College of Arts and Sciences
Department of Mathematics | Mathematics and Actuarial Science Programs
Table 3: Student Learning Outcomes

Doctorate in Mathematics

Outcome Type	Outcome	Assessment & Evaluation Process
Program Outcome: Production of Graduates	By the end of the year, the program will produce an average of 7 or more Mathematics PhD graduates per 12- month period (Summer, Fall, Spring semesters).	Counting the number of Mathematics PhD graduates per 12-month period.
Learning Outcome: Research Communication	As they develop mathematical maturity, students will develop their communications ability about mathematics, and will find value for their own research from the informal contacts as well as the talks at regional, national or international disciplinary research sessions and conferences. In their later graduate school months, students will be able to prepare and deliver professional-level posters or talks on their research in mathematics.	Our goal is to have 60% of the mathematics PhD graduates report conference participation in their research area
Learning Outcome: Research Competence	Upon completion of the course of instruction, the student will be able to produce productive, publishable original research in mathematics and its applications.	Research competence is measured by the writing and defense of a mathematics PhD dissertation, as decided by the student's faculty PhD committee.

Source: FSU Institutional Effectiveness Portal, 2018-19.

Masters in Mathematics

Outcome Type	Outcome	Assessment & Evaluation Process
Program Outcome: Production of Graduates	By the end of the year, the program will produce an average of 40 or more Mathematics MS graduates per 12- month period (Fall, Spring, Summer semesters).	Counting the number of Mathematics MS graduates per 12-month period.
Learning Outcome: Depth of Knowledge	Upon completion of the course of instruction, the student will be able to demonstrate in-depth knowledge of an advanced mathematical topic, if the student is in an academic degree program. These topics include, but are not limited to, abstract algebra, applied analysis and differential equations, mathematical modeling, numerical analysis, real and complex analysis, and topology.	Our goal is 90% of the students scoring 83% or better in a portfolio of assessments from one of the following six topic sequences: abstract algebra, applied analysis and differential equations, mathematical modeling, numerical analysis, real and complex analysis, and topology.

Learning Outcome: Knowledge for Applications in Related Fields	Upon completion of the course of instruction, the student will be able to demonstrate broad graduate level knowledge and skills from relevant outside fields and topic mastery; e.g., computer science and statistics for both programs, with economics, finance and risk management for Financial Mathematics, and with biochemistry, chemistry, biological science and physics for Biomathematics, if the student is in a professional degree program.	This will result in 80% of the students in Financial mathematics degree program (1) scoring 83% or better in each of four approved graduate courses from at least three outside departments and also (2) showing very good mastery in at least one outside department by scoring 88% or better in a regular graduate course in that department, evaluated competitively with graduate students from that outside department. The standard for Biomathematics is three approved graduate courses from at least two outside department and grades of S in S/U Biology courses are also included in (1).
Learning Outcome: Breadth of Knowledge	Upon completion of the course of instruction, the student will be able to demonstrate knowledge of a range of advanced mathematical topics, if the student is in an academic degree program. These topics include, but are not limited to, abstract algebra, applied analysis and differential equations, mathematical modeling, numerical analysis, real and complex analysis, and topology.	Our goal is 90% of the students scoring 83% or better in a portfolio of assessments from three or more of the following six topic sequences: abstract algebra, applied analysis and differential equations, mathematical modeling, numerical analysis, real and complex analysis, and topology.
Learning Outcome: Communicating Research through Speaking & Writing	Upon completion of the course of instruction, the student will be able to select and research a topic and prepare professional-level presentations: (a) 50-minute talks employing appropriate technology (e.g., Power Point) and critiqued by the other program students; (b) properly documented exposition of the results in written form following an accepted manual of style, as a capstone activity of the course of instruction if the student is in a professional degree program.	This will result in 90% of the students in a professional degree program being evaluated as "good" (83% or better) by the capstone projects course instructor(s), taking into account both the talk and resulting student discussions, as well as the written paper.

Source: FSU Institutional Effectiveness Portal, 2018-19.

Bachelors in Mathematics

Outcome Type	Outcome	Assessment & Evaluation Process
Program Outcome: Production of Graduates	By the end of the year, the program will produce 20 or more Mathematics BS graduates for the 12-month period (Summer, Fall, Spring semesters).	Counting the number of Mathematics BS graduates per 12-month period
Learning Outcome: Line Integral	Upon completion of the course of instruction, the student will be able to compute a line integral.	Our goal is 80% of the students scoring 73% or better for a question on the last test or final examination of MAC 2313 that is designed to test whether the student can evaluate a line integral.

Learning Outcome: Eigenvalues and Eigenvectors	Upon completion of the course of instruction, the student will be able to compute the eigenvalues and eigenvectors of a square matrix.	Our goal is 80% of the students scoring 73% or better for a question on the last test or final examination of MAS 3105 that is designed to test whether the student knows how to find the eigenvalues and eigenvectors of a square matrix.
Learning Outcome: Analytical Skill	Upon completion of the course of instruction, the student will be able to demonstrate a sufficiently high level of analytical skill to construct and critique either a valid mathematical model or a valid proof of a mathematical theorem (whichever is appropriate to the student's chosen option).	Our goal is 70% of the students scoring 78% or better in either MAP 4103 AND MAD 3703/4704 (the capstone courses for majors in Applied Mathematics) or MAP 4481 AND MAP 2480 (the capstone courses for majors in Biomedical Mathematics) or MAS 4302/3 AND MAA 4224/6/7 (the capstone courses for majors in Mathematics) or MTG 4212 AND MAS 4203/4302/3 (the capstone courses for FSU Teach Mathematics) as determined by instructor- constructed exams, homework assignments and course projects
Learning Outcome: Multiple Integration	Upon completion of the course of instruction, the student will be able to demonstrate how to evaluate a double integral by interchanging the order of integration.	Our goal is 80% of the students scoring 73% or better for a question on the last test or final examination of MAC 2313 that is designed to test whether the student can evaluate a double integral by interchanging the order of integration.
Learning Outcome: Breadth of Knowledge	Upon completion of the course of instruction, the student will be able to demonstrate in-depth knowledge of a broad range of mathematical topics.	Our goal is 70% of the students scoring 78% or better in a portfolio of assessments within at least one senior-level course in at least three of the following seven subfields of mathematics: abstract algebra, real and complex analysis, game theory and optimization, mathematical modeling, numerical analysis, partial differential equations, or topology, as determined by instructor- constructed exams, homework assignments and course projects.
Learning Outcome: Proficiency in a Scientific Programming Language	Upon completion of the course of instruction, the student will be able to demonstrate proficiency in C, C++, FORTRAN, Java or another approved higher-level programming language.	Our goal is 80% of the students scoring 80% or better in any of the following courses: MAD 3703, ISC 3313 or COP3014.
Learning Outcome: Laplace Transformation	Upon completion of the course of instruction, the student will be able to use the Laplace transform to solve a linear ordinary differential equation.	Our goal is 80% of the students scoring 73% or better for a question on the last test or final examination of MAP 2302 that is designed to test whether the student knows how to use the Laplace transform to solve a linear ordinary differential equation.

Source: FSU Institutional Effectiveness Portal, 2018-19.

Bachelors in Actuarial Science

Outcome Type	Outcome	Assessment & Evaluation Process
Program Outcome: Increase in Graduation Numbers through Recruiting	By the end of the year, the program will increase the number of graduates in the Actuarial Science program to 15 per 12-month period both by (1) recruiting more students and (2) retention to graduation of a larger percentage of those who reach the upper sophomore-junior level.	First, comparing the number of graduates per 12-month period over the past 3 years; and second, estimating retention of these cohorts based on the number in the first specialized course in the window for which graduation would be timely.

Learning Outcome: Knowledge Basis for Essential Collateral Areas	Upon completion of the course of instruction, the student will be able to cite broad range knowledge of the topics from each of Economics, Statistics, and Finance as well as general knowledge in computer science, risk management and insurance, and accounting.	This will result in 90% of the students scoring 70% or better as determined by class performance or presentation (Assessed) in at least 8 courses of study representing finance, economics, risk management and statistics where 5 or more of these are at the four thousand level.
Learning Outcome: Line Integral	Upon completion of the course of instruction, the student will be able to compute a line integral.	Our goal is 80% of the students scoring 73% or better for a question on the last test or final examination of MAC 2313 that is designed to test whether the student can evaluate a line integral.
Learning Outcome: Eigenvalues and Eigenvectors	Upon completion of the course of instruction, the student will be able to compute the eigenvalues and eigenvectors of a square matrix.	Our goal is 80% of the students scoring 73% or better for a question on the last test or final examination of MAS 3105 that is designed to test whether the student knows how to find the eigenvalues and eigenvectors of a square matrix.
Learning Outcome: Multiple Integration	Upon completion of the course of instruction, the student will be able to demonstrate how to evaluate a double integral by interchanging the order of integration.	Our goal is 80% of the students scoring 73% or better for a question on the last test or final examination of MAC 2313 that is designed to test whether the student can evaluate a double integral by interchanging the order of integration.
Learning Outcome: Proficiency in a Scientific Programming Language	Upon completion of the course of instruction, the student will be able to demonstrate proficiency in C, C++, FORTRAN, Java or another approved higher-level programming language.	Our goal is 80% of the students scoring 80% or better in any of the following courses: MAD 3703, ISC 3313 or COP3014.
Learning Outcome: Specialized Life Contingency	Upon completion of the course of instruction, the student will be able to determine relationships based on models for survival/failure and contingent payments for single and multiple life functions and competing risks.	This will result in 80% of the graduating students scoring 75% or better as determined by the tests, problem presentations and practice on the credentialing content of the capstone course required of all students in the program and specific content from Year 2005 Exam M (SOA) or 2005 Exam 3 (CAS).
Learning Outcome: Satisfaction of SOA/CAS Credentialing	Upon completion of the course of instruction, the student will be able to recall knowledge basic to each of the outside areas (Economics, Statistics and Finance) required for credentialing by SOA/CAS, with VEE (Verification for Educational Experience)-approved courses completed in two of these collateral areas by all students, and with mastery at the high (beginning 5/2005) SOA/CAS-specified level demonstrated in one of them.	Upon completion of the course of instruction, the student will be able to recall knowledge basic to each of the outside areas (Economics, Statistics and Finance) required for credentialing by SOA/CAS, with VEE (Verification for Educational Experience)-approved courses completed in two of these collateral areas by all students, and with mastery at the high (beginning 5/2005) SOA/CAS-specified level demonstrated in one of them.

Source: FSU Institutional Effectiveness Portal, 2018-19.