Annual Assessment Report

Mathematics

Chris Schneider and Raymond Hune

Annual Assessment Report

Program Profile

	2013-2014	2014-2015
Majors (total, majors 1,2,3)	7	5
Minors	4	3
Concentrations (Add Rows if needed)		
Full Time Faculty		
Part Time Faculty		

Program Delivery (HLC 3A3)

Traditional on-campus _____X_____

Online Program _____

Evening Cohort _____

Analysis:

Program goals for student retention, persistence and degree completion are? Consider the students' "time to degree." Does the actual time to degree fit and reflect the program's expected and advertised time? If not, are there ways to align the two?

Outside Accreditation:

There is no outside accreditation agency for Mathematics.

Program Action Items

Action Item 1:	Develop the (MAT314) Higher Geometry course project.
Action steps:	Higher Geometry will be taught as a tutorial in Spring 2015 for one student who is a non-major. This will allow an opportunity for the project to be implemented as a pilot to see if useful assessment data is obtained.
Timeline	The project was given in the Spring 2015 semester.
Faculty Responsible	Chris Schneider, who will teach the tutorial section of MAT314.
Evaluation	The student in tutorial section of MAT314 in Spring 2015 did complete the project for Higher Geometry. As the student was not a Math major, we will reassess the process and administer the project the next time the course is taught (in the 2015-16 year), when Math majors will also be taking the course.

Action Item 2:	Consider implementing an EST test to assist in assessment of our majors.
Action steps:	The Mathematics faculty plan to administer some type of standardized test during the Student Performance Days in Spring 2016. The faculty will work with Carrie McCray to see what options are available and which would be best suited for our majors.
Timeline	The Mathematics Major Field test was selected as an assessment instrument. The initial plan was to administer the exam in Spring 2015, but it will now be done in the 2015-16 year.
Faculty Responsible	Chris Schneider and Raymond Hune. Carrie McCray has set aside funding in her budget for the cost of the exams.
Evaluation	The two graduating seniors did not complete the Major Field test due to difficulties in finding a time to take the exam between class conflicts and athletic events. We will ensure that the seniors next year will take the Major Field Test in Mathematics.

Program Objectives: (from most recent Assessment Plan)

Objective 1. Apply mathematical concepts, methods and tools in solving problems pertaining to the world at large.
Objective 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.
Objective 3. Identify and demonstrate pattern and structure inherent in performing different operations on mathematical objects.
Objective 4. Analyze situations involving multiple objects and constraints using multidimensional space.
Objective 5. Demonstrate the dependence or independence of mathematical statements upon their axiomatic framework.
Objective 6. Exhibit competence in various methods of analytic proof.
Objective 7. Accurately use algorithms in appropriate contexts.
Objective 8. Demonstrate the existence of numerical, geometric, and symbolic trends and make conjecture based on those trends.

Program Objectives Matrix (from most recent Assessment Plan)

	Obj. 1	Obj. 2	Obj. 3	Obj. 4	Obj. 5	Obj. 6	Obj. 7	Obj. 8
MAT124	I	I	I		I	I		I
MAT214	R	R	R		R	R		R
MAT215	R		R			R	I	
MAT224	R	R	R	I, M, A	R	R		R
MAT312	R	M	R		R	R		R
MAT313	R	R	R	R	M, A	R	R	R
MAT314	R		R	R		R		M, A
MAT324	M		M			M		R
MAT325	M		M			M	M, A	R
MAT422	M		M			M		
MAT423	M		M			A		

Assessment of Program Objectives

Objective 1	Apply mathematical concepts, methods and tools in solving problems pertaining to the world at large.
Methods	A portfolio presentation will be required of all majors for the annual performance days. The Mathematics faculty and invited guest assessors

	will evaluate the portfolios based on the designed rubric.
Benchmark	80% of the students will receive a score of 3 or higher on a 4 point scale for portfolio presentation.
Data Collected (course specific)	The Assessment Rubric for the portfolio presentation and interviews is attached at the end of the report. Also attached is the instruction sheet given to each major to prepare their portfolio. We had a total of five interviews this year.
Data Collected (Assessment Day, external tests, Senior Achievement)	Each major will prepare a portfolio and participate in an individual interview during the Student Performance Days in March 2015. They will be scored on the attached rubric.
Results/Outcomes	Each Mathematics major participated in the Student Performance Day interviews, and the rubrics were scored and recorded. All five of the students (100%) scored 3 or higher on the portfolio presentation, exceeding the benchmark.
Proposed changes to the assessment process	The faculty plan to also implement a Major Field test for Mathematics to further gauge student progress. The faculty does not feel changes are needed in the portfolio or the individual interviews.
Budget needs related to the objective?	We plan to administer the Major Field test to the graduating seniors in the 2015-16 school year. There should not be any budget needs in administering the exams, as we already have enough copies of the tests for the two seniors graduating next year.

Objective 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.
Methods	A senior project will be required of all graduating majors, reviewing what they have learned during their time at William Woods.
Benchmark	Successfully completing the senior project.
Data Collected	The faculty implemented the senior project with this year's graduating

(course specific)	seniors. As Mathematics does not have a capstone course, the students will meet individually with Chris Schneider, but will be expected to primarily complete it on their own time.
Data Collected (Assessment Day, external tests, Senior Achievement)	The seniors will complete the project during their final semester at William Woods, and then present their results during the Senior Performance Days.
Results/Outcomes	The seniors in Spring 2015 completed a senior portfolio similar to what has been done in the past. With both seniors not taking any Math courses and both being athletes, there was difficulty in getting enough time to meet to be able to complete the modified senior project idea.
Proposed changes to the assessment process	There will be two seniors graduating next year, both who will be taking classes in their last semester. This should make it easier to meet and discuss the process of preparing the project. We will reassess the project idea after the coming year. Another possible solution would be to develop a capstone course for Mathematics where time could be devoted to the senior project.
Budget needs related to the objective?	There are no budget needs specific to the senior project.

Objective3	Identify and demonstrate pattern and structure inherent in performing different operations on mathematical objects.
Methods	A portfolio presentation will be required of all majors for the annual performance days. The Mathematics faculty and invited guest assessors will evaluate the portfolios based on the designed rubric.
Benchmark	80% of the students will receive a score of 3 or higher on a 4 point scale for portfolio presentation.
Data Collected (course specific)	The Assessment Rubric for the portfolio presentation and interviews is attached at the end of the report. Also attached is the instruction sheet given to each major to prepare their portfolio. We had a total of five

	interviews this year.
Data Collected (Assessment Day, external tests, Senior Achievement)	Each major will prepare a portfolio and participate in an individual interview during the Student Performance Days in March 2015. They will be scored on the attached rubric.
Results/Outcomes	Each Mathematics major participated in the Student Performance Day interviews, and the rubrics were scored and recorded. All five of the students (100%) scored 3 or higher on the portfolio presentation, exceeding the benchmark.
Proposed changes to the assessment process	The faculty plan to also implement a Major Field test for Mathematics to further gauge student progress. The faculty does not feel changes are needed in the portfolio or the individual interviews.
Budget needs related to the objective?	We plan to administer the Major Field test to the graduating seniors in the 2015-16 school year. There should not be any budget needs in administering the exams, as we already have enough copies of the tests for the two seniors graduating next year.

Objective 4	Analyze situations involving multiple objects and constraints using multidimensional space.
Methods	The Calculus III (MATH 224) final exam, as Calculus III is a course concerned with multidimensional spaces.
Benchmark	80% of students will achieve a score of 80 percent or higher on the Calculus III final exam.
Data Collected (course specific)	Calculus III (MATH 224) will be offered in the Spring 2015 semester. The final exam will be administered and data will be collected at that time. The current course rotation calls for MATH 224 to be offered in odd years during the spring semester.
Data Collected (Assessment Day, external tests,	MATH 224 was offered in Spring 2015, and all of the students took the final exam in the course.

Senior Achievement)	
Results/Outcomes	All of the students (100%) scored 80 percent or higher on the final exam, exceeding the stated benchmark.
Proposed changes to the assessment process	The faculty will review the assessment process over the summer with the new data in mind. We will consider whether the originally stated benchmark needs to be adjusted.
Budget needs related to the objective?	No budget needs are anticipated for this objective.

Objective 5	Demonstrate the dependence or independence of mathematical statements upon their axiomatic framework.
Methods	The final exam of the Mathematical Probability and Statistics course (MATH 313).
Benchmark	80% of the students will achieve a score of 80 percent or higher on the Mathematical Statistics final exam.
Data Collected (course specific)	Mathematical Probability and Statistics (MATH 313) will be offered in the Spring 2015 semester. The final exam will be administered and data will be collected at that time. The current course rotation calls for MATH 313 to be offered in odd years during the spring semester.
Data Collected (Assessment Day, external tests, Senior Achievement)	MATH 313 was offered in Spring 2015, and all of the students took the final exam in the course.
Results/Outcomes	All of the students (100%) achieved a score of 80 percent or higher on the final exam, exceeding the goal of the objective.
Proposed changes to the assessment	The faculty will review the assessment process over the summer with the new data in mind. We will consider whether the originally stated

process	benchmark needs to be adjusted.
Budget needs related to the objective?	No budget needs are anticipated for this objective.

Objective 6	Exhibit competence in various methods of analytic proof.
Methods	The final exam in the Number Theory (MATH 423) course.
Benchmark	80% of the students will achieve a B grade or higher on the final exam.
Data Collected (course specific)	The five Mathematics majors in MATH 423 in the Fall 2013 semester all achieved a grade of 80% or higher on the final exam. There was no separate rubric for this other than the scoring of the exam. The course will be next offered in the 2015-16 school year.
Data Collected (Assessment Day, external tests, Senior Achievement)	No data will be collected this year, as the course will not be offered.
Results/Outcomes	In Fall 2013, 100% of the Mathematics majors achieved the stated benchmark on the final exam, exceeding the required 80%. No further outcomes will be obtained this year.
Proposed changes to the assessment process	No changes are proposed to this objective at this time. MATH 423 will be offered in the Fall 2015 semester, so this objective will be assessed again at that time.
Budget needs related to the objective?	No budget needs are anticipated for this objective.

Objective 7	Accurately use algorithms in appropriate contexts.
Methods	A course project will be assigned in the Numerical Analysis course

	(MATH 325).
Benchmark	80% of the students will achieve a B grade or higher on the class project.
Data Collected (course specific)	MATH 325 was offered in Fall 2014 and the course project was assigned.
Data Collected (Assessment Day, external tests, Senior Achievement)	The five Mathematics majors in MATH 325 in the Fall 2014 semester all achieved a B grade or higher on the course project. This was a 100% rate, exceeding the benchmark of 80%.
Results/Outcomes	100% of the Mathematics majors achieved the stated benchmark on the Numerical Analysis course project, exceeding the required 80%.
Proposed changes to the assessment process	The course project went well and appears to be a good tool for assessment for this objective. No changes are proposed at this time. The course will not be offered during the 2015-16 year.
Budget needs related to the objective?	No budget needs are anticipated with this objective.

Objective 8	Demonstrate the existence of numerical, geometric, and symbolic trends and make conjecture based on those trends.
Methods	A project/case study will be assigned in the Higher Geometry (MATH 314) course.
Benchmark	80% of the students will achieve a score of 75 or higher on this project.
Data Collected (course specific)	MATH 314 was offered in Spring 2015, but only as a tutorial to one student, who was not a Mathematics major.
Data Collected (Assessment Day, external tests, Senior	The one student in MATH 314 did complete the project.

Achievement)	
Results/Outcomes	The one student did score above 75%, however due to the small sample size we do not feel we can realistically say the benchmark was exceeded.
Proposed changes to the assessment process	MATH 314 will be offered again in the Spring 2016 semester, and it is likely there will be Math majors enrolled in the class this time. The project will be administered again, and reassessed afterwards, with more data at hand.
Budget needs related to the objective?	No budget needs are anticipated for this objective.

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.

The faculty plan to add an outside assessment tool, the Mathematics Major Field Test, in the 2015-16 year. This will allow better comparisons between William Woods Mathematics students and students at other institutions. The outside reviewer for the Mathematics five year program review indicated that they felt this would be a necessary step. (HLC 4B1).

Analysis of the Assessment Process (Empirical & Non-Empirical) (HLC4B3)

The student interviews administered during the Student Performance Days again resulted in positive outcomes for all of the majors. The interviews appear to be taken seriously, and the students have commented that they find them useful in gauging their success and also in preparing them for formal interviews later in their careers.

Program Changes Based on Assessment:

The Mathematics faculty is planning to implement a Mathematics Major Field Test as another gauge of student performance. This test will be administered to each major during the annual Student Performance Days. Each major's performance on the test will be tracked through their academic career to measure their improvement as they progress through the program. The cost of the exam will be covered through the office of the Dean of Assessment. The faculty feel this will provide a more quantitative assessment, as well as one that can be compared to outside programs.

The faculty has also considered replacing MAT 324, Formal Logic, with an Advanced Calculus course for the program requirements. Many graduate Mathematics programs require an Advanced Calculus course in their requirements, and this would give our graduates an advantage. Many of the concepts of the Formal Logic course are also covered in the HUM 107 Critical Thinking course, which many majors take as a General Education requirement. The faculty will not propose this change for the 2015-16 school year, but may consider it in future years.

General Education Assessment:

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)

Program Activities:

Student Performance Day Activities (Assessment Day):

The faculty will discuss the results of the 2015 Student Performance Day in the May revision of this report.

Senior Achievement Day Presentations:

The two graduating seniors, Kacey Scharnhorst and Julian Taylor, completed a senior portfolio, an overall reflection of their career at William Woods and what topics they found most interesting in their Mathematics courses.

Service Learning Activities:

There are no courses in Mathematics with a Service Learning component.

Program Sponsored LEAD Events:

No Mathematics LEAD events were offered in the 2014-15 year. Professor Vern Hart did offer several Science related events, including a poster session on the History of Science, a general overview of the process of obtaining a graduate degree in the sciences, and also a presentation of student research.

Student Accomplishments:

We did not have any Mathematics specific accomplishments by the Math majors in the 2014-15 year.

Faculty Accomplishments:

Professors Hune and Schneider attended the Missouri Math Summit in September. The primary topic of discussion was placing students in the General Education class that best fits the student's needs, a discussion we have been dealing with for several years in promoting MAT 112 Survey of College Math over MAT 118 College Algebra.

Professor Hart organized a Science Demonstration team that visited area public schools, giving demonstrations of scientific experiments and promoting the Sciences in general.

Alumni (Recent Graduates) Accomplishments (past year graduating class):

We have not received any updates on May 2014 graduate Katie Shikles. Her plans were to attend Columbia College and pursue a Master's Degree in Accounting/Business Administration.

To: Mathematics majors
From: Mathematics faculty: Chris Schneider and Raymond Hune
Re: Student Performance reviews of Mathematics majors for Spring 2015

William Woods University is in an ongoing process of annual assessment of each student enrolled in a degree program on campus. We will be assessing your progress in the Mathematics major during the upcoming Student Performance Days. The assessment will again cover two days this year. The traditional assessment that we have done in past years will be held on Wednesday, March 4. On Tuesday, March 3, we will have a lunch time meeting with all of the majors. Senior Mathematics majors will also complete a Major Field Test. Participation is a requirement of the Mathematics program.

PURPOSE

The annual assessment of all Mathematics students allows the division and its students as individuals to work toward the most professional and highest quality outcomes possible. We will provide you with a written report of your review after completion of the process. This report will include an assessment of where you stand based on faculty expectations appropriate to your year of study, and recommendations designed to aid in the achievement of your personal goals. The information that you provide will be placed with the faculty report in a permanent file and updated annually throughout your college years. The division will benefit from an overall assessment of student work, providing an understanding of curricular strengths and weaknesses. We also hope to improve the curriculum based on these assessments.

PROCESS

- By **March 2, 2015,** prepare a Mathematics Portfolio containing the following information and email copies to chris.schneider@williamwoods.edu.
- On **March 4, 2015**, you will meet with the Mathematics faculty and outside assessors for a formal review of the materials you have provided in your Mathematics Portfolio. A sign-up sheet will be available ahead of this date for you to schedule your individual appointment. No classes will be held on this day. *Students are expected to come dressed for this interview as they would if they were having a job interview or applying for a graduate program.* The review is intended to be non-confrontational and beneficial for both students and faculty.

Your Mathematics Portfolio should include:

A. A Personal Mission Statement

Most organizations, including William Woods University, have Mission Statements. They give their directors, all who work for them, and potential clients, an idea about who they are: their goals, what they hope to accomplish, how they are going to accomplish these goals, what their

standards are, and what their vision is. (You can easily find the campus Mission Statement on the William Woods home page, and it is also included on all of the Mathematics course syllabi.) You can use this as a model of how you develop your own personal Mission Statement.

Some questions you might want to consider are:

- *Who am I?*
- *Why am I a Mathematics major? Do I have a passion for this field?*
- *How does the Mathematics major relate to my career goals?*
- *Will I find enough challenge/excitement/fulfillment/fun in this field to sustain me and meet my personal goals beyond making a living?*

Of course, this will take some time and reflection. Start on it, set it aside, and then come back to it in a day or two. It should be about one paragraph in length. (Don't worry—this doesn't have to be forever. Next year you may wish to change it!)

B. Coursework

You should consider the following information related to the courses you have taken so far in your college career:

- Prepare a list of the Mathematics courses taken with the grade you received in each course. Include any other courses taken that you feel are relevant to your Mission.
- Describe how the content of these courses relates to your goals. Include examples of how the content in the various courses relate to one another.
- Describe one or two particular areas of study associated with your coursework that are particularly valuable to you.

C. List of Activities

Other than coursework, list your most significant activities or experiences and explain how they have benefited your Mission. Activities may include internships and other employment, research, volunteer work, special projects, retreats, conferences or presentations you have attended.

ASSESSMENT OF PROGRESS

In addition to the written documents, you should be prepared to respond verbally to questions asked by the Mathematics faculty and outside assessors regarding basic concepts and methodology in Mathematics that you are expected to have mastered by your current year in this major. (All of your course syllabi will have goals for that course and for the Mathematics major.)

Please do not hesitate to contact us if you have any questions regarding the assessment process.

Chris Schneider and Raymond Hune

Mathematics faculty

Assessment Rubric Annual Assessment Report					
Assessment Component	**Assessment Reflects Best Practices**	**Assessment Meets the Expectations of the University**	**Assessment Needs Development**	**Assessment is Inadequate**	**Comments:**
Learning Outcomes	☐ Program learning outcomes are aligned to national standards	☐ Measurable program learning outcomes. ☐ Learning outcomes are clearly articulated.	☐ Program learning outcomes have been identified and are somewhat measurable	☐ Program learning outcomes are not clear or measurable	☐
Assessment Measures	☐ Multiple measures are used to assess a student-learning outcomes. ☐ Rubrics or guides used are provided. ☐ All measurements are clearly described.	☐ Specific measures are clearly identified ☐ Measures relate to program learning outcomes. ☐ Measures can provide useful information about student learning.	☐ Some measurements are described, but need further description.	☐ Assessment measures do not connect to learning outcomes (objectives). ☐ Assessment measures are not clear. ☐ No assessment measures are established.	☐ Need some coursework assessment for objectives 1-3. ☐ Currently only performance review assm't
Assessment Results	☐ All learning outcomes are assessed annually; or a rotation schedule is provided. ☐ Data are collected and analyzed to evaluate	☐ A majority of learning outcomes assessed annually. ☐ Data collected and aggregated are linked to specific learning outcome(s). ☐ Standards for student performance and	☐ Data collected and aggregated for at least one learning outcome (objectives). ☐ Data collection is incomplete ☐ Standards for student performance and gaps in student learning are not identified.	☐ Learning outcomes are not routinely assessed. ☐ Routine data is not collected. ☐ N/A Program is too new to have collected assessment	☐ The low enrollment of upper level courses creates issues with the data.

	prior actions to improve student learning. ☐ Standards for performance and gaps in student learning are clearly identified.	gaps in student learning are recognized.		data.	
Assessment Component	**Assessment Reflects Best Practices**	**Assessment meets the expectations of the University**	**Assessment needs Development**	**Assessment is Inadequate**	**Comments:**
Faculty Analysis and Conclusions	☐ All faculty within the program synthesize the results from various assessment measures to form conclusions about each learning outcome. ☐ Includes input from adjunct faculty. ☐ Includes input from outside consultant.	☐ Program faculty receive annual assessment results and meet to discuss assessment results. ☐ Specific conclusions about student learning are made based on the available assessment results.	☐ Some program faculty receive annual assessment results ☐ Faculty input about results is sought	☐ 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.	Not focused on student results.
Actions to	☐ A	☐ Description of	☐ Adjustments to	☐ No actions	iscussion of

Improve Learning and Assessment	comprehensive understanding of the program's assessment plan and suggestions for improvement. ☐ Clearly stated adjustments in curriculum as a result of assessment data. ☐ Actions are innovative in approach in attempt to improve student learning.	the action to improve learning or assessment is specific and relates directly to faculty conclusions about areas for improvement. ☐ Description of action includes a timetable for implementation and identifies who is responsible for action ☐ Actions are realistic, with a good probability of improving learning or assessment.	the assessment plan are proposed but not clearly connected to data ☐ Minimal discussion of the effectiveness of the assessment plan; minimal discussion of changes, if needed.	are taken to improve student learning. ☐ Actions discussed are not connected to data results or analysis. ☐ N/A Program recently started or too few graduates to suggest any changes.	modifying rubrics, benchmarks, and adding MFT…

Additional Comments:

Make sure the rubric for the senior portfolio matches or is aligned to the program objectives. This might be a project that the program looks at for the semester so it is ready for the next round of senior presentations?

I have looked at the ETS website and I don't show that they have ever scored the math exams I bought for April? Did the students take the ETS test in April and you get it sent in?

It is understood that there is a need for rotating course based assessment data due to the rotation of courses. That should be on the matrix, so that it is clear when courses will be taught and assessed. Also, this might be another reason to look at the ETS Math test as an avenue for assessment? This would be a solid addition to the assessment that happens on Student Performance Reviews.

The program should brainstorm and consider avenues for assessment that will provide for more data to make the process more beneficial.