"CLOSING THE LOOP": PROGRAM IMPROVEMENT DOCUMENTATION AND REPORT

Graduate Program Assessment Report
Academic Year: <u>2015-2016</u>

Program: Mathematics

Assessment Coordinator: Victor Chan

Program 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 at the graduate level, through a range of rigorous advanced courses; to strengthen our students' quantitative reasoning and problem-solving abilities; to equip our students with the necessary skills and knowledge in preparation for either joining the workforce in technical or educational fields, or pursuing Ph.D. degrees in math or other STEM disciplines; and to contribute to the mathematical profession through productive scholarship and active participation in the community and professional organizations.

Program Student Learning Goals:
The math department has identified the following 4 major goals for the Master's program with regard to student learning and achievement:
(A) Knowledge of **core mathematics**
(B) **Breadth** of study
(C) **Depth** and concentration in one or more specific area
(D) **Rigor** in reasoning and analysis

Program Student Learning Objectives:
To meet the mission and goals of the program, the Master's students in Mathematics will have developed, upon graduation, the following skills:

1. Mastery of calculus, linear algebra and differential equations at the undergraduate level.

2. Strong command of mathematical analysis and advanced linear algebra at the graduate level.

3. Solid grasp at the graduate level of key concepts and techniques in at least at least three of the following six areas: analysis, applied mathematics, computational mathematics, algebra and discrete mathematics, geometry and topology, and probability and statistics.

4. In-depth understanding of an advanced topic in mathematics not covered in the graduate curriculum.

5. Proficiency in constructing formal and correct proofs.

6. Ability to critically examine the correctness of mathematical arguments.

Please repond to the following:

1. *Describe the level of faculty participation on this assessment.*

   There were two assessment measures carried out this year, and virtually the entire faculty in the graduate program participated, either in one or both. The first one (the qualifying exams) entailed departmental meetings to discuss the exam results and to determine pass/fail thresholds; these meetings were, and have always been, well attended by the faculty. As for the second assessment measure (the oral exams), nearly every faculty member who teaches graduate courses was involved in some capacity --- either as a faculty advisor preparing the student for their oral defense or as an appointed member of the judging panel or as a faculty member attending an oral exam to help evaluate the student.

2. *Describe the frequency of evaluating the program SLOs.*

   Every program SLO will be assessed at least once every two years.

3. *How are the assessments meaningfully connected to improvement efforts?*

   The improvement efforts are all prompted by the assessment results.

Student Learning Objectives Assessed This Year:

Assessment Measures	SLOs Assessed	Results and Improvements
Performance in Qualifying Exam	1	Following departmental policy, two written qualifying exams were held this year, one in September and one in March. Each was written by two faculty members, who also graded the students' solutions. The scores of the exams were then presented and discussed in a departmental graduate committee meeting, during which the decision regarding the cut-off score for passing was made. The decision-making process took into account the difficulty level of the exam and graduate-level math standards. Of the 18 students who took the first exam, 7 students passed (about 39% pass rate). In the second exam, 7 passed out of 12 (about 58% pass rate). These results are in line with the typical pass rates of this exam, which historically varied mostly between 40% and 60%. To improve the pass rate, additional advisement and guidance on how to better prepare for the exam will be offered and provided.
Evaluation of student's performance in the oral exam on the subject of her/his project or thesis by graduate faculty committee	4, 6	10 graduate students took their oral exams during the Winter quarter, which is the designated time for such exams. The exam performances were evaluated using a three-level rating: highly satisfactory, satisfactory, unsatisfactory. The student is deemed to have passed the oral exam if he or she receives either a satisfactory or highly satisfactory rating. All 10 students passed their exams, with 6 achieving highly-satisfactory ratings and 4 receiving satisfactory ratings. This is a highly agreeable result, by any standard. However, in keeping with efforts at continual improvement, the method of evaluation using the three-level rating will be replaced by a rubric, which is a more effective tool at assessment.

Summary of Intended Improvements:

As mentioned in the table above, to improve the pass rate of the qualifying exam, additional help and guidance will be provided for students who are studying for the exam and who are struggling with passing the exam.

The rating-system evaluation of oral exam, used last Winter quarter, will be supplanted by a rubric. The rubric assesses the oral exam by means of three different grading criteria, each with a clear set of expectations. Starting next fall, all oral exams will be evaluated using the rubric, thus allowing the faculty to identify specific areas of weakness, if any, for improvement.

Graduate Program Self-Assessment Report Rubric

The Graduate Council, in coordination with the University Accreditation and Assessment Advisory Committee (AAAC), will use this rubric in responding to the program assessment reports. Keep these criteria in mind as you complete your report. As part of your Closing the Loop report, please complete a self-assessment using this rubric. Simply circle whether you believe your Student Learning Assessment is at Best Practice, At Standard, Developing, or Unacceptable using the descriptions.

	Best Practice	At Standard	Developing	Unacceptable
Level of Faculty Participation	Broad faculty participation	Select faculty participation with departmental discussion.	Select faculty participation.	Minimal faculty participation.
Frequency and Meaningfulness of Assessment	1. All degree or program SLOs assessed twice in a 5-year cycle corresponding with the Graduate Council program review schedule. 2. Assessments meaningfully connected to improvement efforts.	1. All degree or program SLOs assessed at least once in a 5-year cycle corresponding with the Graduate Council program review schedule. 2. Assessments meaningfully connected to improvement efforts.	Some SLOs not assessed, but selected SLO assessments meaningfully connected to improvement efforts.	Some SLOs not assessed, and elected SLO assessments not meaningfully connected to improvement efforts.
Measures	1. SLO assessment includes meaningful direct measures with threshold designations. 2. Indirect measures meaningfully supplement direct measures.	SLO assessment includes 1 meaningful direct measure for each outcome.	SLO assessment includes direct measures but they are not sufficiently meaningful.	No direct measures of student learning.
Reporting Results	Reported results detail meaningful conclusions sufficient to support data-informed and measurable improvements.	Reported results permit actionable improvements but in a manner that is inferential rather than measurable.	Reported results are not sufficiently specific or meaningful to permit data-informed improvements.	No results reported.
Stage of Implementation of the Improvements	Improvement is fully implemented; program is prepared to evaluate the effect of the improvement upon student achievement.	Improvement is largely implemented (e.g., proposed curriculum change was approved by the department/college and sent to the Graduate Council/ACC).	Program has a plan for implementing the improvement.	Program has no plan for implementing the improvement.