Assessment of Student Learning Outcomes
Degree Program Report

College: COTS  Department: Mathematics
Program: Actuarial Science  Degree: BS, Actuarial Science

1. What student learning outcomes were assessed this year, and why?

In answering this question, please identify:
- the specific student learning outcomes that were assessed
- reasons for assessing the outcomes, with the outcomes written in clear, measurable terms
- which CWU Strategic Plan Outcome do the student learning outcomes relate to? See: http://www.cwu.edu/strategic-planning/strategic-plan. For example:
  - Outcome 1.1.1: Students will achieve programmatic learning outcomes.
  - Outcome 1.1.3: Students and faculty will be increasingly engaged in the learning process in and outside the classroom.
  - Outcome 3.1.1: Sustain participation by faculty, students, and staff in quality research, scholarship, and creative expression.

The first five of the Student Learning Outcomes (attached) were assessed. We chose these because they had similar Criterion of Achievement, and because earlier assessments indicated some issues in these areas.

2. How were the student learning outcomes assessed?

A) What methods were used?

Concisely describe each specific method used in assessing student learning outcomes. For each assessment method specify:
- If that assessment method was direct (e.g. exams) or indirect (e.g. focus groups)
- If the assessment method assessed performance, knowledge, and/or attitudes
- The specific standard of mastery (criterion) against which you will compare your results.
  For example, “at least 85% of students pass the senior exit exam”

For the Outcomes with a Grade-based Criterion of Achievement, data from Safari was obtained.
Additionally, we were able to collect data relating to the number of Society of Actuaries’ exams passed from the advisors.

B) Who was assessed?
• The population assessed
• The number of students assessed (e.g., 53)
• Survey or questionnaire response rate (if appropriate)

We assessed Actuarial Science majors who graduated during the 2014-15 academic year. There were 8 actuarial science majors who graduated in 2014-15.

C) When was it assessed?

• When did the assessment take place (was it at the end of the degree, as students entered the program or during a specific term?)

Fall Quarter, 2014; Winter Quarter, 2015; Spring Quarter 2015; some classes may have been taken earlier in students’ careers.

3. What was learned?

• Were the standards of mastery met?
• Report results in specific qualitative or quantitative terms, with the results linked to the student learning outcomes you assessed, and compared to the standard of mastery (criterion) you noted above
• Include a concise interpretation or analysis of the results

For this group of students, our goals were met for Student Learner Outcome #2, and were very close for Student Learner Outcome #1. Our goals were not met for SLOs #3, 4, and 5. The results here indicate some bottle-necking in the junior-level courses, particularly for this group of students (several students took part of the Math 411 series more than once). While this was a weaker group of students overall than the year before, the variation suggests that some checks for consistency among instructors teaching the junior sequences may be in order.

The actuarial science program is primarily a pre-professional program for future actuaries. Actuaries take a rigorous series of credentialing exams set by the main professional organizations (the Society of Actuaries is the largest of these). We encourage students who are pursuing exam-track actuarial careers to pass as many exams as possible before graduation, with a goal of 1-2 exams passed. For the cohort that graduated in 2014-15, 50% of the students had
passed at least one exam and 25% had passed at least two before graduation. As our coursework is directly related to preparing students for these exams, these passing rates provide another measure of how well our students are meeting the SLOs. For this group of students, these passing rates (especially the low percentage passing two exams) are a further indication that something was problematic, at least for this group of students.

Our major focus in terms of assessment for the next couple of years is the new requirement from general education that all programs assess writing in the major. To be able to assess student writing, we will be implementing a senior seminar and a portfolio requirement. This portfolio will contain examples of various forms of writing that are common in the actuarial profession, and will enable us to more directly assess SLOs #7 and 8. In addition, students will be required to make presentations, enabling a more direct assessment of SLO #9.

4. What will the department or program do as a result of that information?

- Note specific changes to your program as they affect student learning, and as they are related to results from the assessment process
- If no changes are planned, please describe why no changes are needed
- In addition, how has/will the department report the results and changes to internal and/or external constituents (e.g., advisory groups, newsletters, forums, etc.)

We have added a senior seminar with a portfolio requirement to the major. Because of curriculum timing, this senior seminar will be required of all students declaring in 2016-17 and later. This means that the first batch of seniors under the new requirement will be graduating in Spring 2018. This portfolio will contain examples of various forms of writing that are common in the actuarial profession, and will enable us to more directly assess SLOs #7 and 8. In addition, students will be required to make presentations, enabling a more direct assessment of SLO #9.

5. What did the department or program do in response to previous years’ assessment results, and what was the effect of those changes?

- Describe any changes that have been made to improve student learning based on previous assessment results
- Were those changes effective?
- Discuss any changes to your assessment plan or assessment methods
In the last year, paperwork was submitted to create the senior seminar requirement, and we adjusted pre-requisites for several courses to reflect departmental curriculum changes.

One of our goals for the next year is to re-visit our SLOs and assessment methods. With the introduction of the senior seminar, we should be able to assess various outcomes more directly (and without using grade criteria). Ongoing changes in the actuarial profession also mean that our SLOs need to adjust to reflect these changes.

6. Questions or suggestions? Contact Tom Henderson (henderst@cwu.edu) or Bret Smith (bpsmith@cwu.edu)
CWU Student Learning Outcome Assessment Plan  
Department: Mathematics  
Program: Bachelor of Science: Actuarial Science

Many Student Learning Outcomes for this program are assessed through Course Grades and Surveys.  
For Course Grade based assessment, the Criterion of Achievement is “80% of students pass course with a B or better on 1st or 2nd attempt” referred to as “Grade Criterion” in the table below.  
For Survey based assessment, the Criterion of Achievement is a response rate of 80% and that 80% of student responses are either Strongly Agree or Agree with the statements in the survey. This is referred to as “Survey Criterion” in the table below.

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Method(s) of Assessment</th>
<th>Who Assessed?</th>
<th>When Assessed?</th>
<th>Criterion of Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Graduates will be able to use statistical methods to analyze and model time-independent and time-series data.</td>
<td>Course Grade</td>
<td>Students in MATH 311, 410AB, 411BC</td>
<td>Quarterly</td>
<td>Grade Criterion 78.7% of the students earned a B or better on 1st or 2nd attempt.</td>
</tr>
<tr>
<td>2. Graduates will be able to use statistical methods and credibility theory to analyze and model insurance loss data.</td>
<td>Course Grade</td>
<td>Students in MATH 417ABC</td>
<td>Quarterly</td>
<td>Grade Criterion 83.3% of the students earned a B or better on 1st or 2nd attempt.</td>
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<td>3. Graduates will be able to formulate actuarial problems in mathematics, probabilistic and statistical terms.</td>
<td>Course Grade</td>
<td>Students in MATH 417ABC, 418AB, 419ABC</td>
<td>Quarterly</td>
<td>Grade Criterion 69.0% of the students earned a B or better on 1st or 2nd attempt.</td>
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<td>4. Graduates will be able to apply common probability distributions to actuarial applications.</td>
<td>Course Grade</td>
<td>Students in MATH 411AB, 417ABC, 419ABC</td>
<td>Quarterly</td>
<td>Grade Criterion 72.3% of the students earned a B or better on 1st or 2nd attempt.</td>
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<td>5. Graduates will be able to apply concepts of differential and integral calculus to actuarial problems.</td>
<td>Course Grade</td>
<td>Students in 411AB, 418ABC, 417ABC, 419ABC</td>
<td>Quarterly</td>
<td>Grade Criterion 69.0% of the students earned a B or better on 1st or 2nd attempt.</td>
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<td>6. Graduates will be able to employ simulation techniques to analyze and solve dynamic and complex stochastic and mathematical models.</td>
<td>Internship Survey and Post-Graduation Survey</td>
<td>Students on Internships and Graduates</td>
<td>Fall, Winter</td>
<td>Survey Criterion</td>
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<td>7. Graduates will be able to use programming languages such as C++, S, or Visual Basic.</td>
<td>Internship Survey, Senior Survey and Post-Graduation Survey</td>
<td>Students on Internships, Seniors, and Graduates</td>
<td>Fall, Winter</td>
<td>Survey Criterion</td>
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<td>8. Graduates will be able to communicate results and solutions of mathematical, statistical, and actuarial problems in writing using everyday and mathematical language.</td>
<td>Internship Survey, Senior Survey and Post-Graduation Survey</td>
<td>Students on Internships, Seniors, and Graduates</td>
<td>Fall, Winter</td>
<td>Survey Criterion</td>
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<td>9. Graduates will be able to communicate mathematical and statistical solutions orally, using both everyday and mathematical language.</td>
<td>Internship Survey, Senior Survey and Post-Graduation Survey</td>
<td>Students on Internships, Seniors, and Graduates</td>
<td>Fall, Winter</td>
<td>Survey Criterion</td>
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