

Assessment and Improvement Report: AY 2014-15

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 3.37 and 3.08, respectively. These numbers are highly satisfactory. The average for 224 is nearly the same as last year's, while the average for 204 is higher than last year's average of 3.09.																		
In-class performance in MATH 360, measured by student achievement on exam questions.	2	The objective tested was the "ability to use deductive reasoning and knowledge of basic similarities and differences between Euclidean and certain non-Euclidean geometries to determine whether various statements hold in these different geometries". Data was collected from five exam questions for this objective. These questions concerned many manifestations of this broad objective and results were highly satisfactory.																		
In-class performance in MATH 402, measured by student achievement on exam questions corresponding to three specific course objectives.	5	Results varied from highly satisfactory to unexpectedly low and will lead to course improvements. Students demonstrated a high level of achievement concerning "working knowledge of the fundamental isomorphism theorem for rings". Students also performed well on an exam question concerning "knowledge of the notion of the degree of a field extension and the ability to compute the degree of a finite extension", but the instructor noted that this performance was artificially high due to an easier approach to the problem than the one intended. Student performance was low concerning "knowledge of the definition and basic properties of ideal, quotient ring and homomorphism". The instructor will spend more time on this topic in the future.																		
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="640 792 1413 862"> <tr> <td># of areas studied successfully</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>3</td> <td>19</td> <td>23</td> <td>16</td> <td>6</td> <td>10</td> <td>1</td> </tr> </table> <p data-bbox="640 911 2003 971">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	8	7	6	5	4	3	2	# of students	3	19	23	16	6	10	1		
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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 the same as last year's and similar to other recent years.																		
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 1162 1484 1232"> <tr> <td># of completed sequences</td> <td>8</td> <td>6</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>1</td> <td>1</td> <td>3</td> <td>12</td> <td>24</td> <td>16</td> <td>11</td> <td>10</td> </tr> </table> <p data-bbox="640 1300 2032 1360">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	8	6	5	4	3	2	1	0	# of students	1	1	3	12	24	16	11	10
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Count of the number of students graduating with BAE (Bachelor of Arts in	6	All students graduating with a BAE earned credentials. In addition, many other students earned math credentials while completing other degrees.																		

Education) who earn the appropriate professional certification.		
Review pass rates for MATH MATH 156.		Last year we looked at pass rates for 156 to determine the effect of raising the threshold to qualify for this course on the Math Placement Test. Surprisingly, the pass rate fell, so we followed up by looking at this data again. The pass rate this year was 86%, compared with 78% last year, while the percentage of students earning C or better increased from 61% to 79%. These results suggest that last year's results were anomalous.

Program Changes Based on Assessment

In response to student performance on a particular topic in MATH 402, adjustments to the way in which the course is taught will be made (see above).