



**FACULTY OF BUSINESS AND ECONOMICS
FINANCE AND BANKING DEPARTMENT**

1- Course information:

- a. Course Code:** ACFI331
- b. Course Name:** Interest Theory
- c. Prerequisite:** MATH2311
- d. Co-requisite:** Nill

2- Course Description (as in Catalogue)

Application of financial mathematics to problems involving valuation of financial transactions; equivalent measures of interest; rate of return on a fund; discounting or accumulating a sequence of payments with interest; determining yield rates; length of investment; amounts of investment contributions or amounts of investment returns for various types of financial transactions; loans and bonds; introduction to the mathematics of modern financial analysis; calculations involving yield curves, spot rates, forward rates, duration, convexity, and immunization.

3- Course Outcomes

This course provides a solid mathematical introduction to the subject of Compound Interest Theory and its application to the analysis of a wide variety of complex financial problems, including those associated with mortgage and commercial loans, the valuation of securities, consumer credit transactions, and the appraisal of investment projects. The investment and risk characteristics of the standard asset classes available for investment purposes are also briefly considered, as is the topic of asset-liability matching. The course also provides introductions to the term structure of interest rates and simple stochastic interest rate models

A. Knowledge and understanding

Upon completion of this course, students should be able to:

1. Understand the term structure of interest rates and the use of simple stochastic interest rate models.
2. Describe the risk characteristics of the standard asset classes available for investment purposes.
3. Calculate the discounted mean term **or** volatility of an asset and liability and analyse whether an asset-liability position is matched or immunized.

B. Intellectual/Cognitive skills

Upon completion of this course, students should be able to

1. Specify the appropriate mathematical valuation techniques and models for financial data.

2. Develop an understanding of practical actuarial, statistical and financial modelling in the context in which such work is undertaken.

C. Subject specific and practical skills

Upon completion of this course, students should be able to

1. Apply different mathematical valuation techniques for investment decisions and risk analysis within an actuarial context.
2. Demonstrate an understanding of behavioral economics and derivative pricing.

D. General and transferable skills

Upon completion of this course, students should be able to

1. Use R programming software to apply the various analysis techniques using financial data.

4- Course Content

Week	Topic	Reference
1-2	Introduction to the Theory of Interest	Chapters 1 and 2: <i>An Introduction to the Mathematics of Finance</i>
3-5	The compound interest functions	Chapters 3 and 4: <i>An Introduction to the Mathematics of Finance</i>
6	Loan repayment schedules	Chapter 5: <i>An Introduction to the Mathematics of Finance</i>
7-9	Project appraisal and investment performance	Chapter 6: <i>An Introduction to the Mathematics of Finance</i>
10-12	The valuation of securities	Chapter 7: <i>An Introduction to the Mathematics of Finance</i>
13	Capital gains tax	Chapter 8: <i>An Introduction to the Mathematics of Finance</i>
14-16	Term structures and immunization	Chapter 9: <i>An Introduction to the Mathematics of Finance</i>

5- Teaching and learning methods

1. Lecture
2. Problem based learning
3. Lecture demonstrations in labs
4. Group work in classes

6- Assessment methods based on outcomes

1. Quizzes to assess B1
2. Mid-semester exam to assess A1, A2, A3
3. Final exam to assess, B2, C1, C2.
4. Homeworks to assess D1.

7- Weighting of assessments

Midterm	30%
Final Exam	40%
Quizzes	20%
Participation	10%
Total	100%

8- References

A. Essential textbooks

1. Garrett, Stephen. (2016). *An Introduction to the Mathematics of Finance: A Deterministic Approach*. Butterworth-Heinemann.

B. Recommended books

1. Butcher., M. V., & Nesbitt, C. J. (1971). *Mathematics of compound interest*: Ulrichs Books.
2. Kellison, S. (2009). *The theory of interest* (3rd ed.). McGraw-Hill Irwin.
3. McCutcheon, J. J., Scott, W. F., Institute of Actuaries (Great Britain), & Faculty of Actuaries in Scotland. (1986). *An introduction to the mathematics of finance*. London: Published for the Institute of Actuaries and the Faculty of Actuaries [by] Heinemann.
4. Wilders, R. J. (2020). *Financial mathematics for actuarial science : the theory of interest*. CRC Press.