PURDUE UNIVERSITY
REQUEST FOR ADDITION, EXPIRATION,
OR REVISION OF AN UNDERGRADUATE COURSE
(10000-40000 LEVEL)

DEPARTMENT: Mathematical Sciences
EFFECTIVE SESSION: Fall 2013

INSTRUCTIONS: Please check the items below which describe the purpose of this request.

☐ 1. New course with supporting documents
☐ 2. Add existing course offered at another campus
☐ 3. Expiration of a course
☐ 4. Change in course number
☐ 5. Change in course title
☐ 6. Change in course credit type
☐ 7. Change in course attributes (department head signature only)
☐ 8. Change in instructional hours
☐ 9. Change in course description
☐ 10. Change in course requisites
☐ 11. Change in semesters offered (department head signature only)
☐ 12. Transfer from one department to another

PROPOSED:

Subject Abbreviation: MA
Course Number: 27300
Long Title: Introduction to Financial Mathematics
Short Title: Intro to Financial Math

EXISTING:

Subject Abbreviation
Course Number

TERM OFFERED:
Check All That Apply:
☐ Fall
☐ Spring
☐ Summer

CAMPUS(ES) INVOLVED:
☐ Calumet
☐ Cont Ed
☐ Ft. Wayne
☐ N. Control
☐ Tech Statewide
☐ Indianapolis
☐ W. Lafayette

CREDIT TYPE

1. Fixed Credit: Cr. Hrs.
   3

2. Variable Credit Range: Minimum Cr. Hrs. (Check One)
   2
   Or
   3

3. Equivalent Credit: Yes
   No

COURSE ATTRIBUTES:
Check All That Apply

1. Pass/Not Pass Only
2. Satisfactory/Unsatisfactory Only
3. Repeatability
4. Credit by Examination
5. Fees: Coop Lab Rate Request

Include comment to explain fee

Schedule/Type

Lecture
Recitation
Presentation
Laboratory
Lab Prep
Studio
Distance
Clinic
Experimental
Research
Ind. Study
Pract/Observ

MINUTES PER WEEK
75
2

MEETINGS PER WEEK

WEEKS OFFERED
16

% OF CREDIT ALLOCATED
100

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):
Prerequisite: MA 165, MA 228, or MA 230 (Calculus II courses) with a grade of C- or better. Description: A mathematical treatment of some of the fundamental concepts of financial mathematics and their application to real-world business situations and basic risk management. Includes discussions of interest rates, discount rates, annuity valuation, bond valuation, cash flow valuation, spot rates, forward rates, Macaulay duration, modified duration, effective duration, convexity, and immunization, and their use in risk management. Provides preparation for the SOA/CAS Actuarial Exam FM/2. Typically offered in the Fall.

COURSE LEARNING OUTCOMES:
Demonstrate knowledge of key concepts, including interest and discount rates, present and future value, annuity, perpetuity, yield rate, allocation of investment income, duration, convexity, immunization, bonds, certificates of deposit, mortgages, and stocks. Demonstrate the ability to apply the key concepts in financial scenarios.

A&S CCD#12-13

OFFICE OF THE REGISTRAR
To: COAS Curriculum Committee
From: Department of Mathematical Sciences
Date: January 29, 2013
Subject: New Course: MA 273 – Introduction to Financial Mathematics

On January 28, 2013 the Department of Mathematical Sciences adopted the initiation of a new course MA 273 Introduction to Financial Mathematics. Course descriptions, rationale, and the heart of a syllabus are below.

MA 273 - Introduction to Financial Mathematics

Course Description (long): A mathematical treatment of some of the fundamental concepts of financial mathematics and their application to real world business situations and basic risk management. Includes discussions of interest rates, discount rates, annuity valuation, bond valuation, cash flow valuation, spot rates, forward rates, Macaulay duration, modified duration, effective duration, convexity, and immunization, and their use in risk management. Provides preparation for the SOA/CAS Actuarial Exam FM/2. Typically offered in the Fall.

Course Description (short): An examination of interest rates (in their various forms) and their application to the analysis of cash flows and financial instruments. Provides preparation for the SOA/CAS Actuarial Exam FM/2. Typically offered in the Fall.

Prerequisite: MA 166, MA 228, or MA 230 (Calculus II classes) with a grade of C- or better.

Credit Hours: 3 credit hours

Rationale:
This course helps align the Actuarial Science Option with industry expectations from graduates in actuarial science, and allows it to be recognized as an undergraduate-introductory program by the Society of Actuaries.
Introduction to Financial Mathematics – MA 273
Proposed syllabus - Fall 2013

This is an important foundation course in actuarial science and finance, that

- Masters the fundamental concepts of financial mathematics, as listed in the Learning Objectives section below;
- Prepares students for the mathematical theory of interest portion (65-80%) of the SOA Exam FM (CAS Exam 2). The complementary course BUS F301 prepares students for the financial economics portion of this exam.


Instructor: Joe Francis, FSA, CFA

Learning Objectives:

Knowledge of Key Concepts
- Simple interest, compound interest, simple discount, compound discount
- Nominal and effective rates of interest and discount, force of interest
- Equivalent interest measures
- Present value, future value
- Annuity, perpetuity
- Yield rate, internal rate of return
- Time-weighted and dollar-weighted rates of return
- Allocation of investment income
- Loans: principal and interest
- Spot rates, forward rates, yield rates
- Duration, convexity, immunization
- Bonds, certificates of deposit, mortgages, stocks

Application of Key Concepts
- Convert between different types of interest rates
- Calculate the present value or accumulated value of a set of cash flows
- Calculate the present value or accumulated value of an annuity or a perpetuity
- Calculate the internal rate of return given a set of cash flows and their present value
- Calculate a loan payment amount and a loan amortization schedule
- Calculate the price, duration and convexity of a bond
- Calculate the value, duration and convexity of a series of cash flows
- Calculate the spot rate curve given the yield curve or the forward rates
- Calculate the yield curve given the spot rate curve or the forward rates
- Calculate the forward rates given the yield curve or the spot rate curve

Grading: 3 tests (60%), Quizzes and homework (15%), Final (25%);
A - above 90%, 80-89% B; 70-79% C; 60-69% D; below 60% - F;
**Tentative Course schedule:**

<table>
<thead>
<tr>
<th>Tuesday 4:30 – 5:45 PM</th>
<th>Thursday 4:30 – 5:45 PM</th>
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<tbody>
<tr>
<td>8/27 Introduction to Course</td>
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<tr>
<td>Chapter 1: Interest Rates &amp; Factors</td>
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<td>9/3</td>
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<tr>
<td>Chapter 1: Interest Rates &amp; Factors</td>
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<td>9/10</td>
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<td>Chapter 2: Level Annuities</td>
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<td>9/17</td>
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<td>Test 1: Chapters 1 &amp; 2</td>
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<td>Chapter 3: Varying Annuities</td>
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<td>Chapter 4: Non-annual Int. Rates &amp; Annuities</td>
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<td><strong>10/8 FALL BREAK</strong></td>
<td>10/10 Test 2: Chapters 3 &amp; 4</td>
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<td>Chapter 5: Project Appraisal &amp; Loans</td>
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<td>Chapter 6: Financial Instruments</td>
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<td>Chapter 6: Financial Instruments</td>
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<td>Chap. 7: Duration, Convexity, &amp; Immunization</td>
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<td>Chap. 7: Duration, Convexity, &amp; Immunization</td>
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<td>Chapter 8: Term Structure of Interest Rates</td>
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<td>Test 4: Chapters 7 &amp; 8</td>
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<td><strong>12/2 READING WEEK</strong></td>
<td>12/4 READING WEEK</td>
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<td>12/9</td>
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<td>Review for Final Exam</td>
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<td><strong>FINAL EXAM WEEK</strong></td>
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<td>12/11</td>
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<td>Review for Final Exam</td>
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Disabilities Statement:
If you have a disability and need assistance, special arrangements can be made to accommodate most needs. Contact the Director of Services for Students with Disabilities (Walb 113, telephone number 481-6658), as soon as possible to work out the details. Once the Director has provided you with a letter attesting to your needs for modification, bring the letter to me. For more information, please visit the web site for SSD at [http://new.ipfw.edu/disabilities/](http://new.ipfw.edu/disabilities/).