Mathematics Program at University of Wisconsin Green Bay

Self-Study Report (2017 November)

Cover

Name of Program**: Mathematics**

Name of Program Chair**: Woo Jeon**

Date of Last Program Review**: November 8, 2010**

Date the Current Self-Study Report approved by Mathematics Executive Committee**: November 30, 2017**

Mathematics Executive Committee:

Kathleen C. Burns (Associate Professor, Human Development)

Heidi S. Fencl (Professor, Natural & Applied Sciences)

Woo Jeon (Chair, Associate Professor, Natural & Applied Sciences)

Report

Section A. Mission Statement and Program Description

State your program's mission, describe its requirements and explain how they relate to UW-Green Bay's select mission and the institution's overall strategic plan. Note any changes that have been made to your program mission and requirements since the last review. Then provide a description of your program's curricular strengths and areas in need of improvement.

The Mathematics Program at UWGB provides a problem-focused education using critical thinking and logic in Mathematics. The Program believes that the quality of life for students will be enriched through their education in Mathematics at UWGB. To make this possible, the Mathematics Program should provide students a quality education and it has been our mission to:

1. Provide majors and minors in Mathematics, with areas of emphasis in Mathematics and in Statistics respectively, which provide an appropriate practical and theoretical mathematical knowledge and quantitative skills for a student to effectively market his/her expertise within a chosen profession and/or preparing for graduate studies.
2. Provide an environment in which disciplinary and interdisciplinary mathematical scholarship can effectively and efficiently be carried out.
3. Provide a component of the General Education Program that clarifies the importance of mathematics in our society and enhances the general mathematical literacy of our students.
4. Provide supporting courses for all degree programs within Natural and Applied Sciences - Biology, Chemistry, Geoscience, Engineering, Environmental Science and Mathematics, and Physics. Provide supporting courses for the following undergraduate programs: Accounting, Business Administration, Economics, Education, Environmental Policy and Planning, Human Biology, Human Development, Information Sciences, Interdisciplinary Studies, Nursing, Political Science, Psychology, Public Administration, Social Change and Development, Social Work, Sociology, Urban and Regional Studies. Provide supporting courses for the following pre-professional programs of study: Dentistry, Engineering, Medicine, Nursing, Occupational Therapy, Pharmacy, Physical Therapy, and Veterinary Medicine.
5. Provide a component of the Environmental Science and Policy and the Applied Leadership for Teaching and Learning graduate programs.
6. Provide service to the University and local community in the form of remedial mathematics courses, consulting, workshops, etc.

The Mathematics Program offers two emphasis, Mathematics and Statistics, for its major and minor. The requirement for each major and minor are as follows:

Mathematics major with Mathematics emphasis – 45 credits
Mathematics major with Statistics emphasis – 47 credits
Mathematics minor with Mathematics emphasis – 24 credits
Mathematics minor with Statistics emphasis – 24 credits

These credits include courses ranging from MATH 202 Calculus I and MATH 260 Introductory Statistics up to MATH 492 Special Topics in Mathematics. All the degrees that the Program offers are disciplinary majors and minors.

The faculty body of the Mathematics Program consists of one full professor (Provost), one associate professor (in Algebra), four assistant professors (Applied Mathematics, Geometry/Topology, and two in Statistics), three lecturers, and three ad-hoc instructors

Curricular Strengths

1. Our program does not require a lot of credits for its major. This means that students are able to achieve a (disciplinary) major in Mathematics with an interdisciplinary major or minor in 4 years. Typical interdisciplinary majors and minors for students who pursuit a major in Mathematics are Education, Business Administration, and Environmental Science. Within 45 or 47 credits, our curriculum covers important courses for its core.
2. The Mathematics Program supports a breadth of majors. The core requirement includes the "big three": Analysis, Algebra, and Geometry that reflect the current faculty members' specialties. The Mathematics Program also provides enough supporting courses: Calculus sequence, Linear Algebra I & II, Proofs, Statistics, Differential Equations.
3. Several courses serve for UWGB General Education requirements: Quantitative Literacy (MATH 202, 203, 260), Capstone Experiences (MATH 385)

Areas in Need of Improvement

1. There are not many elective options. For example, there are 5 courses listed as electives for Mathematics major with Mathematics emphasis. One of these is a Statistics course, however, in order to take one Statistics course (MATH 361) you must take another Statistics course (MATH 36) for a prerequisite, so it is not useful as an elective option, as you would have to take both courses while the elective is a requirement of only one additional course. Two of the other elective Math courses have been cancelled many times due to low enrollment and the last course option is an independent study. Since all 4 tenured or tenure-track faculty except one (newly hired Mathematician) are teaching overloads (even junior faculty members), we need more resources to be able to offer more elective courses. Low enrolment issue can be solved by engaging the student group while promoting "Math and Sats Club" activities. Two junior faculty members will be co-advisors of (newly reborn) the "Math and Stats Club" and it was launched in November 2017.
2. The core courses in Algebra and Geometry are survey courses, which are not abstract enough. These courses can be "real" undergraduate Algebra and Geometry courses by increasing their credits from 3 to 4. This can be a first step for the Mathematics Program to make the Core courses for its majors stronger. Right now, it is not strong enough for students pursuing higher education in graduate level studies.
3. There are no active courses for Applied Mathematics even though we have an applied mathematician (T. Malysheva). The Mathematics Program plans to offer MATH 355 (new course) Applied Mathematical Optimization (3cr) starting Fall 2018.
4. None of the courses offered by the Mathematics Program satisfies the Writing Emphasis requirement for General Education. The Program has a plan to offer two (at least one) upper-level Writing Emphasis courses starting Spring 2018.

Section B. Student Learning Outcomes Assessment

Describe the program's intended student learning outcomes and the methods used to assess them. Analyze the assessment results and describe the conclusions drawn from that analysis. Finally, describe what specific actions were taken as a result of the assessment of student outcomes learning.

The following is a list of the program's learning outcomes for students:

1. Mathematics majors will be able to understand the important mathematical/statistical concepts, theorems, formulas, computational techniques and axiomatic systems in the required courses.
2. Mathematics majors will be able to demonstrate the ability to follow, construct, and write mathematical proofs.
3. Mathematics majors will be able to apply knowledge derived from the major content areas of Calculus, Analysis, and Linear Algebra.

4. Mathematics majors will be able to pose mathematical/statistical problems and select and apply appropriate mathematical/statistical theories, models and tools to solve and/or analyze the problems.
5. Mathematics majors will be able to demonstrate their understanding of how mathematics/statistics is used in the solution of real-world problems.
6. Mathematics majors will be able to use technological aids appropriately in the study of mathematics/statistics and properly interpret and assess the computed results.

These outcomes have been assessed via combinations of quizzed, assignments, and exams for the following courses for last 4 academic years:

2016~2017	MATH 328, 385	Learning Outcomes 1, 2, 4
2015~2016	MATH 385	Learning Outcomes 1, 2, 4
2014~2015	MATH 385	Learning Outcomes 1, 2, 4
2013~2014	MATH 324	Learning Outcomes 1, 2, 4

Even though the results in each year are satisfactory in every aspects (see p41~46), the Program has a plan to

1. Assess other learning outcomes
2. Get data from various classes that include Statistics classes.

during the next Program Review cycle (2017~2024).

Section C. Program Accomplishments and Student Success

Describe your program's major accomplishments and student successes since the last Academic Program Review (e.g., internship program; enrollment increases; student achievements, awards, publications, and presentations; faculty scholarly activity, graduate school admission, diversification of students and faculty; program and faculty awards). Also describe faculty and staff professional development activities and how they impacted your program.

All the faculty members of the Mathematics Program have been active scholarly. Their resent publications include

- **Woo Jeon,** Ki-Bong Nam (accepted in August 2017) Simplicity of Special Algebras over Laurent Polynomial Algebras, *Southeast Asian Bulletin of Mathematics.*
- **Woo Jeon,** Ki-Bong Nam (2017) Radical Type Combinatorial Lie Algebra, *Journal of Algebra and Applied Mathematics, Vol. 15.*
- **Woo Jeon**, X. Chen, M. Wang, K. Lee, K. Nam (2015) Introductory Abstract Algebra**,** 5th Edition, *ISBN: 978-89-6105-937-4*
- Karas, S. **Olson Hunt, M. J.**, Temes, B., Thiel, M., Swoverland, T., Windsor, B. (2016). The effect of direction specific thoracic spine manipulation on the cervical spine: a randomized controlled trial, *Journal of Manual and Manipulative Therapy 1-8.*
- Terry, P.A., **Olson Hunt, M. J.**, Henning, R. (2017). Removal of phosphates and sulphates in a multi-ion system with nitrates. Applications of Adsorption and Ion Exchange Chromatography in Wastewater Treatment, *Materials Research Foundations 15, 171-192.*
- Dalke, K., **Olson Hunt, M. J.** (2017). Mustangs and domestic horses: examining what we think we know about differences, *Humanimalia 8:2, 46-62.*
- Luczaj, J.A., McIntire, M.J., **Olson Hunt, M.J**. (2016). Geochemical characterization of trace MVT mineralization in Paleozoic sedimentary rocks of northeastern Wisconsin, USA., *Geosciences 6:2, 1-29.*
- Michanowicz, D.R., Shmool, J.L.C., Cambal, L., Tunno, B., Gillooly, S., **Olson Hunt, M. J.**,

Tripathy, S., Naumoff Shields, K., Clougherty, J.E. (2015). A hybrid land use regression/line-source dispersion modeling for predicting intra-urban NO2. Transportation Research Part D, *Transport and the Environment 43, 181-191.*

- **Amiri, S.,** Clarke, B, & Clarke, J. (accepted in 2017). Clustering categorical data via ensembling dissimilarity matrices, *Journal of Computational and Graphical Statistics*.
- **Amiri, S.,** & Dinov, I. D. (2017). msktuple: An Integrated R Library for Alignment-Free Multiple Sequence k-Tuple Analysis, *Chemometrics and Intelligent Laboratory Systems, 168, 84-88. Doi: 10.1016/j.chemolab.2017.07.012.*
- **Amiri, S.** & Modarres, R. (2017). Comparison of tests of contingency tables, *Journal of Biopharmaceutical Statistics* (It is a double-blind journal).
- **Amiri, S.,** Modarres, R., & Zwanzig, S. (2016). Tests of perfect judgment ranking using pseudo-samples, *Computational statistics, doi: 10.1007/s00180-016-0698-7.*
- **Amiri, S.** (2016). Revisiting inference of coefficient of variation: nuisance's parameters, *Stat, 5, 234-24. Doi: 10.1002/sta4.116.*
- Clarke, B, **Amiri, S.,** & Clarke, J. (2016). Enscat: clustering of categorical data via ensembling, *BMC bioinformatics, 17:380 doi 10.1186/s12859-016-1245-9.*
- Ghodsi, M., **Amiri, S**. Hassani, H., & Ghodsi, Z. (2016). An enhanced version of Cochran-Armitage trend test for genome-wide association studies. *Metagene, doi:10.1016/j.mgene.2016.07.001.*
- **Amiri, S.,** & Dinov, I. (2016). Comparison of genomic data via statistical distribution, *Journal of Theoretical Biology, 407, 318-327. Doi: 10.1016/j.jtbi.2016.07.032.*
- **Malysheva, T.**, White, L. W., Well-Posedness of a fully coupled thermo-chemo-poroelastic system with applications to petroleum rock mechanics, *Electron. J. Differential Equations, Vol. 2017 (2017), No. 137, pp. 1-22.*
- **Malysheva, T.**, White, L. W., Sufficient condition for Hadamard well-posedness of a coupled thermo-chemo-poroelastic system, *Electron. J. Differential Equations, Vol. 2016 (2016), No. 15, pp. 1-17.*
- **Malysheva, T.**, White, L. W, Weak well-posedness of a fully coupled model of chemical thermo-poroelasticity arising in petroleum rock mechanics, Abstracts of Papers Presented to the American Mathematical Society (AMS), vol. 38, no. 1 (2017): 149.

And the following is a list of research presentations at professional conferences:

- Dalke, K. (presenter), **Olson Hunt, M.J.** (2016). Becoming the other: a case study of mustang acculturation. Equine Cultures in Transition Conference. Södertörn University, Stockholm, Sweden.
- Tang, G. (presenter), **Olson Hunt, M.J.**, Zhang, Y. (2015). A modified Expectation-Maximization Algorithm for analysis of data with missing values. National Institute of Statistical Sciences: Affiliates Workshop: Non-ignorable nonresponse. Washington, D.C.
- Dalke, K. (presenter), **Olson Hunt, M.J**. (2015). Mustangs and domestic horses: examining what we think we know about differences. International Society for Anthrozoology (ISAZ) Conference. Saratoga Springs, NY.
- **Malysheva, T.** (presenter), White, L. W., Weak well-posedness of a fully coupled model of chemical thermo-poroelasticity arising in petroleum rock mechanics, AMS Contributed Paper Session on Partial Differential Equations, 2017 Joint Mathematics Meetings, Atlanta, GA, January 4-7.
- Ki-Bong Nam (invited speaker), **Woo Jeon,** Hyunsook Moon, Notes on Classification of Finite Simple Lie Algebras and Beyond, *2016 International Conference of the Honam Mathematical Society (June 16-18, 2016), hosted by Department of Mathematics Education at Chonbuk National University, Korea.*
- **Woo Jeon** (organizer and the main speaker) (Jun 15, 2015~August 14, 2015)**,** The 5th Algebra Summer School, *Korea National University of Education & Korea National University of Transportation.*

Note that these work have been done by only the current faculty members in Mathematics.

The Mathematics Program has noticed the following for "Program Accomplishments and Student Success":

1. Remedial Mathematics
   ① There was a new set score for the Mathematics Placement Test of UW System (**WMPT**) announced on October 26, 2016 by Jim Henderson, Vice President for Academic and Student Affairs. The new cut score was 470 (used to be 436/850) and students who score at least 470 on WMPT are guaranteed placement into credit-bearing math courses.
   ② As a result, contents of lower-level mathematics courses was re-categorized as remedial contents and non-remedial contents. Many non-remedial contents became remedial.
   ③ At the same time, UW System wanted to reduce the number of students who are placed into remedial mathematics.
   ④ Based on the new guideline and needs, the Mathematics Program made the new table for WMPT by creating new courses and modifying current courses:

MFND	AALG	TAG	Course Placement
150-415	150-850	150-850	MATH 094 (3cr); MATH 100 (3cr); COMM SCI 205 (4)+COMM SCI 097 (1)
416-465	150-850	150-850	MATH 099 (2cr); MATH 100 (3cr); COMM SCI 205 (4)
466-850	150-525	150-850	MATH 101 (2cr);
	526-850	150-525	MATH 104, MATH 201, MATH 260; BUS ADM 216; CHEM 211; ET 105
		526-850	Math 202; COMP SCI 240; Physics 103

Note that
i. MATH 094/099/101 sequence is mainly for STEM students.
ii. Humanities majors might prefer MATH 100 Math Appreciation.
iii. Social Science majors might prefer COMM SCI 205 Social Science Statistics.
These are successfully implemented starting Fall 2017.

2. Actuarial Science
The following new emphasis in Mathematics Minor has been designed and waiting for approvals:

1. Mathematics Minor with Actuarial Science Emphasis: 31~32 credits
Take 28 credits

MATH 202	Calculus and Analytic Geometry I (4cr)
MATH 203	Calculus and Analytic Geometry II (4cr)
MATH 209	Multivariate Calculus (4cr)
MATH 260	Introductory Statistics (4cr)
MATH 360	Theory of Probability (3cr)
MATH 361	Mathematical Statistics (3cr)
BUS ADM 343	Corporation Finance (3cr)
BUS ADM 442	Principles of Investment (3cr)

Select 1 courses from

MATH 467	Applied Regression Analysis (4cr)
ACCTG 300	Introductory Accounting (4cr)

BUS ADM 345 Risk Management and Insurance (3cr)
BUS ADM 447 Derivatives (3cr)

3. There have been several changes on the status of faculty members and four positions were replaced: M. Olson Hunt, T. Malysheva, S. Amiri, and M. Nortfleet. These transitions have been successful. For example, T. Malysheva and M. Nortfleet helped the Mathematics Program to launch "Math & Stats Club" starting Fall 2017. However, the Mathematics Program still need one more replacement because the Program will need 19 credits of overloads and 28 Ad-hoc credits for 2017~2018 academic year. These credits do not include 28 credits for remedial mathematics.
4. Some Mathematics faculty members were nominated as UWGB Student-Nominated Teaching Award (T. Malysheva 2016, W. Jeon 2017), and M. Olson Hunt won the award in 2017.

Section D. Program Enrollment Trends and Analysis

Provide an analysis of the data (both survey and institutional enrollment data) provided by the Office of Institutional Research and Assessment. Pay close attention to the demographic information. What trends are present? Are there any imbalances in terms of gender, race, or ethnicity? Describe what specific actions, if any, were taken or are intended to be taken based on the conclusions drawn from the analysis.

1. The number of majors has been steady (45~62). However, the number of minors has been decreased from 26 (2010) to 13 (2013) and bounced back to 16 (2016). We notice that the Computer Science Program eliminated math courses from its curriculum around 2013, so the math minor was no longer attractive to students with Computer Science major.
2. Minority students who declared majors in Mathematics has been less than 10%. There have been only 0, 1, or 2 students of color graduated with majors in Mathematics. However, it is not very different from the state-wide and nation-wide trends.

Section E. Program's Vision for Future Development

Describe your program's plan for future development including the program's major goals for the next seven- year period. These goals should established with the understanding that they will be used to guide program planning and development and serve as a framework for your program's next Self-Study Report.

The following are future plans of the Mathematics Program:

1. The Mathematics Program wants to change its name to the "Mathematics and Statistics Program" because we additionally offer a Mathematics major and minor with Statistics emphasis. This change will help promote the program.
2. After the name change, we expect to develop stronger curriculums for both Mathematics and Statistics. For example, we want to add "History of Mathematics" and "Applied Mathematical Optimization" to the Mathematics emphasis curriculum.
3. The Mathematics Program will stay close to the newly re-launched "Math and Stats Club." This will help with retention of student interest in Mathematics. We are hoping to see students who will pursue and be accepted into graduate programs in Mathematics.
4. As the Computer Science Program and School of Engineering are added to CST, the Mathematics Program will provide proper supports.
5. As described in Section C, we would like to launch the Actuarial Science minor starting Fall 2018. If it becomes successful, we will add the Actuarial Science emphasis to the Mathematics major later.
6. The Mathematics Program will develop multiple ways to place students into different levels in courses in Mathematics. This includes an early alert using ACT and/or EMPT scores.

7. The Mathematics Program will provide resources to make “Turbo Charge” successful.
8. The Mathematics Program will keep monitoring the trend of current remedial math courses and the first college credit bearing courses.
9. The Mathematics Program will have a better assessment plan for students’ learning outcomes.

Section F. Summary and Concluding Statement

Respond specifically to the results and recommendations from the last review and end your report with a general concluding statement.

The following are responses to the results and recommendations from the last review:

1. **Last Reviews: p37 (AAC to Dean), p38 (Dean to Provost), p40 (Dean to Chair)**
   The Mathematics Program is finishing a formal beginning of the Mathematics minor with Actuarial Science emphasis. This program will not require an additional resource. We expect to get approvals from the Mathematics Executive Committee, and NAS as well as the Business Program. This program will not help students who pursue a major in Mathematics because students are not allowed to have a major and a minor in a same discipline. This issue will be solved once we can offer a major in Actuarial Science. However, this will require at least one faculty position in Actuarial Science.
2. **Last Reviews: p37 (AAC to Dean), p38 (Dean to Provost), p40 (Dean to Chair)**
   Currently, the Mathematics center is not planned due to resource shortages.
3. **Last Reviews: p37 (AAC to Dean), p39 (Dean to Chair)**
   We started to offer MATH 094, 099, 100, and 101 online courses, and MATH 104 will be added in 2018. Hopefully, it will help to solve the large enrollments issue in these lower level courses.
4. **Last Reviews: p39 (Dean to Chair)**
   The number of majors in Mathematics has been steady: 53 in 2010 and 56 in 2016.
5. **Last Reviews: p39 (Dean to Chair)**
   The Mathematics Program support the curriculum and research associated with the environmental science component of the larger NAS unit. M. Olson Hunt and T. Malysheva teach courses in Environmental Science and ES&P.

The Mathematics Program at UWGB is a program with young faculty members. 4 of 5 faculty members were hired within 4 years: M. Olson Hunt (2014, Statistics), T. Malysheva (2015, Applied Mathematics), S. Amiri (2016, Statistics), M. Nortfleet (2017, Geometry/Topology). Using their energy and enthusiasm, we have been providing an excellent education in Mathematics and Statistics. We keep providing our strong contribution to UWGB and will transfer our expertise and enthusiasm in Mathematics and Statistics to our students.

Section G. Required Attachments

Four attachments (and only these four) should be included with the Self-Study Report:

1. **A series of tables, prepared by the Office of Institutional Research and Assessment. A list of these tables is included in Appendix C.**

Institutional Research - Run date: 14FEB2017

	Fall Headcounts						
	2010	2011	2012	2013	2014	2015	2016
Declared Majors, end of term	53	62	58	53	45	45	56
Declared Minors, end of term	26	24	21	13	18	16	19

	Fall Declared Majors - Characteristics													
	2010		2011		2012		2013		2014		2015		2016	
Female	27	51%	31	50%	30	52%	27	51%	20	44%	18	40%	27	48%
Minority	5	9%	5	8%	3	5%	5	9%	7	16%	4	9%	5	9%
Age 26 or older	5	9%	3	5%	3	5%	2	4%	2	4%	1	2%	3	5%
Location of HS: Brown County	14	26%	18	29%	18	31%	14	26%	9	20%	12	27%	16	29%
Location of HS: Wisconsin	51	96%	60	97%	54	93%	48	91%	40	89%	41	91%	51	91%
Attending Full Time	46	87%	57	92%	52	90%	48	91%	42	93%	39	87%	50	89%
Freshmen	6	11%	3	5%	1	2%	0	0%	1	2%	2	4%	12	21%
Sophomores	6	11%	11	18%	7	12%	10	19%	9	20%	8	18%	12	21%
Juniors	15	28%	19	31%	13	22%	12	23%	13	29%	12	27%	10	18%
Seniors	25	47%	28	45%	37	64%	31	58%	22	49%	23	51%	22	39%

	Fall Declared Majors - Characteristics						
	2010	2011	2012	2013	2014	2015	2016
Average HS Cumulative G.P.A.	3.49	3.46	3.49	3.60	3.59	3.59	3.66
Average ACT Composite Score	23.7	24.2	24.8	25.0	25.0	25.7	25.7
Average ACT Reading Score	22.2	22.5	23.6	23.9	23.7	24.8	25.0
Average ACT English Score	22.8	23.4	23.9	24.3	24.2	24.6	24.7
Average ACT Math Score	26.0	26.9	27.3	26.9	26.9	27.6	27.5
Average ACT Science Score	23.9	24.3	24.7	25.2	25.3	25.9	25.8
Percent started as Freshmen	57%	52%	50%	51%	60%	69%	64%
Percent started as Transfers	43%	48%	50%	49%	40%	31%	36%
Percent with prior AA degree	8%	5%	3%	4%	7%	11%	9%
Percent with prior BA degree	4%	6%	5%	6%	4%	2%	2%

	Calendar Year Headcounts						
	2010	2011	2012	2013	2014	2015	2016
Graduated Majors (May, Aug. & Dec.)	11	13	10	19	16	10	11
Graduated Minors (May, Aug. & Dec.)	9	15	10	4	7	6	5

	Characteristics of Graduated Majors													
	2010		2011		2012		2013		2014		2015		2016	
Graduates who are... Women	6	55%	6	46%	6	60%	8	42%	6	38%	4	40%	6	55%
... Students of Color	0	0%	1	8%	1	10%	1	5%	0	0%	2	20%	0	0%
... Over 26 Years Old	4	36%	4	31%	2	20%	4	21%	7	44%	3	30%	1	9%
Graduates earning Degree Honors	6	55%	6	46%	4	40%	10	53%	6	38%	5	50%	6	55%

	Characteristics of Graduated Majors						
	2010	2011	2012	2013	2014	2015	2016
Average Credits Completed Anywhere	156	142	148	154	162	143	150
Average Credits Completed at UWGB	121	125	125	119	118	110	106
Average Cum GPA for Graduates	3.53	3.20	3.36	3.45	3.41	3.49	3.44

			Headcount Enrollments, Credit-bearing Activities						
			2010	2011	2012	2013	2014	2015	2016
Lectures	**1-Lower**	**1-Spring**	718	686	692	705	646	658	723
		2-Summer	157	118	110	109	114	114	142
		3-Fall	1032	906	891	867	862	884	829
		All	1907	1710	1693	1681	1622	1656	1694
	2-Upper	**1-Spring**	133	134	132	124	77	94	96

			Headcount Enrollments, Credit-bearing Activities						
			2010	2011	2012	2013	2014	2015	2016
		2-Summer	.	.	.	.	.	.	.
		3-Fall	100	86	104	64	76	72	77
		All	233	220	236	188	153	166	173
	All		2140	1930	1929	1869	1775	1822	1867
IST/FEX	1-Lower	1-Spring	.	.	1	.	.	.	.
		2-Summer	.	.	.	.	.	.	.
		3-Fall	.	1	.	1	.	.	.
		All	.	1	1	1	.	.	.
	2-Upper	1-Spring	3	13	3	3	2	3	.
		2-Summer	.	1	.	.	.	.	1
		3-Fall	2	1	7	2	1	1	1
		All	5	15	10	5	3	4	2
	All		5	16	11	6	3	4	2
All			2145	1946	1940	1875	1778	1826	1869

			Student Credit Hours, Credit-bearing Activities						
			2010	2011	2012	2013	2014	2015	2016
Lectures	1-Lower	1-Spring	2562	2445	2495	2584	2373	2441	2655

			Student Credit Hours, Credit-bearing Activities						
			2010	2011	2012	2013	2014	2015	2016
		2-Summer	592	458	418	412	426	412	495
		3-Fall	3687	3227	3167	3064	3080	3140	2976
		All	6841	6130	6080	6060	5879	5993	6126
	2-Upper	1-Spring	423	425	419	403	247	297	315
		2-Summer	.	.	.	.	.	.	.
		3-Fall	315	278	341	211	236	243	251
		All	738	703	760	614	483	540	566
	All		7579	6833	6840	6674	6362	6533	6692
IST/FEX	1-Lower	1-Spring	.	.	3	.	.	.	.
		2-Summer	.	.	.	.	.	.	.
		3-Fall	.	1	.	1	.	.	.
		All	.	1	3	1	.	.	.
	2-Upper	1-Spring	10	35	9	10	6	9	.
		2-Summer	.	3	.	.	.	.	3
		3-Fall	7	3	19	6	4	3	3
		All	17	41	28	16	10	12	6
	All		17	42	31	17	10	12	6

			Lectures and Lab/Discussion Sections (#)						
			2010	2011	2012	2013	2014	2015	2016
Lectures	1-Lower	1-Spring	19	20	23	25	24	24	23
		2-Summer	5	5	7	7	7	6	6
		3-Fall	24	26	27	27	28	27	25
		All	48	51	57	59	59	57	54
	2-Upper	1-Spring	7	7	7	7	6	7	6
		2-Summer	.	.	.	.	.	.	.
		3-Fall	5	6	6	4	5	5	5
		All	12	13	13	11	11	12	11
	All		60	64	70	70	70	69	65
Lab/Disc	1-Lower	1-Spring	4	4	.	.	.	.	.
		2-Summer	.	.	.	.	.	.	.
		3-Fall	.	.	.	.	.	.	.
		All	4	4	.	.	.	.	.
	2-Upper	1-Spring	1	1	1	1	.	.	.
		2-Summer	.	.	.	.	.	.	.
		3-Fall	.	2	1	1	.	.	.
		All	1	3	2	2	.	.	.
	All		5	7	2	2	.	.	.

	Lectures and Lab/Discussion Sections (#)						
	2010	2011	2012	2013	2014	2015	2016
All	65	71	72	72	70	69	65

			Average Section Size of Lectures						
			2010	2011	2012	2013	2014	2015	2016
Lectures	**1-Lower**	**1-Spring**	37.8	34.3	30.1	28.2	26.9	27.4	31.4
		2-Summer	31.4	23.6	15.7	15.6	16.3	19.0	23.7
		3-Fall	43.0	34.8	33.0	32.1	30.8	32.7	33.2
		All	39.7	33.5	29.7	28.5	27.5	29.1	31.4
	2-Upper	**1-Spring**	19.0	19.1	18.9	17.7	12.8	13.4	16.0
		2-Summer	.	.	.	.	.	.	.
		3-Fall	20.0	14.3	17.3	16.0	15.2	14.4	15.4
		All	19.4	16.9	18.2	17.1	13.9	13.8	15.7
	All		35.7	30.2	27.6	26.7	25.4	26.4	28.7

	Unique Lecture Courses Delivered in Past Four Years						
	2010	2011	2012	2013	2014	2015	2016
1-Lower	9	9	9	9	9	9	9
2-Upper	15	16	16	16	16	15	14

	General Education as a Percent of all Credits in Lectures						
	2010	2011	2012	2013	2014	2015	2016
1-Lower	0%	0%	0%	0%	22%	45%	43%
2-Upper	0%	0%	0%	0%	0%	0%	0%

	Instructional Staff Headcounts and FTEs						
	2010	2011	2012	2013	2014	2015	2016
Full Professors (FT)	3	3	5	7	8	8	7
Associate Professors (FT)	15	17	15	12	10	7	6
Assistant Professors (FT)	4	3	5	3	6	10	8
Instructors and Lecturers (FT)	8	6	4	5	4	4	6
Total Full-time Instructional Staff	30	29	29	27	28	29	27
Part-time Instructional Staff	18	16	.	.	.	.	.
FTE of Part-time Faculty	6.8	3.2	.	.	.	.	.
Total Instructional FTE	36.8	32.2	.	.	.	.	.

	Student Credit Hours per Faculty FTE						
	2010	2011	2012	2013	2014	2015	2016
SCH per Full-time Faculty FTE	406	358	.	.	.	.	.
SCH per Part-time Faculty FTE	137	587	.	.	.	.	.
SCH per Faculty FTE	356	378	.	.	.	.	.

Graduating Senior Survey:
2012, 2013, 2014, 2015 & 2016

	Graduation Year	Mathematics	UWGB Overall
Graduates:	2012	10	1293
	2013	17	1229
	2014	14	1233
	2015	9	1260
	2016	11	1250
Response Rate*	2012-2016	31/61 (51%)	2815/6265 (45%)

* Note: % response misses double-majors who choose to report on their other major.

Table 1: Rating the MAJOR (A = 4, B = 3.0, etc.)	**Unit of Analysis**	**2012-2016**						
		N	**mean**	**A**	**B**	**C**	**D**	**F**
Clarity of major requirements	MATH	31	3.8	77%	23%	0	0	0
	UWGB	2809	3.5	60%	32%	6%	1%	<1%
Reasonableness of major requirements	MATH	30	3.4	50%	37%	13%	0	0
	UWGB	2803	3.5	58%	34%	6%	1%	<1%
Variety of courses available in your major	MATH	30	2.7	20%	40%	30%	10%	0
	UWGB	2797	3.1	38%	40%	17%	4%	1%
Frequency of course offerings in your major	MATH	30	2.3	10%	37%	30%	20%	3%
	UWGB	2789	2.8	24%	42%	24%	8%	2%
Times courses were offered	MATH	31	2.5	16%	32%	36%	16%	0
	UWGB	2744	2.9	31%	41%	21%	6%	1%
Quality of internship, practicum, or field experience	MATH	8	3.8	75%	25%	0	0	0
	UWGB	1630	3.4	59%	27%	9%	4%	1%
Quality of teaching by faculty in your major	MATH	31	3.2	32%	52%	16%	0	0
	UWGB	2797	3.4	52%	37%	9%	2%	<1%
Knowledge and expertise of the faculty	MATH	31	3.7	68%	32%	0	0	0

Table 1: Rating the MAJOR (A = 4, B = 3.0, etc.)	Unit of Analysis	2012-2016						
		N	mean	A	B	C	D	F
in your major	UWGB	2807	3.6	69%	26%	4%	1%	<1%
Faculty encouragement of your educational goals	MATH	31	3.3	58%	26%	6%	10%	0
	UWGB	2782	3.4	58%	28%	10%	3%	1%
Overall quality of advising received from the faculty in your major	MATH	26	3.0	34%	50%	8%	0	8%
	UWGB	2691	3.2	56%	23%	11%	6%	4%
Availability of your major advisor for advising	MATH	29	3.3	55%	31%	10%	0	3%
	UWGB	2675	3.4	62%	22%	9%	4%	3%
Ability of your advisor to answer university questions	MATH	26	3.5	58%	38%	0	0	4%
	UWGB	2635	3.4	66%	20%	8%	4%	2%
Ability of your advisor to answer career questions	MATH	25	3.1	36%	48%	12%	0	4%
	UWGB	2337	3.2	54%	26%	12%	5%	3%
In-class faculty-student interaction	MATH	31	2.9	35%	32%	23%	10%	0
	UWGB	2563	3.1	45%	29%	13%	13%	<1%
Overall grade for your major (**not** an average of the above)	MATH	31	3.2	29%	61%	10%	0	0
	UWGB	2784	3.4	51%	40%	8%	1%	<1%

Table 2. Job related to major while completing degree?	Unit of Analysis	n	Full-time		Part-time		No
			Paid	Non-paid	Paid	Non-paid	
2012-2016 percent	MATH	31	3%	0	52%	0	45%
	UWGB	2803	16%	1%	34%	5%	44%

Table 3. "If you could start college over"	Unit of Analysis	n	UW-Green Bay		Another college		No BA degree
			Same major	Different major	Same major	Different major	
2012-2016 percent	MATH	30	70%	7%	10%	13%	0
	UWGB	2801	68%	13%	13%	5%	1%

Table 4. Plans regarding graduate/professional study	Unit of Analysis	n	Already admitted	Have applied	Plan to eventually attend	NA/have not applied yet
2012-2016 percent	MATH	21	9%	5%	57%	29%
	UWGB	2123	9%	10%	60%	21%

Table 5. Highest degree planned	Unit of Analysis	n	Bachelor's	Master's	Specialist's	Professional	Doctoral
2012-2016 percent	MATH	31	45%	32%	3%	3%	16%
	UWGB	2803	36%	46%	1%	4%	13%

Table 6. General Education preparation Current proficiency vs. Contribution of Gen Ed to current proficiency (3-pt. scale; 3 = high, 2 = medium, 1 = low)	Unit of Analysis	Current Proficiency			Gen Ed Contribution		
		n	% High	mean	n	% High	mean
Critical analysis skills.	MATH	30	70%	2.7	29	31%	2.2
	UWGB	2675	63%	2.6	2594	41%	2.3
Problem-solving skills.	MATH	29	86%	2.9	28	39%	2.2
	UWGB	2674	70%	2.7	2585	43%	2.3
Understanding biology and the physical sciences.	MATH	27	7%	2.0	25	8%	1.9
	UWGB	2535	29%	2.0	2438	27%	2.0
Understanding the impact of science and technology.	MATH	29	52%	2.5	28	36%	2.2
	UWGB	2564	37%	2.2	2473	30%	2.1
Understanding social, political, geographic, and economic structures.	MATH	28	18%	2.1	28	25%	2.0
	UWGB	2603	34%	2.2	2537	33%	2.1
Understanding the impact of social institutions and values.	MATH	28	43%	2.3	27	26%	2.0
	UWGB	2613	49%	2.4	2542	42%	2.3
Understanding the significance of major events in Western civilization.	MATH	29	17%	2.0	26	19%	2.0
	UWGB	2572	33%	2.1	2494	34%	2.1
Understanding the role of the humanities in	MATH	27	26%	2.2	26	23%	2.0

Table 6. General Education preparation

Current proficiency vs. Contribution of Gen Ed to current proficiency

(3-pt. scale; 3 = high, 2 = medium, 1 = low)

	Unit of Analysis	Current Proficiency			Gen Ed Contribution		
		n	% High	mean	n	% High	mean
identifying and clarifying values.	UWGB	2609	40%	2.3	2534	38%	2.2
Understanding at least one Fine Art.	MATH	26	23%	1.9	25	16%	1.8
	UWGB	2565	39%	2.2	2471	35%	2.1
Understanding contemporary global issues.	MATH	27	19%	2.1	27	15%	1.8
	UWGB	2585	34%	2.2	2499	31%	2.1
Understanding the causes and effects of stereotyping and racism.	MATH	28	50%	2.5	28	21%	1.9
	UWGB	2616	60%	2.6	2534	47%	2.3
Written communication skills	MATH	28	46%	2.4	27	19%	1.9
	UWGB	2644	66%	2.6	2556	50%	2.4
Public speaking and presentation skills	MATH	28	36%	2.3	28	18%	1.8
	UWGB	2601	45%	2.3	2489	36%	2.2
Computer skills	MATH	29	69%	2.7	28	29%	2.0
	UWGB	2621	53%	2.5	2500	36%	2.1

Table 7. Educational experiences

(5 pt. scale; 5 = strongly agree)

	Unit of Analysis	2012-2016		
		n	Strongly Agree or Agree	mean
Because of my educational experiences at UW-Green Bay, I have learned to view learning as a lifelong process.	MATH	29	90%	4.2
	UWGB	2715	90%	4.4
While at UW-Green Bay, I had frequent interactions with people from different countries or cultural backgrounds than my own.	MATH	29	55%	3.6
	UWGB	2584	49%	3.4
The UW-Green Bay educational experience encourages students to become involved in community affairs.	MATH	29	48%	3.4
	UWGB	2590	62%	3.6
My experiences at UW-Green Bay encouraged me to think creatively and innovatively.	MATH	29	72%	3.9
	UWGB	2701	82%	4.1

Table 7. Educational experiences (5 pt. scale; 5 = strongly agree)	**Unit of Analysis**	**2012-2016**		
		n	**Strongly Agree or Agree**	**mean**
My education at UW-Green Bay has given me a "competitive edge" over graduates from other institutions.	MATH	27	48%	3.4
	UWGB	2588	66%	3.8
UW-Green Bay provides a strong, interdisciplinary, problem-focused education.	MATH	28	64%	3.7
	UWGB	2660	75%	4.0
Students at UW-Green Bay have many opportunities in their classes to apply their learning to real situations.	MATH	29	41%	3.1
	UWGB	2681	73%	3.9
I would recommend UW-Green Bay to a friend, co-worker, or family member.	MATH	29	72%	3.8
	UWGB	2698	82%	4.2
There is a strong commitment to racial harmony on this campus.	MATH	27	70%	4.0
	UWGB	2404	60%	3.7
The faculty and staff of UWGB are committed to gender equity.	MATH	28	79%	4.0
	UWGB	2495	78%	4.1
This institution shows concern for students as individuals.	MATH	29	76%	3.8
	UWGB	2641	75%	4.0
The General Education requirements at UWGB were a valuable component of my education.	MATH	29	41%	3.1
	UWGB	2554	53%	3.4

Table 8. Activities while at UW-Green Bay	**Unit of Analysis**	**n**	**Independent**	**Student org**	**Internship**	**Professional**	**Community**	**Worked with a faculty member**	**Study group**	**Study abroad**
2012-2016 percent	MATH	31	42%	65%	58%	16%	65%	26%	68%	13%
	UWGB	2802	25%	49%	58%	24%	61%	24%	59%	15%

Table 9. Rating services and resources

(A = 4, B = 3, etc.)

	Unit of Analysis	2012-2016		
		n	A or B	mean
Library services (hours, staff, facilities)	MATH	26	85%	3.4
	UWGB	2295	91%	3.5
Library collection (books, online databases)	MATH	21	90%	3.5
	UWGB	2190	93%	3.5
Admissions Office	MATH	25	92%	3.5
	UWGB	2111	91%	3.4
Financial Aid Office	MATH	24	88%	3.4
	UWGB	2010	87%	3.3
Bursar's Office	MATH	31	87%	3.4
	UWGB	2470	87%	3.3
Career Services	MATH	20	90%	3.4
	UWGB	1528	86%	3.3
Academic Advising Office	MATH	29	66%	3.0
	UWGB	2248	78%	3.2
Student Health Services	MATH	18	94%	3.6
	UWGB	1247	87%	3.4
Registrar's Office	MATH	27	93%	3.6
	UWGB	2095	90%	3.4
Writing Center	MATH	8	100%	3.6
	UWGB	940	85%	3.3
University Union	MATH	30	90%	3.3
	UWGB	2195	87%	3.3
Student Life	MATH	19	84%	3.2
	UWGB	1336	83%	3.2
Counseling Center	MATH	5	100%	3.8

Table 9. Rating services and resources

(A = 4, B = 3, etc.)

	Unit of Analysis	2012-2016		
		n	A or B	mean
	UWGB	524	83%	3.3
Computer Facilities (labs, hardware, software)	MATH	30	93%	3.5
	UWGB	2240	96%	3.6
Computer Services (hours, staff, training)	MATH	26	88%	3.5
	UWGB	1994	93%	3.5
Kress Events Center	MATH	28	100%	3.7
	UWGB	1848	97%	3.7
Dining Services	MATH	24	33%	2.4
	UWGB	1883	54%	2.5
American Intercultural Center	MATH	7	86%	3.4
	UWGB	354	89%	3.5
International Office	MATH	6	83%	3.2
	UWGB	342	85%	3.3
Residence Life	MATH	17	100%	3.5
	UWGB	1175	75%	3.0
Bookstore	MATH	29	83%	3.2
	UWGB	2651	81%	3.1

Alumni Survey: 2012, 2013, 2014, 2015 & 2016

	Survey year	Graduation Year	Mathematics	UWGB Overall
Graduates:	2012	2008-2009	17	1133
	2013	2009-2010	18	1295
	2014	2010-2011	10	1309
	2015	2011-2012	9	1233
	2016	2012-2013	19	1305
Response Rate*	2012-2016		8/73 (11%)	901/6275 (14%)

* Note: % response misses double-majors who chose to report on their other major.

Table 1. Preparation & Importance

- **Preparation by UWGB (5-pt. scale; 5 = excellent)**
- **Importance to current job or graduate program (5-pt. scale; 5 = very important)**

	Unit of Analysis	2012-2016					
		Preparation			Importance		
		n	Excellent or Good	Mean	n	Very important or Important	Mean
Critical analysis skills.	MATH	5	60%	3.8	5	60%	4.0
	UWGB	636	57%	3.6	620	72%	4.0
Problem-solving skills.	MATH	5	60%	3.6	5	60%	3.8
	UWGB	635	58%	3.6	621	76%	4.2
Understanding biology and the physical sciences.	MATH	5	80%	3.6	4	25%	2.3
	UWGB	610	47%	3.4	585	35%	2.8
Understanding the impact of science and technology.	MATH	5	40%	3.2	5	60%	3.6
	UWGB	613	49%	3.4	604	47%	3.3
Understanding social, political, geographic, and economic structures.	MATH	5	60%	3.6	5	40%	3.0
	UWGB	622	53%	3.6	614	52%	3.4
Understanding the impact of social institutions and values.	MATH	5	60%	3.6	4	50%	3.0
	UWGB	630	59%	3.7	612	57%	3.6
Understanding the significance of major events in Western civilization.	MATH	5	60%	3.6	4	25%	2.3
	UWGB	617	49%	3.4	582	32%	2.8
Understanding a range of literature.	MATH	5	60%	3.2	4	0	1.5
	UWGB	608	47%	3.4	593	34%	2.9
Understanding the role of the humanities in identifying and clarifying individual and social values.	MATH	4	50%	3.3	5	20%	2.8
	UWGB	614	51%	3.5	599	44%	3.2
Understanding at least one Fine Art, including its nature and function(s).	MATH	5	60%	3.4	5	40%	3.2
	UWGB	610	51%	3.4	586	31%	2.7
Understanding contemporary global issues.	MATH	5	40%	3.2	5	20%	2.6

Table 1. Preparation & Importance

- **Preparation by UWGB (5-pt. scale; 5 = excellent)**
- **Importance to current job or graduate program (5-pt. scale; 5 = very important)**

	Unit of Analysis	2012-2016					
		Preparation			Importance		
		n	Excellent or Good	Mean	n	Very important or Important	Mean
	UWGB	626	48%	3.4	611	48%	3.4
Understanding the causes and effects of stereotyping and racism.	MATH	5	40%	3.6	5	40%	3.4
	UWGB	623	53%	3.6	609	53%	3.5
Written communication skills.	MATH	5	40%	3.4	5	60%	3.8
	UWGB	630	65%	3.8	618	76%	4.2
Public speaking and presentation skills.	MATH	5	40%	3.2	5	60%	4.0
	UWGB	629	54%	3.5	620	69%	4.0
Reading skills.	MATH	5	60%	3.8	5	60%	3.6
	UWGB	629	60%	3.7	620	74%	4.1
Listening skills.	MATH	5	40%	3.6	5	60%	3.6
	UWGB	630	63%	3.7	620	77%	4.2
Leadership and management skills.	MATH	5	40%	3.4	5	60%	3.6
	UWGB	634	58%	3.6	621	76%	4.1

Table 2. Educational experiences

(5-pt. scale; 5 = strongly agree)

	Unit of Analysis	N	Strongly Agree or Agree	Mean
My educational experiences at UW-Green Bay helped me to learn or reinforced my belief that learning is a lifelong process.	MATH	8	88%	4.4
	UWGB	894	91%	4.3
While at UW-Green Bay, I had frequent interactions with people from different countries or cultural backgrounds than my own.	MATH	8	25%	3.0
	UWGB	877	52%	3.4

Table 2. Educational experiences

(5-pt. scale; 5 = strongly agree)

	Unit of Analysis	N	Strongly Agree or Agree	Mean
Students at UW-Green Bay are encouraged to become involved in community affairs.	MATH	8	75%	3.6
	UWGB	878	60%	3.6
My experiences and course work at UW-Green Bay encouraged me to think creatively and innovatively.	MATH	8	63%	3.9
	UWGB	892	86%	4.1
The interdisciplinary, problem-focused education provided by UW-Green Bay gives its graduates an advantage when they are seeking employment or applying to graduate school.	MATH	8	63%	3.5
	UWGB	884	77%	4.0
UW-Green Bay provides a strong, interdisciplinary, problem-focused education.	MATH	8	63%	3.5
	UWGB	889	83%	4.1
Students at UW-Green Bay have many opportunities in their classes to apply their learning to real situations.	MATH	8	63%	3.5
	UWGB	889	73%	3.9
I would recommend UW-Green Bay to co-worker, friend, or family member.	MATH	8	88%	4.1
	UWGB	892	90%	4.4
The General Education requirements at UWGB were a valuable component of my education.	MATH	8	38%	3.0
	UWGB	848	56%	3.5
UWGB cares about its graduates.	MATH	8	63%	4.1
	UWGB	853	65%	3.8
I feel connected to UWGB.	MATH	8	63%	4.0
	UWGB	879	48%	3.4

Table 3. "If you could start college over"	**Unit of Analysis**	**n**	**UW-Green Bay**		**Another college**		**No bachelor's degree anywhere**
			Same major	**Different major**	**Same major**	**Different major**	
2012–2016 percent	MATH	8	63%	13%	12%	12%	0

	UWGB	895	65%	21%	6%	7%	1%

Table 4. Rating the MAJOR (Scale: A = 4, B = 3, etc.)	**Unit of Analysis**	**2012–2016**			
		n	**A or B**	**C or D**	**mean**
Quality of teaching.	MATH	8	100%	0	3.3
	UWGB	898	95%	4%	3.6
Knowledge and expertise of the faculty.	MATH	8	100%	0	3.4
	UWGB	897	98%	2%	3.7
Faculty-student relationships (e.g., helpfulness, sensitivity, acceptance of different views).	MATH	8	100%	0	3.6
	UWGB	895	93%	7%	3.6
Importance and relevance of courses to professional and academic goals.	MATH	8	88%	12%	3.6
	UWGB	892	89%	11%	3.4
Advising by faculty (e.g., accuracy of information).	MATH	8	75%	25%	3.1
	UWGB	876	87%	12%	3.4
Availability of faculty (e.g., during office hours).	MATH	8	88%	12%	3.4
	UWGB	873	93%	7%	3.5
Overall grade for the major (not a sum of the above).	MATH	8	100%	0	3.1
	UWGB	892	94%	6%	3.5

Table 5. Highest degree planned	**Unit of Analysis**	**n**	**Bachelor's**	**Master's**	**Specialist**	**Professional**	**Doctoral**
2012-2016 percent	MATH	8	75%	25%	0	0	0
	UWGB	889	39%	45%	1%	3%	12%

Table 6. Graduate/professional study plans	Unit of Analysis	n	Already graduated	Currently enrolled	Accepted, not enrolled	Rejected	Have not applied
2012-2016 percent	MATH	3	33%	0	0	0	67%
	UWGB	554	25%	22%	3%	1%	48%

Table 7. Current employment status	MATH (n = 8)	UWGB (n = 892)
Employed full-time (33 or more hours/week)	100%	79%
Employed part-time	0	11%
Unemployed, seeking work	0	4%
Unemployed, not seeking work	0	2%
Student, not seeking work	0	4%

Table 8. Satisfaction with current job (5-pt. scale; 5 = very satisfied)	Unit of Analysis	n	Very satisfied or satisfied	mean
2012-2016 percentage	MATH	8	100%	4.6
	UWGB	797	77%	4.0

Table 9. Minimum educational requirements for current job	MATH (n = 8)	UWGB (n = 772)
High school or less	25%	17%
Certificate	0	2%
Associate's degree	12%	13%
Bachelor's degree	63%	59%
Graduate degree	0	9%

Table 10. Extent to which job relates to major	MATH (n = 8)	UWGB (n = 790)
Very related	38%	50%
Somewhat related	37%	32%
Not at all related	25%	18%

Table 11. Current income	MATH (n = 7)	UWGB (n = 765)
Under $20,000	0	11%
$20,000 to $25,999	0	9%
$26,000 to $29,999	14%	9%
$30,000 to $35,999	0	15%
$36,000 to $39,999	29%	12%
$40,000 to $49,999	29%	18%
$50,000 or more	28%	25%

Employers, Locations, and Job Titles

Northeast Wisconsin Technical College	Green Bay	Wisconsin	Computer Support Help Desk Specialist
SECURA Insurance	Appleton	Wisconsin	Actuarial Analyst
Homes for Independent Living	Green Bay	Wisconsin	Business Analyst
Aon Risk Solutions	Green Bay	Wisconsin	Account Specialist II
Stephenson National Bank & Trust	Marinette	Wisconsin	Loan Processor
JT Engineering	Madison	WI	Project Engineer

2. **The program's current official description and requirements as published in the most recent Undergraduate Catalog;**

Mathematics

http://www.uwgb.edu/nas/
Disciplinary Major or Minor
(Bachelor of Science)
The Mathematics discipline has programs of study in two emphasis areas: mathematics and statistics. A student who elects a disciplinary major in Mathematics must choose an area of emphasis from one of these two programs of study.

Students choosing the emphasis in mathematics will focus their studies in a discipline which has been an important part of our intellectual heritage for centuries. Students select this area of emphasis if they are interested in mathematics for its own sake (pure mathematics) or as a tool for analyzing and solving real-world problems (applied mathematics). Graduates may use their skills in many careers, including fields such as secondary education and engineering. Other typical areas of employment traditional for mathematicians are those requiring physics. Today, mathematical techniques are required in social, industrial, and management realms as well.

The emphasis in statistics provides applied courses in experimental design, multivariate statistical analysis, and applied regression analysis. Students also gain an extensive background in statistical computing. Students who wish to enter actuarial professions may prepare for the first two actuarial examinations by completing the calculus sequence, linear algebra sequence, and statistical theory sequence. Students who concentrate studies in statistics may find employment in business, industry, and government, as well as pursue further professional training in graduate school.

Program Entrance Requirements

The University of Wisconsin System placement examination in mathematics is used to advise entering freshmen about the level at which they should enter university courses. In rare cases, a student who has been accelerated and has mastery of calculus may, with advice of faculty, enter MATH 203 Calculus and Analytic Geometry II. Upon earning a "C" or better in MATH 203, an additional four credits are granted for MATH 202 Calculus and Analytic Geometry I.

Credits for calculus at UW-Green Bay may also be awarded for satisfactory performance on an AP exam. More details are available at http://www.uwgb.edu/oira/cfpl/ap/.
Retroactive credit for MATH 202 is not awarded to students who transfer to UW-Green Bay and have completed coursework deemed to be equivalent to MATH 203. If the student completes Math 209 or 305 at UW-Green Bay, they may submit an approved Retroactive Credit Form to the Registrar's Office to be awarded credit for MATH 202 only.

Mathematics majors must choose an interdisciplinary minor. Examples are Environmental Science or Business Administration.

Students seeking information on teacher certification should contact the Education Office.

This disciplinary major also requires:
Completion of an interdisciplinary major or minor
Completion of one of the following areas of emphasis:

- Mathematics Emphasis
- Statistics Emphasis

Mathematics Major with Mathematics Emphasis

Code	Title	Credits
Supporting Courses		**16**
MATH 202	Calculus and Analytic Geometry I	
MATH 203	Calculus and Analytic Geometry II	
MATH 209	Multivariate Calculus	
MATH 260	Introductory Statistics	
Upper-Level Courses		**29**
MATH 305	Ordinary Differential Equations	
MATH 314	Proofs in Number Theory and Topology	
MATH 320	Linear Algebra I	
MATH 321	Linear Algebra II	
MATH 323	Analysis I	
MATH 324	Analysis II	
MATH 328	Introduction to Algebraic Structures	
MATH 385	Foundations of Geometry	
Elective Courses (choose one of the following):		
MATH 360	Theory of Probability	
MATH 361	Mathematical Statistics	
MATH 410	Complex Analysis	
MATH 425	Dynamical Systems	
MATH 492	Special Topics in Mathematics	
Total Credits		**45**

Mathematics Major with Statistics Emphasis

Code	Title	Credits
Supporting Courses		**16**
MATH 202	Calculus and Analytic Geometry I	
MATH 203	Calculus and Analytic Geometry II	
MATH 209	Multivariate Calculus	
MATH 260	Introductory Statistics	
Upper-Level Courses		**31**
MATH 314	Proofs in Number Theory and Topology	
MATH 320	Linear Algebra I	
MATH 321	Linear Algebra II	
MATH 323	Analysis I	
MATH 324	Analysis II	
MATH 360	Theory of Probability	
MATH 361	Mathematical Statistics	
MATH 467	Applied Regression Analysis	
Elective Courses (choose one of the following):		
MATH 430	Design of Experiments	
MATH 431	Multivariate Statistical Analysis	
MATH 492	Special Topics in Mathematics	
Total Credits		**47**

Mathematics Minor with Mathematics Emphasis

Code	Title	Credits
Supporting Courses		**12**
MATH 202	Calculus and Analytic Geometry I	
MATH 203	Calculus and Analytic Geometry II	
MATH 260	Introductory Statistics	
Upper-Level Courses		**12**
MATH 320	Linear Algebra I	
Elective Courses (choose 9 credits of the following):		
MATH 305	Ordinary Differential Equations	
MATH 314	Proofs in Number Theory and Topology	
MATH 321	Linear Algebra II	
MATH 323	Analysis I	
MATH 324	Analysis II	
MATH 328	Introduction to Algebraic Structures	
MATH 360	Theory of Probability	
MATH 361	Mathematical Statistics	
MATH 385	Foundations of Geometry	
MATH 410	Complex Analysis	
MATH 425	Dynamical Systems	
MATH 492	Special Topics in Mathematics	
Total Credits		**24**

Mathematics Minor with Statistics Emphasis

Code	Title	Credits
Supporting Courses		**12**
MATH 202	Calculus and Analytic Geometry I	
MATH 203	Calculus and Analytic Geometry II	
MATH 260	Introductory Statistics	
Upper-Level Courses		**12**
MATH 320	Linear Algebra I	
Elective Courses (choose three of the following):		
MATH 360	Theory of Probability	
MATH 361	Mathematical Statistics	
MATH 430	Design of Experiments	
MATH 431	Multivariate Statistical Analysis	
MATH 467	Applied Regression Analysis	
Total Credits		**24**

Course List

3. **The Academic Affairs Council and Dean's conclusions and recommendations from the program's last review;**

To: **Dean Scott Furlong**

From: **Steve Dutch, chair of the Academic Affairs Council**

Date: **June 24, 2011**

Subject: **Academic Affairs Council Review of the Mathematics Program**

Overview

Dr. Davis, the chair of the Mathematics Program provided the Self-Study Report and the supporting materials in the spring of 2011 and the Academic Affairs Council reviewed and discussed the document with him. The AAC noted that the Mathematics Program has a clear mission statement that shares and supports the mission of the Natural and Applied Sciences program as well as the UW-Green Bay Core/Select Mission and the Guiding Principles. The acquisition of critical thinking, disciplinary and interdisciplinary problem solving, and communication are primary focuses for the Mathematics Program, which promotes an appropriate practical and theoretical mathematical knowledge and quantitative skills for a student to effectively market his/her expertise within a chosen profession and/or preparing for graduate studies.

Other areas of the Mathematics Program mission encompass:

- Providing a component of General Education Program that clarifies the importance of mathematics in our society and enhances the general mathematical literacy of our students.
- Providing supporting courses for all degree programs within Natural & Applied Sciences as well as many other undergraduate programs including pre-professional programs.
- Providing component of the Environmental Science and Policy and the Applied Leadership for Teaching and Learning graduate programs.
- Providing service to the University and local community in the form of remedial mathematics courses, consulting, workshops, etc.

The Mathematics Program's anticipated student learning outcomes are clear, and the program offers four different options: majors and minors in both Mathematics and Statistics emphases.

Strengths and Accomplishments

The Mathematics Program serves UW-Green bay in a fundamental way. For example, the number of students needing to enroll in mathematics classes has increased up to the point such that "all sections of mathematics are enrolled to capacity and the program often looks to add additional sections". This is because student recruiting for the Mathematics Program has been very active and successful. Also student demand for mathematical background in other areas has been increasing. To maximize benefit for students, the tenured faculty members in the Mathematics Program

have projects available for undergraduate students and lead various “independent studies covering a wide breadth of mathematical and statistical topics – both pure and applied” The ACC noted that undergraduate research opportunities in mathematics have not been a requirement for post graduate employment or graduate study, so that the independent studies serve to enhance the students’ education beyond the minimum requirements for employment or graduate study.

Mathematics also has a strong connection with the Education Program in that the Mathematics emphasis has been developed to be consistent with the DPI guidelines for students who intend to be secondary school instructors. Similarly, the minor in Mathematics is appropriate for students that are to be certified at the lower-level (K-9).

The AAC also noted that the Mathematics Program has been “designed in a very stable fashion” even under increasing enrollments in the program, a reduced staff over the last couple of years due to extended medical leave of a tenured faculty member, and reaching for a new lecturer.

Faculty listed on UWGB Mathematics website	Faculty appointment status	Approximate number of Independent Studies per year	Number of courses in their load that are specifically for the Math program per year			Has Advising responsibilities for Math students
			regular load	overload	summer	
Greg Davis	Professor	4 - 8	2 – 4	1 – 2	0 – 1	Primary
Tian-You Hu	Professor	2 - 4	6	1	1	Secondary
David M. Dolan	Assoc. Prof.	1 - 2	4	1		Secondary
Woo Jeon	Assoc. Prof.	2 - 4	6 – 7	0 – 1	1	Secondary
Vladimir Kurenok	Medical Leave					
Atife Caglar-Clark	Ass’t. Prof.	2 - 4	4	0 – 1	1	Secondary
Theresa E. Adsit	Lecturer		7	0 – 1	1	Limited
James Meyer	Lecturer		7	0 – 1	1	Limited
May Guy			7			Limited

Also, the AAC note strong involvement from students and faculty members in the Mathematic Program as mentioned as following:

Under faculty guidance, a number of undergraduate students have organized a student organization known

as “Analytical Minds”. Currently they are considering actives such as tutoring on and off campus, fundraisers, and guest speakers.

Faculty members in the Mathematics Program continue to organize an on campus seminar series “Mathematics and Applications” so that they can share their ideas and interest in research and instructional development

Concerns

One area in need of immediate attention is Actuarial Sciences. All faculty members in the Mathematics Program want to offer “a substantial curriculum” to students due to students’ demand and the large employment opportunities in this field. The Mathematics faculty has made initial plans for a program in Actuarial Sciences, but still need courses focused on preparing for the actuarial examinations in probability and in financial mathematics. Without additional resources, new course coverage would have to be met via reduction of other offerings or by overload. The program chair mentioned that paperwork would first need to be filed before they could formally begin, requiring at least another year. It would be advantageous to have a course contribution from the Business Program that would focus on derivative markets.

There have been several concerns and suggestions regarding creating and managing a Mathematics center to parallel the Writing Center because it would provide mathematical assistance and academic advising to students across the campus. At this point, with or without funds, a physical space would need to be designated for such a Center. This concept has been discussed for many years but invariably has proven infeasible due to resource shortages.

Another concern is large enrollments in Math 101. Currently, large enrollments in Math 101 are managed via a large number of sections, which diminishes the program’s abilities to offer other courses. The Mathematics Program has taken action to evaluate the possibility of alternative instruction methods such as online and self-paced.

In conclusion, the Mathematics Program has been strong and the current faculty members expect to maintain and strengthen in the program, and remain abreast of trends across the nation. The Mathematics Program should maintain their program structure, in line with the capabilities of their current faculty members.

To: Julia Wallace

Provost and Vice Chancellor for Academic Affairs

From: Scott Furlong

Dean of Liberal Arts and Sciences

Re: Report on the Mathematics Program Review

I have examined the Self-Study Report prepared by the faculty in Mathematics, as well as the Program Review conducted by the Academic Affairs Council. Based on my examination of these materials I recommend continuation of the Mathematics. Specific comments that I made to the faculty include the following:

1. There is some concern regarding the decrease in the number of majors in the program over the past five years and this needs some further exploration by the faculty.

2. Despite the above, enrollments in Mathematics classes continue to be very strong because of the program support provided to other programs around campus

3. The program has been hampered over the past few years by a prolonged sick leave by one of the faculty. It will be searching for a new position this year. I have recommended that the person hired be able to support the curriculum and research associated with the environmental sciences component of the larger NAS unit.

4. A more comprehensive assessment plan on student learning needs to be developed.

5. I support the work being done to explore the development of an Actuarial Science emphasis within the major, and perhaps the new faculty hire can support this as well. I also support the faculty efforts to increase undergraduate research opportunities.

6. I support additional discussions regarding the development of a Mathematics Center and encouraged collaborations with Student Support Services.

Cc: Greg Davis, Chair NAS

Tim Sewall, Associate Provost

Steve Dutch, Chair AAC

To: Greg Davis

Chair, Mathematics

From: Scott Furlong

Dean of Liberal Arts and Sciences

Re: Report on the Mathematics Program Review

The Mathematics program at the University of Wisconsin-Green Bay is a disciplinary program that focuses on "inquiry, critical thinking, disciplinary and interdisciplinary problem solving, and communication." This is done in the context of providing a formal education in mathematical sciences. The program provides necessary support for a number of other university requirements as well as majors/minors around campus. Some of these include: the university mathematics competency requirement, statistics and other supporting math courses for a number of majors (e.g., Environmental Science, Human Biology, all the science disciplinary majors). A number of the faculty are key contributors to the graduate programs in Environmental Science and Policy, and to a lesser degree the Applied Leadership for Teaching and Learning. It is a program that continues to be closely aligned with the mission of the institution, and many of the faculty are integrated fundamentally with issues of environmental concerns in curricular and scholarly ways.

Enrollment Trends/Resource Issues:

The Mathematics has averaged 80 majors over the past five years, although I note a drop in majors since 2006 (from 105 to 52) and this is something that the faculty needs to pay attention to in the coming years. Disregarding the number of majors, mathematics classes in most cases have strong (and in some cases over) enrollment. We offer many sections of Math 101, 104, 202, 203, and 260 every year and they typically all fill to capacity. There have been situations over the past years where we have had to add additional sections of these classes to meet demand. I have been particularly concerned in meeting the needs of some of our better incoming students that may need one of the Calculus courses when starting their education. The strength of these class enrollments has much to do with the program's support of other majors such as Human Biology, Environmental Sciences, and the other disciplinary science programs. Some of the faculty also teach classes within the Environmental Science curriculum.

During the past few years the program has been operating without full faculty resources due to a prolonged sick leave of one of its faculty. This will be addressed in the coming year. The number of lower level sections needed also prevents the faculty from offering a wider range of upper level classes. The faculty's participation in the graduate program tends to fall primarily on a few

people, which affects overload workload. Mathematics (and NAS) will be searching this for a new faculty member and I strongly recommend that the individual hired can adequately participate in, and support, the ES&P program to help alleviate some of the workload issues.

Assessment:

Mathematics have six learning outcomes that are well defined and relevant not only for the program but to the university. The self-study correctly notes that there has been little progress made regarding the assessment of the

program's learning outcomes. Their existing methods include the use of alumni surveys and "semi-formal discussion of students' work…" The program notes that more needs to be done here but has not been able to address this due to resource constraints. This is a critical need at this point and is an area that needs to be address by the faculty.

Curriculum Development/General Education:

There have not been any significant changes to the Mathematics curriculum since the last review. The program has a significant common core that all majors take and then two emphases (Mathematics and Statistics) beyond the core. The faculty have been in discussions for a couple of years to develop an Actuarial Science emphasis that they believe will be appealing to students. They are a couple of courses away from their ability to offer such an emphasis but this could potentially be addressed with the new hire. The program also plans to become more involved in offering undergraduate research opportunities.

While the Mathematics courses are not part of the formal general education program, they are necessary for helping students to meet the Math competency requirement. Faculty in the program do teach and support general education through other courses outside of Mathematics.

As discussed in the last review, there continues to be an interest to develop a Mathematics Center, similar to the Writing Center, that would provide support to students and also serve as a way organize workshops and lectures. This could be a good idea and I would encourage the faculty to explore this and include Student Support Services in these discussions.

In summary, the Mathematics program continues to be an important part of the UW-Green Bay curriculum. The major program is coherent and provides a well-rounded education for its students. The program supports the university missions and is critical for a number of other majors and programs around campus both in CLAS and CPS. There proposed idea to add an actuarial science emphasis could provide some interesting opportunities for our students. More work is necessary toward assessment of student learning outcomes.

Cc: Steve Dutch, Academic Affairs Council

Tim Sewall, Associate Provost

4. **The program's Assessment Plan and Annual Updates on Student Outcomes Assessment (see the descriptions below). These processes will be coordinated by the University Assessment Council, the UAC's Academic Program Assessment Subcommittee and are described in the University Assessment Plan.**

Mathematics 2014-2015 Assessment Plan

1. Which outcome will you assess?

    1. Mathematics majors will be able to understand important mathematical/statistical concepts, theorems, formulas, computational techniques and axiomatic systems in the required courses.

    2. Mathematics majors will be able to demonstrate the ability to follow, construct, and write mathematical proofs.

    4. Mathematics majors will be able to pose mathematical/statistical problems and select and apply appropriate mathematical/statistical theories, models and tools to solve and/or analyze the problems.

2. Which technique will you use to assess this outcome?

    - MATH 385 – It will be assessed via a combination of assignments and exams.

3. Which course or group of students will you assess on the outcome chosen above and when?

    - Students in MATH 385 will be assessed in Spring 2015

4. Who will do the assessment and coordinate the data collection and reporting?

    - Woo Jeon will collect and report on the assessment data for MATH 385.

Mathematics 2014-2015 Assessment Report

Please give a brief overview of the assessment data you collected this year.

The assessment data was collected through MATH 385 Foundations of Geometry for spring 2015.

1. It is a required course for Mathematics majors with a Mathematics emphasis and an elective course for Mathematics minors with a Mathematics emphasis.
2. It includes interdisciplinary contents that explores many topics of mathematics including Calculus, Linear Algebra, Analysis, Number Theory, Topology, and Geometry (Euclidean and Non-Euclidean). Students will apply them to the areas of History (Mathematics), Hyperbolic Space (Physics & Astronomy), transformation (picture distortion), Chaos Theory, Projective geometry (drawings), etc. So, several questions span across of the semester. It is problem-focused and students will write a lot of (mathematical) proofs.
3. There were 4 senior students who started the course for spring 2015 and all 4 students finished the course successfully with grade A or AB.
4. All 4 students were Mathematics majors with 1 or more other majors (Environmental Science, Bachelor of Science, Human Development, Business Administration, Computer Science).
5. The assessment includes a combination of 3 midterms, and the final.
6. All the exam problems are free-response, mostly consisting of proofs.
7. The following outcomes were assessed:

LO1. Mathematics majors will be able to understand the important mathematical/statistical concepts, theorems, formulas, computational techniques and axiomatic systems in the required courses.

LO2. Mathematics majors will be able to demonstrate the ability to follow, construct, and write mathematical proofs.

LO4. Mathematics majors will be able to pose mathematical/statistical problems, and select and apply appropriate mathematical/statistical theories, models and tools to solve and/or analyze the problems.

How will you use what you've learned from the data that was collected?

1. The students achieved an average score of 94.3%
2. The data shows that all of the students successfully demonstrated their understanding of most of the important concepts and skills. Their skills at proof writing were more than sufficient.
3. All LO1, LO2, LO4 were successfully implemented for spring 2015.

Mathematics 2015-2016 Assessment Plan

1. Please review last year's assessment results (2014-2015) with the faculty in your program. How does your program plan to take these results into consideration for future programmatic planning?

    - No further curricular revision planned with this learning outcome.

2. Which outcome will you assess this year (2015-2016)?

    1. Mathematics majors will be able to understand important mathematical/statistical concepts, theorems, formulas, computational techniques and axiomatic systems in the required courses.

    2. Mathematics majors will be able to demonstrate the ability to follow, construct, and write mathematical proofs.

    4. Mathematics majors will be able to pose mathematical/statistical problems and select and apply appropriate mathematical/statistical theories, models and tools to solve and/or analyze the problems.

3. Which technique will you use to assess this outcome?

    - MATH 385 – It will be assessed via a combination of assignments and exams.

4. Which course or group of students will you assess on the outcome chosen above and when?

    - Students in MATH 385 will be assessed in Spring 2016.

Mathematics 2015-2016 Assessment Report

Please give a brief overview of the assessment data you collected this year.

The assessment data was collected through MATH 385 Foundations of Geometry for spring 2015.

1. It is a required course for Mathematics majors with a Mathematics emphasis and an elective course for Mathematics minors with a Mathematics emphasis.
2. It includes interdisciplinary contents that explores many topics within mathematics including Calculus, Linear Algebra, Analysis, Number Theory, Topology, and Geometry (Euclidean and Non-Euclidean). Students will apply them to the areas of History (Mathematics), Hyperbolic Space (Physics & Astronomy), transformation (picture distortion), Chaos Theory, Projective geometry (drawings), etc. So, several questions span across of the semester. It is problem-focused and students will write a lot of (mathematical) proofs, making this a best fit for Capstone experiences.
3. There were 12 students (2 juniors and 10 seniors) who started the course for spring 2016 and all 12 students passed the course with grade C (2 student) and above.
4. All 12 students were having Mathematics major with 1 or more other majors (Education, Certificate in Sustainability, Environmental Science, Spanish & Latin American Studies, Bachelor of Science, History, Music, Business Administration, Computer Science).
5. The assessment includes a combination of 6 midterms, 1 midterm, and the final.
6. All the exam problems are free-response, mostly consisting of proofs.
7. The following outcomes were assessed:

LO1. Mathematics majors will be able to understand the important mathematical/statistical concepts, theorems, formulas, computational techniques and axiomatic systems in the required courses.

LO2. Mathematics majors will be able to demonstrate the ability to follow, construct, and write mathematical proofs.

LO4. Mathematics majors will be able to pose mathematical/statistical problems, and select and apply appropriate mathematical/statistical theories, models and tools to solve and/or analyze the problems.

How will you use what you've learned from the data that was collected?

1. The students achieved an average score of 83.9%
2. The data shows that most of the students successfully demonstrated their understanding of most of the important concepts and skills. Their skills at proof writing were sufficient.
3. All LO1, LO2, LO4 were successfully implemented for spring 2016.

Program: Mathematics

Program Assessment Coordinator: Woo Jeon

Date: December 15, 2016

Academic Program Assessment Plan (2016-2017)

The questions below will form the outline for your programmatic assessment for this academic year. The Assessment Plans should be determined by the end of the fall semester, **December 16, 2016**. All Assessment Plans should be implemented by the end of the spring semester with results compiled in May 2017. Reports including those results are due **June 1, 2017**.

You can find your program's Learning Outcomes as well as previous Assessment Plans and Reports on the Assessment website: http://www.uwgb.edu/assessment/.

1. Please review last year's assessment results (2015-2016) as well as the Academic Program Assessment Report with the faculty in your program. How does your program plan to take these results into consideration in future programmatic planning?

- No further curricular revision planned with those results.

2. Please review your program's Learning Outcomes. Do any of them need to be updated or clarified?
    - No further revision planned with the current Mathematics Program learning outcomes.

    a. Please provide brief indications of the kinds of assessment (e.g. course exams, term papers, course projects, senior seminar, senior interview, etc.) that might be used to assess each outcome. (The purpose here is to see that your program has considered ways it might measure each outcome.)
        - MATH 328 (Fall 2016) & MATH 385 (Spring 2017) – They will be assessed via combinations of assignments and exams.

    b. Please compare your Learning Outcomes to the University's main learning objectives: interdisciplinary, problem-focused education; critical thinking; diversity; environmental sustainability; and engaged citizenship. (These objectives were identified in the MLLO Project, which may be found here: http://www.uwgb.edu/MLLO/.) Which programmatic outcomes match university mission outcomes?
        - problem-focused education; critical thinking

    There is no requirement that all, or even any, program outcomes match the MLLO outcomes. However, since these outcomes have been identified as the core of UWGB's mission, and since virtually every program has identified critical thinking, problem solving, and interdisicplinarity as core learning objectives, programs may wish to review their outcomes if few or no outcomes seem to match these objectives.

3. Which outcome will you assess this year (2016-2017)?

    1. Mathematics majors will be able to understand important mathematical/statistical concepts, theorems, formulas, computational techniques and axiomatic systems in the required courses.

    2. Mathematics majors will be able to demonstrate the ability to follow, construct, and write mathematical proofs.

    4. Mathematics majors will be able to pose mathematical/statistical problems and select and apply appropriate mathematical/statistical theories, models and tools to solve and/or analyze the problems.

4. Which technique will you use to assess this outcome?
    - Assignments and exams will be designed to assess the outcome and students' proof will be checked to assess them.

(You may, for example, wish to include a combination of direct and indirect methods. Methods such as tests, embedded assessment, papers, projects, laboratory procedures, competence interviews or musical performance and/or indirect measures, for example, student perceptions and experiences, survey data, portfolios, records of job placement, graduate admissions, etc.)

5. Which course or group of students will you assess on the outcome chosen above and when?
    - All the students in MATH 328 will be assessed in Fall 2014.
    - All the students in MATH 385 will be assessed in Spring 2015

    (Please keep in mind that assessment should be a snapshot of what you're doing. You do not need to assess every single student in your major, but rather a sample group that is large enough to get reliable data.)

    In preparing this portion of your assessment plan, it may be useful to you to create a crosswalk of your courses, mapping which learning outcomes are met by which courses or program requirements. Such a crosswalk might look like this:

	Learning Outcome 1	Learning Outcome 2	Learning Outcome 4
ATH 328	✓	✓	✓
ATH 385	✓	✓	✓

Mathematics 2016-2017 Assessment Report

Please give a brief overview of the assessment data you collected this year.

The assessment data was collected through

- MATH 328 Introduction to Algebraic Structures for fall 2016
- MATH 385 Foundations of Geometry for spring 2017

They are required courses for Mathematics majors with a Mathematics emphasis and an elective course for Mathematics minors with a Mathematics emphasis. The following outcomes were assessed:

LO1. Mathematics majors will be able to understand the important mathematical/statistical concepts, theorems, formulas, computational techniques and axiomatic systems in the required courses.

LO2. Mathematics majors will be able to demonstrate the ability to follow, construct, and write mathematical proofs.

LO4. Mathematics majors will be able to pose mathematical/statistical problems, and select and apply appropriate mathematical/statistical theories, models and tools to solve and/or analyze the problems.

MATH 328 Introduction to Algebraic Structures for fall 2016

1. It includes interdisciplinary contents that explore many topics within mathematics including Calculus, Linear Algebra, Number Theory, Topology, and Geometry. Students will apply them to the areas of Abstract Algebra. So, this course is a purely disciplinary course in Mathematics. It is problem-focused.
2. There were 11 students (1 junior and 10 seniors) who started the course for fall 2016. 10 students passed the course with grade C (1 student) and above. 1 student received a grade D.
3. 8 students were Mathematics majors with 1 or more other majors (Human Biology, Global Studies, Education, Business Administration, English, Environmental Science, Music, Computer Science). 3 students were Computer Science majors.
4. The assessment includes a combination of 6 assignments, 1 midterm, and the final.
5. All the assignments and exam problems are free-response, mostly consisting of proofs.
6. Students had to demonstrate the ability to follow, construct, and write mathematical proofs using knowledge derived from the major content areas of Abstract Algebra (Group Theory, Ring Theory, Vector Spaces, and Field Theory).

MATH 385 Foundations of Geometry for spring 2017

1. It includes interdisciplinary contents that explore many topics within mathematics including Calculus, Linear Algebra, Analysis, Number Theory, Topology, and Geometry (Euclidean and Non-Euclidean). Students will apply them to the areas of History (Mathematics), Hyperbolic Space (Physics & Astronomy), transformation (picture distortion), Chaos Theory, Projective geometry (drawings), etc. So, several questions span across the semester.
2. It is problem-focused and students will write a lot of (mathematical) proofs. It will be a course for Capstone experiences starting next academic year (approved).
3. There were 9 students (2 juniors and 7 seniors) who started the course for spring 2017 and all 9 students passed the course with grade C (1 student) and above.
4. All 9 students were Mathematics majors with 1 or more other majors (Education, Accounting, Humanistic Studies, Business Administration, Economics, English, Environmental Science, and Computer Science).

5. The assessment includes a combination of 5 assignments, 1 midterm, and the final.
6. All the assignments and exam problems are free-response, mostly consisting of proofs.
7. Students had to demonstrate the ability to follow, construct, and write mathematical proofs using knowledge derived from the major content areas of Calculus, Number Theory, Linear Algebra, and Geometry (Euclidean and Non-Euclidean).

How will you use what you've learned from the data that was collected?

MATH 328 Introduction to Algebraic Structures for fall 2016

1. The students achieved an average score of 84.0%
2. The data shows that 9 out of 11 students were clear in understanding about most of the important concepts and skills. Their skills at proof writing were sufficient. 2 students needed to pay more attention to their weekly assignments and attendance.
3. 7 students who had 60 or 70 out of 70 attendance points achieved 87.3% or higher. 2 students who had 30 out of 70 attendance points achieved 70.7% or 76.9%. 2 students who had 10 or 20 out of 70 attendance points achieved 58.7% or 65.1%. Therefore, we concluded that a student's performance in the course had a strong positive correlation with their attendance.
4. The implementation of LO1, LO2, LO4 were satisfactory for fall 2016.

MATH 385 Foundations of Geometry for spring 2017

1. The average score that the students achieved was 90.4%
2. The data shows that all of the students were clear in understanding about most of the important concepts and skills. Their skills at proof writing were very sufficient.
3. All LO1, LO2, LO4 were successfully implemented for spring 2017.