

Illinois State University
Department of Mathematics
Proposed Sequence Title: Sequence in Actuarial Science

CIPS Classification:
Date of Implementation: Fall, 2007

**Description: Sequence within the Mathematics program, allowing
specialization in courses related to actuarial science**

Executive Summary:
Master of Science in Mathematics, Actuarial Science Sequence

This proposal seeks to introduce an Actuarial Science Sequence within the Master of Science in Mathematics. The proposal does not require new funding, it merely recognizes the reality of increased enrollment of students interested in studying mathematics within the actuarial science specialization. The proposal also seeks to rationalize and align with current university requirements the existing requirements for a Master degree in Mathematics.

Students seeking the Master of Science degree in the Actuarial Science Sequence will be required to fulfill the following requirements:

- 32 credit hours of graduate work including a culminating experience (Option I in Actuarial Science Sequence), or 30 credit hours of graduate work and a Master Thesis (Option II in Actuarial Science Sequence). The culminating experience will be in the form of MAT 490 (Research in Mathematics, Mathematics Education, or Applied Mathematics; in the Actuarial Science Sequence, only actuarial case studies will be accepted), or MAT 498 (Professional Practice; in the Actuarial Science Sequence, only actuarial internships will be accepted), or comprehensive examinations.
- One of the following courses: MAT 336, MAT 337, MAT 347, MAT 407, MAT 447, and three of the following courses: MAT 380, MAT 383, MAT 384, MAT 480, MAT 483.
- Other requirements will be exactly the same as Master degree requirements in Mathematics.

Proposed sequence
Master of Science in Mathematics: Actuarial Sequence
RATIONALE

The last five years has witnessed significant growth in the demand for graduate offerings in actuarial science and related areas at Illinois State University. This trend coincides with the increased demand in the marketplace for employees educated in relatively sophisticated areas of applications of mathematics in all types of financial markets and financial institutions.

The Actuarial Program at Illinois State University is currently recognized by the two main U.S. professional actuarial organizations, the Society of Actuaries and the Casualty Actuarial Society, as the Advanced Undergraduate as well as Graduate Program in Education and Research. This means that the program has received the highest level of recognition at both graduate and undergraduate level, placing it among only twelve such programs in the nation. This level of recognition is a result of offering graduate level courses in actuarial science (in the Department of Mathematics), statistics (in the Departments of Mathematics and Economics), and insurance (in the Department of Finance, Insurance and Law), as well as high level of research activity among faculty in actuarial science, statistics, applied mathematics, finance, and insurance.

Students applying to our graduate program frequently seek to pursue a degree in actuarial science. We currently offer them a Master degree in mathematics, in which they can take a relatively heavy load of classes in actuarial science. This proposal seeks to both recognize the reality of high demand in this area and the needs of the students, who will benefit from a curriculum more closely matched to their needs.

However, we do not believe it is at this point desirable to seek a separate degree in actuarial science, and propose a sequence in mathematics instead. The reason believe this is appropriate is that we want to retain a relatively high level of mathematics sophistication expected of our students in actuarial science, as this is what we believe to be best for their overall education in their process of lifelong learning, and this is what the marketplace values in the long run.

Expected Impact on existing programs:

No impact is expected outside the Department of Mathematics. Within the Department, this specialization will mean students in this area will take fewer of the other regular courses in mathematics. Higher visibility as a sequence may attract more students.

Expected curricular changes:

Courses required by this sequence are already in place, and generally have room for more students. The one new course proposal that forms part of this overall proposal, MAT 490, is being set up to help structure culminating experiences.

Anticipated staffing arrangements: To be made within Department lines.

Anticipated funding needs: Because this proposal is designed to serve the type of students already in the Department, no new funding requirements are projected for the near future.

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New graduate catalog contents for this proposal, replacing the analogous existing contents concerning the Master degree in Mathematics:

Programs Offered

The Department of Mathematics offers varied programs leading to the Master of Science in Mathematics and Doctor of Philosophy in Mathematics Education degrees. At the master's level, concentrations are available for persons interested in secondary mathematics education, pure mathematics, computational mathematics, and applied mathematics. Sequences are available in Actuarial Science and also in Applied Statistics, and a Sequence in Elementary and Middle School Mathematics Education is available for teachers at those levels. The Ph.D. program is for persons seeking advanced preparation as teacher educators and mathematics education researchers. Graduate assistantships and instructorships are available.

Master's Degree Programs

The student must meet the general university requirements listed elsewhere in this catalog for the Master of Science degree. In addition, the student must complete either Option I or Option II in Mathematics, the Actuarial Science Sequence, the Applied Statistics Sequence, or the Sequence in Elementary and Middle School Mathematics Education as described below. Any course substitutions must be approved by the Department's Master's Program director. Option I requires a culminating experience in the form of an approved master's project, comprehensive exam, or professional practice; Option II requires a master's thesis. The culminating experience/thesis project must be approved in advance by the Department's Master's Program committee.

Admission Requirements

Admission to the Mathematics program normally requires an undergraduate major in mathematics or secondary mathematics education. Admission to the Actuarial Science Sequence or the Applied Statistics Sequence normally requires an appropriate background in mathematics, actuarial science, statistics, or mathematical finance. Admission to the Sequence in Elementary and Middle School Mathematics Education requires an appropriate background in mathematics content and methodology. Applicants lacking the required background for these programs may be admitted with deficiencies at the discretion of the department's graduate committee. Applicants whose undergraduate grade point average for the last sixty hours is less than 3.0 (but at least 2.8) may be admitted probationally and must make a grade point average of 3.0 during their first term (summer or semester) of study.

Program Options

Each student must complete a program in one of four areas: Mathematics, the Actuarial Science Sequence, the Applied Statistics Sequence, or the Sequence in Elementary and Middle School Mathematics Education. In each, the student completes one of two options:

Option I

Thirty-two (32) hours are required, with at least 26 in mathematics; fifteen hours must be at the 400 level, including at least 12 in mathematics. A culminating experience in the form of MAT 490, or MAT 498, or comprehensive examinations, is required.

Option II

Thirty (30) hours are required, with at least 24 in mathematics; fifteen hours must be at the 400 level, including at least 10 in mathematics. A written approved thesis is required.

Additional requirements are given below.

Mathematics

MAT 336, 337 and 347 are required. Three mathematics courses numbered 407 or above are required. All electives are subject to approval by the department's graduate director. Students may select an area of concentration from the following:

Areas of Concentration:

Secondary mathematics education: 401, 403, 421, 422

Doctoral study in mathematics: 407, 447, 448

Computational mathematics: 356, 361, 363, 370, 461

Applied mathematics: 340, 341, 345, 356, 361, 362, 363, 370, 378

Other courses not yet listed in this catalog are also available. Contact the graduate advisor.

Actuarial Science Sequence

One of MAT 336, 337, 347, as well as three of the following: 380, 383, 384, 480, or 483, are required. Three mathematics courses numbered 407 or above are required. All electives are subject to approval by the department's graduate director.

Applied Statistics Sequence

MAT 350, MAT 351, and one of MAT 336, 337, or 347 are required. Three of the following: MAT 450, 453, 455, 456, or 458, are required. All electives are subject to approval by the department's graduate director.

Sequence in Elementary and Middle School Mathematics Education

Persons who are teaching or who plan to teach at the elementary or middle school level may elect the Sequence in Elementary and Middle School Mathematics Education. Each student who elects this sequence must complete MAT 304, 401,

402, 403, and 409. All electives are subject to approval by the department's graduate director.

Students in this sequence who are considering entering the Mathematics Education Ph.D. program at Illinois State University are advised to take MAT 145 and 146 and, as part of their master's program, the following courses: MAT 304, 307, 309 or 330, 312, 315, 320, 326, 409, 421 and 422. Please see the Ph.D. advisor for more information.