

Department of Mathematics

University of Michigan

(Adopted 1999; Revised 2015)

Master's Programs

There are several programs at the University of Michigan leading to the Master's Degree in Mathematics, a general program and special programs designed for students wishing to concentrate in applied mathematics, teaching or actuarial mathematics. While entering students have usually completed courses in differential equations, advanced calculus, linear algebra, and introductory modern algebra, (404, 451, 417, 412), admissibility depends on the student's record and background in view of the type of program being pursued.

In all areas, programs are planned in consultation with a counselor; course elections and requirements are subject to the approval of the counselor. Students who may enter a doctoral program at a future date are encouraged to follow programs that will provide a good foundation and an easy transition to doctoral studies. Elementary courses taken to fill gaps in undergraduate preparation are not counted toward credit hour degree requirements.

All programs require a minimum of 24 graduate credits in approved courses including 2 cognate courses. There is no foreign language requirement in any of the Master's Degree Programs. The writing of a thesis is not required, although students continuing in a doctoral program may substitute a master's thesis for a course. While cognate courses may be chosen from other program areas in mathematics, potential doctoral students are encouraged to elect cognates in such a manner as to satisfy the cognate requirements of the doctoral program. Well-prepared students can complete master's degree requirements in most programs by taking four courses in each of the fall and winter terms. Students with less preparation or lighter course loads can usually complete requirements during an additional term.

Specific degree requirements for each of the programs are detailed below. When one of a set of courses is required, the student should elect the highest level course for which he is prepared. Courses elected to satisfy condition 1 may also be used to satisfy condition 2. A course in these programs can usually be replaced by a more advanced level course. All course elections and deviations from prescribed programs must receive counselor approval before courses are taken.

General Master's Program

This program has a minimum requirement of twenty-four credit hours of course work that includes two cognate courses. In addition, the program must satisfy each of the following conditions:

1. The program must include 420, 452 and 590 unless equivalent courses have already been completed.
2. The program must include five courses from Group A below. At least one of these five courses must be chosen from Group B.
A: 420, 452 481, 490, 525, 526, 537, 555, 575, 590, 591, 593, 594, 596, 597, 635, other counselor approved advanced courses.
B: 537, 591, 593, 594, 596, 597. A more advanced level course may be substituted, for example, 635 for 537.
3. Two cognate courses at the graduate level must be included in the program. These may be elected from special areas of mathematics or from other fields. The courses chosen must be related to the student's mathematics program.

Applied Mathematics Master's Program

(Not to be confused with AIM – information on AIM can be found on the AIM Website)

There are two options in this program. One option is a program concentrating in classical applied mathematics, differential equations, and/or numerical analysis and scientific computing; the second focuses on the mathematics of optimization, or on stochastic processes. Each option has a minimum requirement of twenty-four credit hours of course work that includes two cognate courses. In addition, a program under the first option must satisfy conditions 1, 2 and 3, and a program under the second option must satisfy conditions, 1, 2* and 3.

1. The following two courses must be included in the program unless equivalent courses have already been completed; 420 and 452. The program must also include one course at or above the 500 level not in analysis (including probability) or classical applied mathematics. Examples at the 500 level of the latter type of course include: 531, 532, 535, 565, 566, 567, 575, 582, 590, 591, 592, 593, and 594.
2. The program must include five courses from Group A below. At least one of these five courses must be chosen from Group B.
A: 420, 452, 454, 490 or 590, 525, 526, 555, 556, 557, 558, 565, 566, 571, 572, 593, 594, 596, 597, 651, 652, 654, 655, 656, 658, 663, 671, 756, or other counselor approved courses.
B: 651, 654, 655, 656, 658, 671, 756.
- 2*. The program must include five courses from Group A* below. At least one of these course must be chosen from Group B*.
A*: 420, 452, 454, 525, 526, 555, 561, 562, 565, 566, 571, 572, 490 or 590, 593, 596, 597, 625, 626, 663, 773, or other counselor approved courses, possibly including at most two statistics courses at or above the 500 level.
B*: 596, 597, 625, 626, 663, 773.
3. Two cognate courses at the graduate level must be included in the program. These may be elected from other special areas of mathematics or from other fields. The courses chosen must be related to the student's mathematics program.

Mathematics Program for Secondary School Teachers

This program is designed for persons who have completed or are completing the requirements for a secondary school teacher's certificate. An effort is made to construct a program for each student that will provide a broad background in mathematics and that will be compatible with the student's vocational objectives. While several courses that apply to the program are offered in the spring and summer terms, at the present time, the program cannot be completed by summer attendance only. Well prepared students can complete the degree program with a minimal twenty-four credit hours of course work that includes two cognate courses. Entering students who have not recently completed courses in advanced calculus, linear algebra, and introductory modern algebra (equivalent to Math 451; 417 or 419; and 412) are ordinarily advised to complete those additional courses; such a program would require up to thirty hours of course work. In addition, a program must satisfy each of the following conditions:

1. The following courses must be included in the program unless equivalent courses have already been completed: 420; 490 or 590; and 452 or 555.
2. The program must include five courses from the following group: 420, 425 or 525, Statistics 426, Math 452, 475 or 575, 481, 490 or 590, 531, 533, 555, 565, 581, 582, 593, 594, 596, 597, or other counselor approved advanced courses.
3. The program must include two cognate courses at the graduate level including at least one appropriate Education course such as D450, D451, D650, D750, or C611. Courses in the history of mathematics, mathematical logic, and computer science are recommended as cognates. Cognate courses must be related to the student's mathematics program.

Actuarial Mathematics Master's Program

Effective January 1st, 2015

This program has a minimum requirement of 24 graduate credit hours of course work, including two cognate courses. Elementary courses taken to fill gaps in undergraduate preparation (e.g., Math 424 and 425) are not counted toward the 24 credit hour degree requirement.

The curriculum will be individually designed to complement a student's past educational experiences and to reflect future actuarial plans, particularly as they relate to the professional actuarial examinations and other professional credentialing requirements. For example, a student with a strong Economics background might be advised to elect specialized courses in Statistics while a student with a strong Statistics background might be advised to elect Economics courses in addition to classes in Mathematics.

In all cases, the program must be planned in consultation with and approved by the Actuarial Master's Program Advisor.

1. The following courses must be included in the program unless equivalent courses have already been completed:
 - MATH 520-521 (Life Contingencies I-II) -AND-
 - MATH 523-524 (Loss Models I-II).
2. In addition to the courses in Item (1), the program must include
 - Two advanced Mathematics courses, such as MATH 525-526 or MATH 542-543 -OR-
 - Two advanced Statistics courses, such as STAT 500 and STAT 531.
3. In addition to the courses in Items (1) and (2), the program must include two cognate courses at the graduate level. These may be elected from other special areas of mathematics or from other fields. The courses chosen must be related to the student's mathematics program. These courses may include the following:
 - MATH 423, 472, 506, 525, 526, 542, 543, 561, 562, 623
 - STAT 415, 426, 500, 503, 509, 531
 - ECON 401, 402, 409, 454, 501, 502
 - IOE 452
 - Other courses in Business Economics, Computer Science, Economics, Finance, Industrial and Operations Engineering, Mathematics, and Statistics may be appropriate, depending on the student's background and goals.