SAINT LOUIS UNIVERSITY
Program Assessment Plan

Program: BA MATHEMATICS
Department: Mathematics and Statistics
College/School: College of Arts and Sciences
Primary Assessment Contact: Associate Chair of Mathematics & Statistics

#	Program Learning Outcomes	Assessment Mapping	Assessment Methods	Use of Assessment Data
	What do the program faculty expect all students to know, or be able to do, as a result of completing this program? Note: These should be measurable and manageable in number (typically 4-6 are sufficient).	From what specific courses (or other educational/professional experiences) will artifacts of student learning be analyzed to demonstrate achievement of the outcome? Include courses taught at the Madrid Campus and/or online as appropriate.	What specific artifacts of student learning will be analyzed? How, and by whom, will they be analyzed? Note: The majority should provide direct, rather than indirect, evidence of achievement. Please note if a rubric is used and, if so, include it as an appendix to this plan.	How and when will analyzed data be used by faculty to make changes to pedagogy, curriculum design, and/or assessment work? How and when will the program evaluate the impact of assessment informed changes made in previous years?
1	Demonstrate conceptual competency in foundational areas of mathematics by developing problem solving skills and solving problems in these areas of mathematics.	Primary: MATH 1510 Calculus 1 MATH 1520 Calculus 2 MATH 2530 Calculus 3 MATH 3120 Intro to Linear Algebra STAT 3850 Foundation of Statistics Secondary: See attached Curriculum Map	Direct assessment through final exam questions in primary courses covering specific course learning outcomes. Faculty will typically use a standard rubric (see below) to score the performance of all students in the course. Indirect assessment may incorporate data from a variety of sources, including exit survey responses, student records, sample assignments, sample student work, etc.	If the analyzed data conveys a pattern of low achievement, faculty who regularly teach the relevant course(s) will meet to discuss possible changes and their expected effect on student learning. Effort will be made to evaluate assessment informed changes based on on data collected during the first year with the new methods and will be repeated the following year before returning to the normal cycle of evaluation.

2	Demonstrate an ability to write and comprehend mathematical proofs using both direct and indirect methods.	Primary: MATH 2660 Principles of Mathematics MATH 3120 Intro to Linear Algebra Secondary: See attached Curriculum Map	Direct assessment through final exam questions in MATH 2660 and MATH 3120 covering specific course learning outcomes. Faculty will typically use a standard rubric (see below) to score the performance of all students in the course. Indirect assessment may incorporate data from a variety of sources, including exit survey responses, student records, sample assignments, sample student work, etc.	If the analyzed data conveys a pattern of low achievement, faculty who regularly teach the relevant course(s) will meet to discuss possible changes and their expected effect on student learning. Effort will be made to evaluate assessment informed changes based on on data collected during the first year with the new methods and will be repeated the following year before returning to the normal cycle of evaluation.
3	Demonstrate an ability to analyze data and perform appropriate statistical analyses.	Primary: STAT 3850 Foundation of Statistics Secondary: See attached Curriculum Map	Indirect assessment may incorporate data from a variety of sources, including exit survey responses, student records, sample assignments, sample student work, etc.	If the analyzed data conveys a pattern of low achievement, faculty who regularly teach the relevant course(s) will meet to discuss possible changes and their expected effect on student learning. Effort will be made to evaluate assessment informed changes based on on data collected during the first year with the new methods and will be repeated the following year before returning to the normal cycle of evaluation.
4	Demonstrate an ability to write computer programs that implement mathematical or statistical algorithms.	Primary: CSCI 1060 Scientific Programming CSCI 1300 Intro. Object Oriented Prog. Secondary: See attached Curriculum Map	Indirect assessment may incorporate data from a variety of sources, including exit survey responses, student records, sample assignments, sample student work, etc.	If the analyzed data conveys a pattern of low achievement, faculty from the Department will meet with colleagues in Computer Science to discuss possible changes and their expected effect on student learning. Effort will be made to evaluate assessment informed changes based on on data collected during the first year with the new methods and will be repeated the following year before returning to the normal cycle of evaluation.

| 5 | Demonstrate an ability to communicate mathematical ideas and concepts both orally and in writing. | Primary:
MATH 2660 Principles of Mathematics
MATH 3120 Intro to Linear Algebra

Secondary:
See attached Curriculum Map | Direct assessment through final exam questions in MATH 2660 and MATH 3120 covering specific course learning outcomes. Faculty will typically use a standard rubric (see below) to score the performance of all students in the course.

Indirect assessment may incorporate data from a variety of sources, including exit survey responses, student records, sample assignments, sample student work, publications of student work, or presentations by students at professional meetings or other academic events. | If the analyzed data conveys a pattern of low achievement, faculty who regularly teach the relevant course(s) will meet to discuss possible changes and their expected effect on student learning.

Effort will be made to evaluate assessment informed changes based on on data collected during the first year with the new methods and will be repeated the following year before returning to the normal cycle of evaluation. |
| 6 | Demonstrate an understanding of at least one advanced, in-depth topic in mathematics or statistics. | Students must complete one of the following year-long sequences:
MATH 3550 & (MATH 4550 or 4570)
STAT 3850 & (MATH 4800 or STAT 48xx)
MATH 4110 & (MATH 4120 or 4150)
MATH 4210 & (MATH 4220 or 4230)
MATH 4310 & (MATH 4320 or 4360)

Additionally, students must complete at least three 4000-level MATH or STAT courses. | Indirect assessment may incorporate data from a variety of sources, including exit survey responses, student records, sample assignments, sample student work, etc. | If the analyzed data conveys a pattern of low achievement, faculty who regularly teach the relevant course(s) will meet to discuss possible changes and their expected effect on student learning.

Effort will be made to evaluate assessment informed changes based on on data collected during the first year with the new methods and will be repeated the following year before returning to the normal cycle of evaluation. |

Additional Questions

1. On what schedule/cycle will faculty assess each of the above-noted program learning outcomes? (It is not recommended to try to assess every outcome every year.)

   > The Department will strive to assess three of six program learning outcomes during any given year, which should make it possible to evaluate each outcome at least three times in a six-year cycle.
   >
   > Direct assessment of student learning in MATH 1510, 1520, 2530, 2660, 3120, and 3850 will be carried out each semester (fall, spring) with the goal of sampling the majority of the various course level learning outcomes during a typical six year cycle.

2. Describe how, and the extent to which, program faculty contributed to the development of this plan.

   > This plan represents the collaboration of various members of the Department's Upper Division Committee and will be presented and accepted by the Faculty before being adopted.

3. On what schedule/cycle will faculty review and, if needed, modify this assessment plan?

   > This plan will be reviewed at least once during each six-year assessment cycle, but will also be reviewed whenever programmatic changes dictate that revision is warranted, e.g., upon revision of program requirements.

Appendix

The following standard rubric will typically be used in the direct assessment of student learning through problems on the final exam.

0   Student shows little or no understanding of the concept(s).
1   Student shows a limited understanding of the concept(s).
2   Student shows competence, but not complete mastery of the concept(s).
3   Student shows mastery of the relevant concept(s).

The goal with this rubric is to have a low percentage of students receiving a 0 or 1 score.

Detailed Curriculum Map for Mathematics BA Program

Legend: P = Primary Development (light blue), S = Secondary Development (dark blue)

Program Learning Outcome	MATH 1510 Calculus 1	MATH 1520 Calculus 2	MATH 2530 Calculus 3	MATH 2660 Principles of Mathematics	MATH 3120 Introduction to Linear Algebra	STAT 3850 Foundations of Statistics	CSCI 1060 Scientific Programming	CSCI 1300 Object-Oriented Programming	MATH 4050 History of Mathematics	MATH 4110 Introduction to Abstract Algebra	MATH 4120 Linear Algebra	MATH 4150 Number Theory	MATH 3240 Numerical Analysis	MATH 4210 Introduction to Analysis	MATH 4220 Metric Spaces	MATH 4230 Multivariable Analysis	MATH 4310 Introduction to Complex Variables	MATH 4320 Complex Variables II	MATH 4410 Euclidean Geometry	MATH 4430 Non-Euclidean Geometry	MATH 3550 Differential Equations	MATH 4550 Nonlinear Dynamics	MATH 4570 Partial Differential Equations	MATH 3600 Combinatorics	MATH 4630 Graph Theory	STAT 4800 Probability Theory	STAT 4840 Time Series	STAT 4850 Mathematical Statistics	STAT 4860 Statistical Models	STAT 4870 Applied Regression	STAT 4880 Bayesian Statistics	MATH 4960 Senior Capstone	STAT 4960 Senior Capstone
Demonstrate conceptual competency in foundational areas of mathematics by developing problem solving skills and solving problems in these areas of mathematics.	P	P	P		P	P			S	S	S	S	S	S	S	S	S	S						S		S	S	S	S	S	S	S	
Demonstrate an ability to write and comprehend mathematical proofs using both direct and indirect methods.				P	P					S	S	S		S	S	S								S	S								
Demonstrate an ability to analyze data and perform appropriate statistical analyses.						P																				S	S	S	S	S	S		S
Demonstrate an ability to write computer programs that implement mathematical or statistical algorithms.						S	P	P				S	S																				
Demonstrate an ability to communicate mathematical ideas and concepts both orally and in writing.				P	P					S	S	S		S	S	S			S	S												S	
Demonstrate an understanding of at least one advanced, in-depth topic in mathematics or statistics.						P				P	S	S		P	S	S	P	S			P	S	S			S	S	S	S	S	S		