Assessment and Improvement Report: AY 2015-16

Department: Mathematics

Assessment Coordinator: V. Chan

Departmental Mission:

In accordance with the mission of Western Washington University and the College of Science 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:

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

<table>
<tr><th>Assessment Measures</th><th>SLO's Assessed</th><th>Use of the Information</th></tr>
<tr><td>Grades in Math 204 and Math 224 of graduating seniors.</td><td>1</td><td>The average grades (in numerical scale) of the two courses were 3.10 and 2.97, respectively. Although slightly less than last year's in both cases (most likely due to year-to-year variability), these figures are more or less satisfactory.</td></tr>
<tr><td>In-class performance in ten sections of MATH 341, measured by student achievement on an exam question corresponding to a specific course objective.</td><td>3</td><td>The course objective in Math 341 used in the assessment is the ability to "apply the linear property of the expected value of a function of a continuous random variable". The data from the final exams of ten sections of Math 341 were collected and analyzed (one section was omitted due to nonconforming question), and the overall average was about 7.5 out of 10. Individual section-wise, the averages range from 6.5 to 8.4 out of 10. These results are quite satisfactory and on par with what is typically expected of this class, considering the fact that its student enrollment includes not only math majors but a large number of non-math majors as well.</td></tr>
<tr><td>Count of the number of different mathematical areas studied successfully (C or better) at the upper division. Our learning outcomes require at least two.</td><td>3</td><td>The data from this academic year's graduating seniors were tabulated in the following table:

<table><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></tr><tr><td># of students</td><td>4</td><td>13</td><td>30</td><td>12</td><td>4</td><td>3</td></tr></table>
It indicates that all of our graduating majors satisfy the learning outcome, with a large majority far exceeding the minimal requirement.</td></tr>
<tr><td>Count of the number of graduating seniors who took Math 419.</td><td>4</td><td>About 88% of graduating seniors took this course and passed with C- or better (58 out of 66). This is significantly better than the percentage from last year, which was 73%.</td></tr>
<tr><td>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.</td><td>5</td><td><table><tr><td># of completed sequences</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>5</td><td>21</td><td>23</td><td>9</td><td>7</td></tr></table>
It is seen that a large majority of the students completed two or more sequences. Note that completing two such sequences is not required for all of our major options.</td></tr>
<tr><td>Count of the number of students graduating with BAE (Bachelor of Arts in Education) who earn the appropriate professional certification.</td><td>6</td><td>Seven students graduated with BAE in Math, all of whom received certification, with five in math and two in elementary education.</td></tr>
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Program Changes Based on Assessment

Because of the satisfactory nature of virtually all the learning outcomes assessed this time, no changes to the program are being currently considered. Next year's assessment will be used to determine future program improvement.