



Mathematics Annual Assessment

2017-2018

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Annual Assessment 17-18

Mathematics

Program Profile

Program Mission Statement

Please insert your program mission statement here

The mission of the Mathematics program is to provide an environment where students can learn and become accomplished users of Mathematics and Mathematical applications. The program contributes to the development of students as Mathematical thinkers, enabling them to become life-long learners, to continue to develop in their chosen professions, and to function as productive citizens.

Program Data

Delivery Method

Traditional On Campus (selected)

Online

Hybrid

Students Majors 2016-17

4

Student Minors 2016-17

4

Student Majors 2017-18

5

Student Minors 2017-18

4

Concentrations 2016-17

If your program contains concentrations, please list the concentrations and the number of students identified within each concentration.

Concentrations 2017-18

If your program contains concentrations, please list the concentrations and the number of students identified with each concentration.

Student Demographics

Program goals for student retention, persistence and degree completion are? What do the persistence numbers mean to the faculty in the program? Are your persistence numbers what you expected? If not, how could the numbers be improved? What is the optimal enrollment for the program?

The Mathematics faculty would like to increase the enrollment in the program. Although the individual attention and small classes sizes are positives, it would be helpful to have more students to support the growth of the program. Some of the classes in the past have been tutorials, and the faculty would like to lessen the chances of that being necessary. The small sample size of students makes discussion of the persistence numbers challenging. Most of the students who have entered the program have completed it. The faculty feels optimal enrollment for the program would be between 10-15 students,

Is the Program Externally Accredited

Yes
No (selected)

External Accreditation

Name the Accrediting Agency or entity including the last review/approval. Is there an accrediting body for the field of study? If yes, what is the name of the group. Is the program seeking accreditation? If no, why?

There is no outside accreditation for Mathematics.

Program Assessment

Standard/Outcome

Identifier	Description
WWU2016.1	Major Field Competence: Students will demonstrate excellence in an academic or professional discipline, and engage in the process of academic discovery.
WWU2016.2	Ethics: Students will exhibit values and behaviors that address self- respect and respect for others that will enable success and participation in the larger society.
WWU2016.3	Self-Liberation: Students will develop an honest understanding and appreciation of themselves and others resulting in an ability to make individual decisions.
WWU2016.4	Lifelong Education: Students will possess an intellectual curiosity and desire for continual learning both within and beyond formal education in preparation for participation in a global society.

Additional Standards/Outcomes

Identifier	Description
MAT.1	Apply mathematical concepts, methods and tools in solving problems pertaining to the world at large.
MAT.2	Model rates of change and accumulation of various quantities and find conditions under which those quantities are optimized in both discrete and continuous settings.
MAT.3	Identify and demonstrate pattern and structure inherent in performing different operations on mathematical objects.
MAT.4	Analyze situations involving multiple objects and constraints using multidimensional space.
MAT.5	Demonstrate the dependence or independence of mathematical statements upon their axiomatic framework.
MAT.6	Exhibit competence in various methods of analytic proof.
MAT.7	Accurately use algorithms in appropriate contexts.
MAT.8	Demonstrate the existence of numerical, geometric, and symbolic trends and make conjecture based on those trends.

General Education Alignment to Program

How do the General Education criteria align with the Program Objectives? What courses within your program build upon

skills learned in general education courses (please list the program course and the general education criteria). The General Education clusters are: Critical Analysis, Creative Expression, Quantitative Inquiry, and Society & the Individual. See attached for more detailed breakdown.

Communication: Mathematics majors need to have communication skills to present steps in a problem clearly. They also need to be able to communicate their understanding of Mathematical concepts to others, both in written and spoken form.

Critical Thinking: Critical thinking is required in all Mathematics courses to analyze and construct Mathematical proofs of concepts.

Meaning: Students are required to read chapters in their textbooks in all courses, and identify central themes and underlying meaning. They often need to identify central themes of individual courses as well.

Ethics: Ethics is often a major concern in Statistics courses. Data should not be modified to meet the desired goals, nor should testing processes be developed to achieve a certain goal.

Historical Perspective: Mathematics is a sequential process, so the historical perspective on how these processes are achieved is often studied. Also, we often investigate particular results or theorems and the process of their development.

Fine Arts: Mathematics is often a visual process, requiring an understanding of geometrical shapes and curves. While artistic ability is not always required for this, it can assist in visualizing these concepts.

Natural Science: In the Mathematics courses, applications to other disciplines are often studied. Fields of natural science such as Physics and Biology frequently require Mathematical concepts.

Social Science: Statistics are often needed to analyze data collected in Social Sciences such as Psychology and Sociology. Also, economics often requires analyzing financial data.

Diversity: Many Mathematical concepts were developed by cultures other than our own. Mathematics is often considered the “universal language”, meaning it is the result of the collective human experience.

(HLC 4B1)

GE_Cluster_Descriptions_FINAL_Version_Approved.docx

Curriculum Map

A - Assessed
 R - Reinforced
 I - Introduced
 M - Master

CURRICULUM MAP(Imported)

	MAT 124	MAT 214	MAT 215	MAT 224	MAT 312	MAT 313	MAT 314	MAT 324	MAT 325	MAT 422	MAT 423	SPR
MAT.1 Apply mathematical concepts, methods and tools in solving problems pertaining to the world at large.	I	R	R	R	R	R	R	M	M	M	M	A
MAT.2 Model rates of change and accumulation of various quantities and find conditions under which those quantities are optimized in both discrete and continuous settings.	I	R		R	M	R						
MAT.3 Identify and demonstrate pattern and structure inherent in performing different operations on mathematical objects.	I	R	R	R	R	R	R	M	M	M	M	A
MAT.4 Analyze situations involving multiple objects and constraints using multidimensional space.				I, A, M		R	R					
MAT.5 Demonstrate the dependence or independence of mathematical statements upon their axiomatic framework.	I	R		R	R	M, A						A
MAT.6 Exhibit competence in various methods of analytic proof.	I	R	R	R	R	R	R	M	M	M	A	A
MAT.7 Accurately use algorithms in appropriate contexts.			I			R			M, A			A
MAT.8 Demonstrate the existence of numerical, geometric, and symbolic trends and make conjecture based on those trends.	I	R		R	R	R	A, M	R	R			A

Assessment Findings

Assessment Findings for the Assessment Measure level for CURRICULUM MAP(Imported)

MAT.1 Apply mathematical concepts, methods and tools in solving problems pertaining to the world at large.				
Assessment Measures				
Student Performance Review				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Portfolio Review	Has the criterion 80% received a score of 3 or higher on the 4 point scale for the Mathematics assessment rubric. been met yet? Met	All five of the Mathematics majors received a score of 3 or higher on the 4 point scale for the Mathematics assessment rubric.		

* No Assessment on Objective 2 found

MAT.3 Identify and demonstrate pattern and structure inherent in performing different operations on mathematical objects.				
Assessment Measures				
Student Performance Review				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Presentation	Has the criterion 80% of the students will receive a score of 3 or higher on a 4 point scale for portfolio presentation. been met yet? Met	All five of the Mathematics majors received a score of 3 or higher on the 4 point scale for the Mathematics assessment rubric.		

MAT.4 Analyze situations involving multiple objects and constraints using multidimensional space.				
Assessment Measures				
MAT 224				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives

Direct - Final Exam

Has the criterion 80% of students will achieve a score of 80 percent or higher on the Calculus III final exam. been met yet?

Not met

Calculus III was not offered during the 2017-18 school year.

MAT.5 Demonstrate the dependence or independence of mathematical statements upon their axiomatic framework.				
Assessment Measures				
MAT 313				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Final Exam				
	Has the criterion 80% of students will achieve a score of 80 percent or higher on the Mathematical Statistics final exam. been met yet?	Mathematical Statistics was not offered during the 2017-18 school year.		
	Not met			
Student Performance Review				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Portfolio Review	Has the criterion 80% of the students will receive a score of 3 or higher on a 4 point scale for portfolio presentation. been met yet?	All five of the Mathematics majors received a score of 3 or higher on the 4 point scale for the Mathematics assessment rubric.		
	Met			

MAT.6 Exhibit competence in various methods of analytic proof.

Assessment Measures

MAT 423				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Final Exam	Has the criterion 80% of the students will achieve a B grade or higher on the final exam. been met yet? Met	4 of 4 (100%) of the students enrolled in MAT 423 achieved a B grade or higher on the final exam.		

Student Performance Review				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Portfolio Review	Has the criterion 80% of the students will receive a score of 3 or higher on a 4 point scale for portfolio presentation. been met yet? Met	All five of the Mathematics majors received a score of 3 or higher on the 4 point scale for the Mathematics assessment rubric.		

MAT.7 Accurately use algorithms in appropriate contexts.

Assessment Measures

MAT 325				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Class Assignment	Has the criterion 80% of the students will achieve a B grade or higher on the class project. been met yet? Not met	Numerical Analysis was not offered during the 2017-18 school year.		

Student Performance Review				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Portfolio Review	Has the criterion 80% of the students will receive a score of 3 or higher on a 4 point scale for portfolio presentation. been met yet? Met	All five of the Mathematics majors received a score of 3 or higher on the 4 point scale for the Mathematics assessment rubric.		

MAT.8 Demonstrate the existence of numerical, geometric, and symbolic trends and make conjecture based on those trends.

Assessment Measures

MAT 314				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Case Study	Has the criterion 80% of the students will achieve a score of 75 or higher on this project. been met yet? Not met	Higher Geometry was not offered during the 2017-18 school year.		

Student Performance Review				
Assessment Measure	Criterion	Summary	Attachments of the Assessments	Improvement Narratives
Direct - Portfolio Review	Has the criterion 80% of the students will receive a score of 3 or higher on a 4 point scale for portfolio presentation. been met yet? Met	All five of the Mathematics majors received a score of 3 or higher on the 4 point scale for the Mathematics assessment rubric.		

Analysis of the Assessment Process

Describe your assessment process; clearly articulate how the program is using course work and or assessment day activities for program assessment. Note any changes that occurred to that process since the previous year. Discuss what activities were successful at assessment and which ones were not as helpful and why. Please include who met to discuss the changes (unless you are a program of one person) and when you met. – Include a discussion on the process for collection and analysis of program data.

Analysis of Assessment:

The process of the student portfolio and individual interview has worked well for the Mathematics majors. It allows them to reflect on their prior coursework and to practice interview skills that will be needed in future career work. All students met the benchmark established for success. Several of the objectives have not been assessed yet, due to the courses not yet being offered. These objectives will be assessed and analyzed in coming years.

Improvement Narrative List

Assessment Findings for the Assessment Measure level

No improvement narratives have been added.

Program Activities

Student Performance Review

Describe the department assessment day activities if not already described previously. Please articulate the nature of the assessments are conducted, explain the process for assessment that happens on these two days. Include the schedule of assessment day for your program. What does the data and outcomes tell you? What changes will you make as a result of the data? What areas are successful for the program?

Conducted interviews with each Mathematics, Physics, and Pre-Engineering major for the Student Performance Days. The Mathematics faculty members (Chris Schneider, Raymond Hune, and Julie Davenport) interviewed Math majors Briley Browning, Mackenzie Hawkins, Mikayla Maple Laburay, James Rogers, and Bailey Ward; Physics majors Desi DesBouillons II and Aurora Henriksen, and Pre-Engineering majors Sarah Eliason, Taylor Nelson, and Connor Poulsom.

Student Performance Review Schedule

Upload the program schedule for students during Performance Reviews.

Student_Performance_day_schedule_2018.xlsx

Senior Showcase

Describe program Senior Showcase activities if not detailed previously in the report? What benefit does the program gain from the activities? What if any assessment of students happens during this event? What changes if any will occur due to what is learned by faculty on Senior Showcase?

Senior Mathematics majors Bailey Ward and James Rogers did a presentation on Cryptography from the Numerical Analysis course. As a LEAD event, it allowed other students to get some understand of an application of Mathematics. The seniors were given an opportunity to work on their presentation skills, and the faculty were able to observe this. We plan to give more guidelines to future seniors to improve the quality of future presentations.

Assessment Rubrics

Upload rubrics used for Senior Showcase or Student Performance Reviews for student assessment.

Mathematics_Assessment_Rubric.doc

Service Learning

Does the Program include projects/ course content that uses the philosophy of service learning?

Yes

No (selected)

Service Learning Component

If so, how is service learning infused in the coursework within your department? Is service or community engagement in the program mission? Describe the Service Learning Activities that your students and department engaged in this past year. How did the activities improve student learning? How did the activities benefit the community?

LEAD Events

Highlight lead events sponsored by program faculty that are connected to program or general education objectives for the past academic year. Include a total number of lead events program faculty sponsored.

The Senior presentation of Bailey Ward and James Rogers was a LEAD event along with other presentations during the Senior Showcase days. About 15 students attended.

Student Accomplishments

Highlight special examples of student successes in the field (academic: mentor-mentee, conference presentations, competitive internship, journal acceptance; extra-curricular: horse show championship, art exhibit). This is for any accomplishments that a student achieved outside of course work or the normal expectations of student success.

Faculty Accomplishments

Highlight special examples of faculty success in the profession/field/content area. This is for any accomplishment of a faculty activity/research/professional nature.

Professors Julie Davenport and Chris Schneider attended the Missouri Math Pathways Central Regional Symposium on September 29. This was a meeting of college and high school teachers in central Missouri to discuss creating a pathway for students to progress through their college Math courses. There was discussion about the naming of some of the General Education math courses such as College Algebra and Survey of College Math.

Assessment Rubric

Annual Assessment Rubric

8.000 pts 66.67%

	3.000 Assessment Reflects Best Practices	2.000 Assessment Meets the Expectations of the University	1.000 Assessment Needs Development	0.000 Assessment is Inadequate	N/A
Learning Objectives weight: 1.000	<ul style="list-style-type: none"> • Detailed, measurable program learning objectives • Objectives are shared with students and faculty 	<ul style="list-style-type: none"> • Measurable program learning objectives. • Learning objectives are available to students. 	<ul style="list-style-type: none"> • Program learning objectives are identified and are generally measurable 	<ul style="list-style-type: none"> • Program learning objectives are not clear or measurable 	N/A
Comment:					
Assessment Measures weight: 1.000	<ul style="list-style-type: none"> • Multiple measures are used to assess a student-learning objectives. • Rubrics or guides are used for the measures. • All measurements are clearly described. • External evaluation of student learning included. 	<ul style="list-style-type: none"> • Assessment measures relate to program learning objectives. • Various measures are used to assess student learning. • Measures chosen provide useful information about student learning. 	<ul style="list-style-type: none"> • Assessment focuses on class content only. • Minimal description of how the assessment relates to the objective. • Minimal assessment measures established. 	<ul style="list-style-type: none"> • Assessment measures not connected to objectives. • Assessment measures are not clear. • No assessment measures are established. 	N/A
Comment:					
Assessment Results weight: 1.000	<ul style="list-style-type: none"> • All objectives are assessed annually, or a rotation schedule is provided. • Data are collected and analyzed to show learning over time. • Standards for performance and gaps in student learning are clearly identified. 	<ul style="list-style-type: none"> • Most objectives assessed annually. • Data collected and analyzed showing an annual snapshot of student learning. • Data are used to highlight gaps in student learning. • Some data from non-course based content. 	<ul style="list-style-type: none"> • Data collected for at least one program objective. • Data collection is incomplete. • Gaps in student learning not identified. • Lacking external data to support course data. 	<ul style="list-style-type: none"> • Learning objectives are not routinely assessed. • Routine data is not collected. • No discussion on gaps in student learning. • No use of external data to support student learning. • Assessment data not yet collected. 	N/A
Comment:	<p>There is only one datapoint for most objectives and it would be helpful for the program to have a minimum of 2 data points for each objective. This could be accomplished if some course based assessment was included in the overall assessment plan. The assessment plan can rotate to match the rotation of the upper level courses, or the program could use Calculus as a baseline as it is taught regularly.</p>				
Faculty Analysis and Conclusions weight: 1.000	<ul style="list-style-type: none"> • Data is shared that incorporates multiple faculty from the program. • Discussions on data results incorporate multiple faculty. • Opportunities for adjunct faculty to participate. • Includes input from external sources when possible. 	<ul style="list-style-type: none"> • Multiple program faculty receive assessment results. • Assessment results are discussed. • Specific conclusions about student learning are made based on the available assessment results. 	<ul style="list-style-type: none"> • Minimal faculty input about results is sought. • Data not used to determine success or not to the objective. • Minimal conclusions made. 	<ul style="list-style-type: none"> • Faculty input is not sought. • Conclusions about student learning are not identified. • N/A • Program recently started or too few graduates to suggest any changes. 	N/A
Comment:					
Actions to Improve Learning and Assessment weight: 1.000	<ul style="list-style-type: none"> • All assessment methods, timetable for assessing, and evaluating the effectiveness modifications are included. • Changes to assessment are inclusive of multiple faculty. • Description of changes is detailed and linked to assessment results. 	<ul style="list-style-type: none"> • More than one change to assessment is proposed, timetable for assessment, and evaluating the change is provided. • Changes to assessment measures is highlighted. • Changes are realistic, with a good probability of improving learning or assessment. 	<ul style="list-style-type: none"> • At least one change to improve learning or assessment is identified. • The proposed action(s) relates to faculty conclusions about areas for improvement. • Adjustments to the assessment are proposed but not clearly connected to data 	<ul style="list-style-type: none"> • Lacking actions to improve student learning. • Actions discussed lack supportive data. • Lacking discussion of the effectiveness of the assessment plan 	N/A
Comment:	<p>no changes were recommended or discussed for future assessment. The program is going to continue current practices to create a pool of data to support decision making as their student population is low, they need additional cycles of data to make curricular decisions.</p>				