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

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| 1  | Demonstrate conceptual competency in foundational areas of mathematics by developing problem solving skills and solving problems in these areas of mathematics. | 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? |

| 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. |
|   | 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 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. |
|   | 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 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 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. |
|   | 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 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. |
|   | 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 | Demonstrate an understanding of at least two advanced, in-depth topics in mathematics or statistics, including at least one topic in pure mathematics. | 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 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. |
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| 5 | | | Students must complete two year-long sequences:  
MATH 3550 & (MATH 4550 or 4570)  
STAT 3850 & (MATH 4800 or STAT 48–)  
MATH 4110 & (MATH 4120 or 4150)*  
MATH 4210 & (MATH 4220 or 4230)*  
MATH 4310 & (MATH 4320 or 4360).  
One of the two starred sequences in pure mathematics is required. Additionally, students must complete at least 27 credits through MATH or STAT courses numbered above 3120. | Indirect assessment may incorporate data from a variety of sources, including exit survey responses, student records, sample assignments, sample student work, etc. | |
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., after changes to the major requirements, etc.

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.
### Program Learning Outcome

- Demonstrate conceptual competency in foundational areas of mathematics by developing problem solving skills and solving problems in these areas of mathematics.
- Demonstrate an ability to write and comprehend mathematical proofs using both direct and indirect methods.
- Demonstrate an ability to analyze data and perform appropriate statistical analyses.
- Demonstrate an ability to write computer programs that implement mathematical or statistical algorithms.
- Demonstrate an ability to communicate mathematical ideas and concepts both orally and in writing.
- Demonstrate an understanding of at least two advanced, in-depth topics in mathematics or statistics, including at least one topic in pure mathematics.