectively in their personal and professional lives; and to contribute to the mathematical profession through productive scholarship and active participation in the community and professional organizations.

Departmental Student Learning Outcomes: Upon graduation, majors will be able to

1. demonstrate mastery of the essentials of two core lower-division mathematics courses: calculus and linear algebra (**core math**)
2. understand the importance of abstraction and rigor in mathematics, construct complete proofs, and critically examine the correctness of mathematical arguments (**rigor**)
3. demonstrate knowledge of a wide variety of mathematical areas by showing a solid grasp of the materials in upper-division courses in at least two of the following disciplines: abstract algebra, differential equations, geometry, linear algebra, mathematical analysis, number theory, optimization, numerical analysis, probability and statistics (**breadth**)
4. recognize major contributions of some prominent mathematicians of the past and present (**history**)
5. demonstrate in-depth understanding of at least two mathematical subjects at an advanced level by showing understanding of the materials in a second course of a sequence in these subjects (**depth**)
6. [For programs in mathematics education] complete the appropriate professional preparation program and certification (**certification**)

GUR Learning Outcomes:

3. Use quantitative and scientific reasoning to frame and solve problems.
5. Apply tools of technology, with an understanding of their uses and limitations.

Assessment Measures	SLO's Assessed	Use of the Information																		
Grades in Math 204 and Math 224 of graduating seniors.	1	The average grades (in numerical scale) of the two courses were 3.09 and 3.13, respectively. These numbers are satisfactory and are nearly the same as last year's averages.																		
In-class performance in five sections of MATH 304, measured by student achievement on exam questions corresponding to three specific course objectives.	3	A large amount of data was collected and analyzed – student performance on a total of 27 midterm and exam questions concerning the objectives “ability to construct a matrix representation of a linear transformation, relative to given bases and to choose a convenient basis for such a representation”, “ability to construct an orthogonal basis for a subspace by using the Gram-Schmidt process” and “knowledge of the properties of symmetric matrices and associated quadratic forms”. Overall the results were satisfactory to highly satisfactory.																		
Count of the number of different mathematical areas studied successfully (C or better) at the upper division. Our learning outcomes require at least two.	3	<table border="1" data-bbox="640 634 1453 699"> <tr> <td># of areas studied successfully</td> <td>9</td> <td>8</td> <td>7</td> <td>6</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> </tr> <tr> <td># of students</td> <td>1</td> <td>7</td> <td>16</td> <td>26</td> <td>14</td> <td>7</td> <td>5</td> <td>3</td> </tr> </table> <p data-bbox="640 748 2003 813">It is apparent from the table that a large majority of our graduating majors far exceed the minimal requirement for this outcome.</p>	# of areas studied successfully	9	8	7	6	5	4	3	2	# of students	1	7	16	26	14	7	5	3
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Count of the number of graduating seniors who took Math 419.	4	73% of graduating seniors took (and passed with C- or better) this course (58 out of 79). This proportion is a little lower than last year's 76%, but is the same as two years ago. Math majors also fulfill their WP requirements through SEC, CSCI, FAIR, ELED, ECON, ENG, ESCI, SPAN, ACCT, CHIN, JAPN, CHEM, and PHYS courses, with ECON and CSCI being the most popular alternatives for those not taking MATH 419.																		
Count of the number of sequences at the advanced level successfully completed (C or better) by graduating seniors. Our learning outcomes require at least two.	5	<table border="1" data-bbox="640 1024 1423 1089"> <tr> <td># of completed sequences</td> <td>7</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> <td>0</td> </tr> <tr> <td># of students</td> <td>4</td> <td>7</td> <td>7</td> <td>17</td> <td>22</td> <td>13</td> <td>9</td> </tr> </table> <p data-bbox="640 1162 2032 1227">It is seen that most students complete more sequences than are required. Note that completing two such sequences is not required for all of our major options.</p>	# of completed sequences	7	5	4	3	2	1	0	# of students	4	7	7	17	22	13	9		
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# of students	4	7	7	17	22	13	9													
Count of the number of students graduating with BAE (Bachelor of Arts in Education) who earn the appropriate professional certification.	6	All but one students graduating with a BAE earned credentials. In addition, many other students earned math credentials while completing other degrees.																		

Review pass rates for MATH 114 and MATH 156.		Last year changes were made in the thresholds on the Math Placement Test to qualify for these courses. For MATH 114: the percentage of students passing increased from 70% to 76%, and the percentage of students earning C or better increased from 53% to 57%. For MATH 156: the percentage of students passing decreased from 85% to 78%, and the percentage of students earning C or better decreased from 74% to 61%.
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Program Changes Based on Assessment

The pass rates for MATH 156 (see last line of table above) are surprising: not only did these percentages decrease from the previous year, they were the lowest in at least the last four years. We will look at these percentages again next year to determine if further changes are needed.