UMBC UGC New Course Request: MATH 365 Financial Mathematics for Actuaries

Date Submitted: 08/15/15 Proposed Effective Date: Fall 2015

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COURSE INFORMATION:

Course Number(s)	MATH 365
Formal Title	Financial Mathematics for Actuaries
Transcript Title (≤30c)	Financial Math for Actuaries
Recommended Course Preparation	
Prerequisite	You must have completed MATH 152 with a grade of "C" or better.
Credits	3
Repeatable?	☐ Yes ☒ No
Max. Total Credits	3
Grading Method(s)	☒ Reg (A-F) ☒ Audit ☒ Pass-Fail

PROPOSED CATALOG DESCRIPTION (no longer than 75 words**):**

We will study the mathematics of interest and the evaluation of interest related products including: annuities with non-contingent payments, loans, bonds, general cash flows, portfolios, and immunization. We may also introduce related topics such as the sources of interest rates, stochastic interest rates, and financial instruments such as shorts, swaps, and options. This material includes most of the learning objectives for the Financial Mathematics Exam (called Exam FM by the Society of Actuaries and Exam 2 by the Casualty Actuarial Society).

RATIONALE FOR NEW COURSE:

a) Why is there a need for this course at this time?

Preparing interested students for a career in actuarial science is one of the core missions of a Math/Stat program. This course prepares students for one of the entry level exams in the sequence of actuarial exams. We note that these exams are subject to revision every few years. The department has correspondingly changed which or how many courses prepare students repeatedly over the years, most recently using the special topics course for this purpose. But the situation appears somewhat stable right now, and hence it makes sense to create this course now. In particular, the title of the course refers to the exam by the same title for best clarity.
We are submitting coordinated proposals for a MATH 365 and STAT 365, and we intend to offer these as cross-listed courses. The topics in the course include both mathematical and statistical aspects, and we are trying to reach an audience as wide as possible. In particular, we are complying with rules in various programs that have rules such as allowing "MATH" courses as electives or "STAT" courses as electives, but not either of them interchangeably.

b) How often is the course likely to be taught?

We have taught the course every Fall for three years as special-topics course Math 390. It has been very successful with over 20 students; this is as large as desired for a hands-on training course like this one.

c) How does this course fit into your department's curriculum?

As stated above already, preparing interested students for a career in actuarial science is one of the missions of the department. For advising purposes, we have a concentration listed for this, which we will revise correspondingly upon approval of this course.

d) What primary student population will the course serve?

Interested Mathematics and Statistics majors and minors as well as students from other majors interested in actuarial sciences such as Financial Economics.

e) Why is the course offered at the level (ie. 100, 200, 300, or 400 level) chosen?

The course is taught as a hands-on training course. This would not be consistent with our typical 400-level electives.

f) Explain the appropriateness of the recommended course preparation(s) and prerequisite(s).

The required MATH 152's integration, sequences, and series material is needed for this course; these topics are not covered in sufficient depth in other courses such as MATH 155. Note: The attached historical syllabus is not clear on this point; we clarify that MATH 152 is *required*, not just recommended.

g) Explain the reasoning behind the P/F or regular grading method.

We want to allow for all grading methods, like in all departmental upper level electives.

h) Provide a justification for the repeatability of the course.

Regular elective, not repeatable.

ATTACH COURSE OUTLINE (mandatory):

See attached for a historical syllabus.
We apologize that the grading criteria are not clear in it; we add here the missing information:
- Participation 15%
  This part of the grade is based on completion of reading assignments.
  Every class will begin with a short Reading Quiz entirely based on
  assigned reading materials. Students are typically allowed to use the
  textbook while taking reading quizzes.
- Homework: 20%
- Mid Sem Exam I 20%
- Mid Sem Exam II 20%
- Final Exam 25%

SYLLABUS Fall 2014
MATH 390 INTRODUCTION TO FINANCIAL MATHEMATICS FOR ACTUARIAL STUDENTS

Instructors:	**Stephen Meskin**, Ph.D., F.S.A., M.A.A.A.	**Bimal Sinha,** Ph.D.,
Office	MP 236 410-455-3163 (no messages)	MP414 410.455.2347
Office Hours:	By appointment (preferred Tue 5:30 – 6:30 pm)	Tuesday/Thursday: 3-4
Email Address:	actuary@umbc.edu	sinha@umbc.edu

- **Required Text**: Financial Mathematics, 2nd Ed., by Chris Ruckman, FSA and Joe Francis, FSA
- **Recommended Calculator**: BA II Plus
- **Time and Location of Class**: Tu/Th 4:00 to 5:15 pm Sondheim 101
- **Recommended Prerequisite**: A year of Calculus including series.
- **Course Description and Learning Goals:** We will study the mathematics of interest and the evaluation of interest related products including: annuities with non-contingent payments, loans, bonds, general cash flows, portfolios, and immunization. We will also introduce (financial) derivatives and related financial instruments. This will cover almost all the learning objectives for the Financial Mathematics Exam (called Exam FM by the Society of Actuaries and Exam 2 by the Casualty Actuarial Society).

- *Class attendance and active participation in working out a wide variety of problems are crucial to doing well in the course.*

- **Tentative Schedule,** subject to change.

Dates	**Text**	**Reading**
8/28	Introductions	
9/2	Chapter 1	Pp 1 – 13
9/4		Pp 13 – 22
9/9	Chapter 2 **Hwk 1 due**	Pp 27 – 35
9/11		Pp 38 – 44
9/16		Pp 35 – 38 & 44 – 48
9/18	Chapter 3	
	Fri 9/19 **Hwk 2 due**	
9/23		
9/25		
9/30	**Hwk 3 due**	
10/2	**Mid-Sem Exam 1**	
10/7	Chapter 4	Pp 95 -106
10/9		Pp106 - 117
10/14	Chapter 6	Pp 118-122 & 170-190
10/16	**Hwk 4 due**	Pp 163-170 & 190-196

10/21	Chapter 5
10/23	
10/28	
10/30	Chapter 7
11/4	
11/6	
11/11	**Mid-Sem Exam 2**
11/13	Chapter 8
11/18	
11/20	Derivatives, etc.
11/25	
11/27	**(Thanksgiving)**
12/2	
12/4	
12/9	**Review**
12/16	**Final Exam 3:30-5:30**

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