

COURSE NAME:	FINANCIAL MATHEMATICS I
COURSE CODE:	MATH 2701
LEVEL:	II
SEMESTER:	I
NUMBER OF CREDITS:	3
PREREQUISITES:	(MATH1141, MATH1142, MATH1151 & MATH1152) or (M10A & M10B).

RATIONALE

The goal of the course is to provide an understanding of the fundamental concepts of financial mathematics, and how those concepts are applied to calculating present and accumulated values for various streams of cash flows. This course is a necessary foundation for actuarial and financial practice areas such as reserving, valuation, pricing, asset/liability management, investment income, capital budgeting, and valuing contingent cash flows.

This is a compulsory level II course which is an important foundation course in actuarial science and finance. Candidates should master the fundamental concepts of financial mathematics and its simple applications as indicated in the “Learning outcomes”. This course allows the candidate to begin preparation for the professional Financial Mathematics examinations (the Society of Actuaries course FM and the Faculty/Institute of Actuaries CT1 exam) as well as the Quantitative Methods section of the CFA level I exam.

CONTENT & DESCRIPTION:

The theory of rates of interest and discount including the theoretical continuous cases of forces of interest and discount; annuities with payments that are not contingent and sinking funds, including the continuous case. Practical and theoretical applications primarily to mortgages, stocks and bonds.

LEARNING OUTCOMES:

At the end of studying this course, students should be able to:

1. Illustrate how to use a generalized cash-flow model to describe financial transactions.
2. Explain the basic concepts of simple and compound interest/discount.
3. Elaborate on and calculate nominal rates of interest.
4. Calculate the present value or accumulation of any set of discrete-time cash-flows, at constant or varying rates of interest.
5. Derive and use simple formulae for values of level and increasing annuities-certain.

6. Explain the concept of the yield on a series of cash-flows, and its limitations.
7. Calculate time-weighted, money-weighted and internal linked rates of return.
8. Analyze loan schedules, including simple alterations.
9. Explain basic fixed-interest securities, and calculate prices and yields.
10. Explain how an appropriate inflation index may be used to measure changes in the value of money with the passage of time.
11. Elaborate on what, in relation to a given inflation index, is meant by the 'real yield' for a particular investment and be able to calculate such yields.
12. Explain the discounted cash flow model and know what internal rates of return (IRR), net present values (NPV) and break-even durations are.

CONTENT:

A. BASIC INTEREST THEORY

• TIME VALUE OF MONEY:

Interest rate, simple interest/discount, compound interest/discount, accumulation function:

Future value, present value, net present value, discount factor

Convertible mth-ly, nominal rates of interest/discount

Inflation and real interest; force of interest

Equivalent interest measures, equation of value

• GENERAL CASH FLOW & PORTFOLIOS:

Yield rate/ rate of return, dollar-weighted rate of return, time-weighted rate of return, current value.

• ANNUITIES WITH NON-CONTINGENT PAYMENTS :

Annuity immediate, annuity-due, perpetuity

Payable mth-ly, payable continuously

Level payment annuity, arithmetic increasing/decreasing payment annuity, geometric increasing/decreasing annuity

B. BASIC APPLICATIONS:

Loans and amortization schedules

Valuation of bonds

Stock Valuation

TEACHING METHODOLOGY:

This course will be delivered by a combination of theoretical classes, practices (tutorials) and other group activities. The delivery mode will be largely interactive. The total 39 contact hours are broken down as follows: 26 hours of lectures and 13 hours of tutorials. The course material (complementary notes, practice problems and assignments) will be posted on ourvle <http://ourvle.mona.uwi.edu/>

ASSESSMENT:

The course assessment will be divided into two components: a coursework component worth 25% and a final exam worth 75%.

- One hour coursework exam worth 15% of the final grade
- Two written assignments (problem paper) each worth 5% each of the final grade
- The final theory exam will be two hours in length and consist of compulsory questions (75%).

PRESCRIBED REFERENCE MATERIALS:

1. KELLISON, S.G. *The Theory of Interest (Third Edition)*, 2008, Irwin/McGraw-Hill: ISBN 10: 0-07-338244-2 [This book is highly recommended for RBC placement in the library]

RECOMMENDED REFERENCE MATERIALS

2. PARMENTER, Michael. *Theory of Interest and Life Contingencies With Pension Applications: A Problem Solving Approach 3(Third Edition)*, 1999. Actex Publication. ISBN: 1566983339

Online resources:

The following are free online lectures which the student may access for revision purposes:
<http://freevidelectures.com/Course/2641/MA105-Mathematics-of-Finance/>
<http://www.scribd.com/doc/22351427/The-Theory-of-Interest-Stephen-G-Kellison>