

1. Every student graduating with an MS in Mathematics and Statistics is expected to be able to construct mathematical proofs of basic theorems and to write these proofs clearly using correct grammatical constructs and appropriate mathematical notation.

This outcome will be accomplished by providing examples of well written mathematical proofs in lecture. The examples will be broad enough so that students are exposed to direct proofs, proofs by contradiction, and proofs by induction. The examples will include modeling the thinking processes and strategies of a mathematician as a precursor to developing and writing the proof of a theorem. The thinking processes and strategies include examining small cases, breaking the proof into parts, and comparison to proofs of related results. The in-class examples will be followed up by assigning problems that require proofs in homework and on exams. The proofs will be graded on the basis of both correctness and clarity of exposition; comments by the instructor will be conveyed to the student in written and/or oral form.

Courses where this outcome will be met: all 400-level mathematics courses.

2. Every student graduating with an MS in Mathematics and Statistics is expected to have seen applications of mathematics to areas across mathematical disciplines and outside of mathematical disciplines.

Historically, mathematics was developed to solve problems that arose in the sciences such as astronomy, physics, chemistry, engineering, or biology. More recently mathematics has been applied to solve problems in fields traditionally distinct from the sciences, such as business, economics, and social sciences. Additionally some disciplines in mathematics arose to provide tools to solve problems in other seemingly unrelated mathematics disciplines; for example techniques used to solve problems in abstract algebra can be used to shed light on problems in analysis, and vice-versa. A well-rounded Masters student should be exposed to these connections. This outcome will be accomplished by applying mathematics to problems traditionally outside of mathematics and to problems that cross mathematical disciplines. First, through lecture, example, and graded assignments, students will be exposed to problems outside of mathematics whose solutions are at least partially given by the mathematics developed in that course. Second, through lecture, example, and graded assignments, students will be exposed to problems that intersect the discipline of that course but cross into other disciplines of mathematics.

Courses that can be applied to areas outside of mathematics: all 400-level statistics courses, Math 409, Math 421, Math 428, Math 431, Math 445, Math 446, Math 455, and Math 478. Courses that have applications crossing mathematical disciplines: Math 413, Math 414, Math 423, Math 441, Math 451, and Math 452.

3. Every student graduating with an MS in Mathematics and Statistics is expected to have the training sufficient to be accepted into additional educational programs in either a PhD program or professional school, or to obtain a job in mathematics or a mathematics related field.

Ultimately success in the MS program in Mathematics and Statistics is measured by where the students go after completing their degree. Assessing the sufficiency of the training students receive will be measured by where the students go after leaving Loyola. The department will keep in contact with their graduates particularly within the first year after graduation to see whether the student continues in education or enters the work force, what specifically the student will be doing, and where that will take place.

4. Every student graduating with an MS in Mathematics and Statistics is expected to act responsibly and ethically in their daily conduct.

This outcome will be attained by giving graded assignments in some graduate courses that require the students to complete the assignment unsupervised but with specified guidelines as to allowed resources (people and materials) for completion of the assignment. Grading will be done with awareness of possible violations of the guidelines. Students violating the guidelines will be presented with the evidence by the instructor. Severe penalties ranging from a zero on the assignment to failure in the course will be imposed, and the graduate program director will be informed of the violation. Repeated violators will face expulsion. In addition, all graduate students will be expected to attend the newly designed seminar on ethics.

Courses where this outcome will be met: all 400-level statistics and 400-level mathematics courses.