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Title: BUSINESS MATHS AND RESEARCH TECHNIQUES
 Status: Definitive
 Code: **4504CP** (103523)
 Version Start Date: 01-08-2013

Owning School/Faculty: Arts, Professional and Social Studies
 Teaching School/Faculty: Dublin Business School

Team	Leader
Alistair Beere	Y

Academic Level: FHEQ4 **Credit Value:** 20.00 **Total Delivered Hours:** 77.00

Total Learning Hours: 200 **Private Study:** 123

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	50.000
Tutorial	25.000

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Test	AS1	Class test 1	20.0	
Essay	AS2	Excel-based project	10.0	
Exam	AS3	Final Exam	50.0	2.00
Test	Ass2	Class test 2	20.0	

Aims

*To provide learners with an introduction to the mathematics required for finance.
 To introduce learners to calculus and the optimisation of mathematical models.
 To furnish learners with the tools for basic data analysis and presentation.*

To introduce learners to core statistical areas such as regression modelling, inference, and probability.

To develop in learners IT skills through the use of Microsoft Excel.

Learning Outcomes

After completing the module the student should be able to:

- 1 Apply mathematical techniques to interest rates, investment decisions and bond pricing.
- 2 Solve common finance problems using differentiation and integration.
- 3 Summarise business and financial data using appropriate statistical methods.
- 4 Explain the results within the context of the limitations of regression models and inferential methods
- 5 Use Microsoft Excel for basic statistical and financial analysis.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

TEST 1	1	2		
ESSAY	5			
EXAM	1	2	3	4
TEST 2	3	4		

Outline Syllabus

- 1. Introduction to the Mathematics of Finance: • Discrete and continuous compounding • Effective annual rates of return • Logarithms and investment term length problems.*
- 2. Investment evaluation • Net Present Value • Internal Rate of Return • Annuities and bond pricing.*
- 3. Differential Calculus: • Rates of change and the derivative • Differentiation by rule: polynomial, logarithmic and exponential functions • Second derivatives, convexity and inflection points • Applications: optimisation, profit maximisation, logistic growth models.*
- 4. Integration: • Finding anti-derivatives by rule and by u-substitution • The definite integral, the Fundamental Theorem of Calculus and calculation of area • Applications: consumer & producer surplus, average value, continuous income streams, Gini coefficient.*
- 5. Descriptive Statistics: • Central tendency and dispersion • Percentages, including mean percentage change using geometric mean • Presentation of data: stem & leaf, histogram, box plot.*
- 6. Index Numbers: • Simple index and indexed line charts • Basket indices: the*

Laspeyre index and Paasche index • Deflation of time series using CPI.

7. Probability: • Fundamentals: "and" and "or" rules, independence and probability trees • Conditional probability and Bayes' theorem.

8. Random Variables: • Discrete vs Continuous • Expected value and variance • Binomial random variable and Normal random variable

9. Statistical Inference: • Sampling distributions and the Central Limit Theorem • Confidence intervals and hypothesis tests for the population mean and proportion • Margin of error • P-values • Type I and Type II decision errors.

10. Regression Analysis: • Identification of appropriate models using scatter diagrams • Pearson's correlation coefficient • Ordinary Least Squares regression and R-square.

Learning Activities

Lectures and tutorials.

References

Course Material	Book
Author	Stine, R & Foster, D
Publishing Year	2010
Title	Statistics for Business
Subtitle	
Edition	1st
Publisher	Pearson
ISBN	

Course Material	Book
Author	La Torrem D. et al
Publishing Year	2011
Title	Calculus Concepts
Subtitle	
Edition	5th
Publisher	Pearson Education
ISBN	

Course Material	Book
Author	McClave, J & Sincich, T.
Publishing Year	2012
Title	Statistics
Subtitle	
Edition	12th
Publisher	Pearson
ISBN	

Course Material	Book
Author	Jacques, I
Publishing Year	2012
Title	Mathematics for Economics and Business
Subtitle	
Edition	7th
Publisher	FT Prentice Hall
ISBN	

Notes

The accounting and finance sector demands graduates with strong quantitative & IT skills. This module gives the key concepts and techniques behind a variety of quantitative topics and areas including calculus, regression, and probability and their application in the business world. Contact hours will consist of traditional lectures, problem-solving tutorials and lab-based tutorials on Microsoft Excel. Assessment is by two in-class tests (20% each), an Excel project (10%), and final exam (50%).