Assessment Data Mathematical, Information and Computer Sciences
General Education: Mathematics

Learning Outcome:
1e. Quantitative Reasoning: Students will be able to solve problems that are quantitative in nature

Components of this outcome as defined by the department:

- Students will be able to formulate a mathematical model from a verbal description of a problem.
- Students will be able it solve non-routine problems using logic and quantitative techniques.
- Students will be able to construct solutions to problems using computational techniques.

Outcome Measure:
Problems placed on the final exam.
MTH144 Calculus with Applications
MTH164 Calculus I
MTH303 Problem Solving

Note that all classes use the same learning outcomes even if the problems used to measure those outcomes are different. Because it is a life skill, all classes spend some time on financial mathematics (loans, interest and credit cards) in a manner appropriate for the skill level of the students in the class.

Criteria for Success:
Average score of 2.5 or higher for each problem. Note that this data is gathered by taking a random sample of the students in each section of each course.

Scale Used:
0 Unsatisfactory - Completely Incorrect
1 Low Satisfactory - Missed more than one key concept or step
2 Satisfactory - Missed one key concept or step
3 High Satisfactory - Made a minor error
4 Outstanding - Completely correct

Longitudinal Data:

		Students will be able to formulate a mathematical model from a verbal description of a problem.	Students will be able it solve non-routine problems using logic and quantitative techniques.	Students will be able to construct solutions to problems using computational techniques.
MTH144	Spring 2010	3.27	3.17	3.37
MTH144	Spring 2011	2.05	1.88	3.10
MTH144	Summer 2011	3.67	2.83	3.50
MTH144	Spring 2012	1.79	2.77	3.46
MTH144	Spring 2013	3.68	2.66	3.24
MTH144	Spring 2014	2.19	2.80	3.93
MTH144	Spring 2015	2.51	3.23	3.69
MTH164	Fall 2009	2.92	2.85	1.62
MTH164	Fall 2010	2.48	2.52	1.24
MTH164	Fall 2011	1.30	2.93	3.02
MTH164	Fall 2012	3.50	3.28	3.80
MTH164	Fall 2013	3.35	2.80	3.68
MTH164	Fall 2014	2.95	2.90	2.83
MTH303	Fall 2007	2.19	3.14	2.22
MTH303	Spring 2008	3.32	2.82	3.42
MTH303	Fall 2008	3.63	3.30	3.50
MTH303	Spring 2009	3.37	3.07	2.93
MTH303	Fall 2009	2.78	2.78	3.22
MTH303	Spring 2010	3.16	3.26	3.61
MTH303	Fall 2010	3.28	2.73	3.55
MTH303	Spring 2011	2.66	2.79	2.96
MTH303	Fall 2011	3.02	3.23	3.25
MTH303	Spring 2012	2.69	2.95	2.71
MTH303	Fall 2012	3.22	2.70	2.48
MTH303	Spring 2013	3.54	2.89	2.74
MTH303	Fall 2013	2.95	2.97	2.93
MTH303	**Spring 2014**	**2.85**	**2.65**	**2.83**
MTH303	**Fall 2014**	**2.81**	**2.77**	**3.02**
MTH303	**Spring 2015**	**2.56**	**2.64**	**2.70**

Bold means sections taught in blended (50% online) format.

Conclusions Drawn from Data:
Note that in the Spring of 2014 some sections of MTH303 were hybrid. In the Fall 2014 and Spring 2015 all sections of MTH303 were hybrid. It is interesting to note that student learning outcome success has persisted through the change in modality.

Some of the early weakness in the data came from two features: poorly phrased problems (MTH144 and MTH164) and a need for a greater emphasis on financial mathematics in MTH144 and MTH164. These are calculus classes and we were expecting students to draw conclusions about how to apply calculus techniques to finance without sufficient practice.

Changes to be Made Based on Data:
Increased emphasis on practical financial mathematics. Increased time spent on solving problems and engaging in computations in groups in class.

Rubric Used

General Education Mathematics Rubric

	Unsatisfactory (0)	Low Satisfactory	Satisfactory	High Satisfactory	Outstanding (4)
Students will be able to formulate a mathematical model from a verbal description of a problem.	Completely incorrect	Missed more than one key step or concept	Missed one key step or concept	Made a minor error	Completely correct
Students will be able it solve non-routine problems using logic and quantitative techniques.	Completely incorrect	Missed more than one key step or concept	Missed one key step or concept	Made a minor error	Completely correct
Students will be able to construct solutions to problems using computational techniques.	Completely incorrect	Missed more than one key step or concept	Missed one key step or concept	Made a minor error	Completely correct

Calculus (MTH 144 and MTH164)

- Interest
- Max/min
- Complex derivative

Problem Solving (MTH303)

- Compound interest
- Scheduling
- interest