

FOUN045 Mathematics for Commerce

Section 1: General Information

1.1 Administrative Details

Subject:	Mathematics for Commerce
Code:	FOUN045
Stream:	Commerce
Points:	12
Pre-requisite none but see notes below	

1.2 Subject Workload

Number of timetabled hours per week	Number of Personal study hours per week	Total workload hours per week
4	5	9

1.3 Pre-requisites

Students are required to have undertaken a pre-requisite subject.

A FOUN045 student should have a very good mathematical background in number, basic algebra and graphing. Knowledge of calculus, probability and statistics is desirable, but not necessary.

Students who do not have a strong background in Mathematics are advised to do the Bridging Programme Mathematics for Commerce paper.

Alternatively, a student may be advised to enroll in the Extra Mathematics Programme.

1.4 Other resource requirements

List specialist facilities and/or equipment required for the delivery of this subject:

Scientific calculator/ access to blackboard/in class technology

Section 2: Academic Details

2.1 Subject Overview

Mathematical problem solving is an important technique for the solution of problems in any area of society. This paper aims to develop the ideas and concepts from Mathematics in such a way that the student develops their problem solving techniques in Mathematics and can apply the processes to Commerce. This paper will give the student a sound knowledge of mathematical concepts and prepare them for the demands of 100-level Commerce, Mathematical and Statistical papers at the University of Otago.

2.2 Learning Objectives and Outcomes

Learning Objectives

By the end of the paper, successful students will be able to:

1. explore the use of formulae, relationships, equations, expressions and statistical techniques in a variety of contexts.
2. use number, algebra, probability, statistics and financial maths in different situations and interpret their results.
3. develop their mathematical skills in number, algebra, financial maths, probability, statistics and some curve sketching.
4. gain and demonstrate an understanding and appreciation of problem solving techniques in a variety of contexts.

Overview of Learning Outcomes

Topic 1 FINANCIAL MATHEMATICS

At the end of this topic, a student should be able to:

- calculate rates
- calculate currency conversions
- solve hire-purchase problems
- solve commission problems
- identify and calculate quantities using the simple interest formula
- identify and calculate quantities using the compound interest formula
- use the simple interest and compound interest formulae to solve real-life problems
- identify two types of depreciation and solve depreciation problems using the formulae
- solve appreciation problems using a formula
- calculate annual effective rates
- define and understand a break-even point in Commerce
- form and use cost equations
- form and use revenue equations
- solve break-even analysis problems graphically and algebraically
- form price- demand equations
- solve break even equations involving price-demand equations
- optimise yields
- use the Future Value of an Annuity formula to solve problems for a variety of contexts
- use the Present Value of an Annuity Formula to solve problems for a variety of contexts
- solve a range of problems dealing with financial situations.

Topic 2 PROBABILITY

At the end of this topic, a student should be able to:

- define probability
- calculate probabilities
- use and understand correct probability notations
- find the probability of the union, intersection and complement of events
- calculate the odds for an event
- use Venn diagrams to find all possible outcomes and calculate probabilities
- use decision diagrams and tables to find all the possible outcomes and calculate the probabilities of events with replacements and without replacements
- use two way tables to find all the possible outcomes and calculate the probabilities of events
- apply probability theory to a range of problems.

Topic 3: STATISTICS

At the end of this topic, a student should be able to:

- identify and classify data into categorical data and numerical data, discrete and continuous data
- organize and interpret categorical and discrete data using statistical graphs such as bar graphs, dual bar charts and pie charts
- organize, draw and interpret continuous data using statistical graphs such as histograms, frequency polygons and cumulative frequency curves
- summarise, numerically, graphically and using SPSS, and interpret a set of data using measures of central tendency such as mean, mode and median
- summarise, numerically, graphically and using SPSS, and interpret a set of data using measures of dispersion - range, interquartile range, percentiles and standard deviation
- compare and comment on sets of data using various statistics
- describe a discrete and continuous random variable
- draw the probability distribution of a discrete random variable
- calculate the expectation of a discrete random variable
- describe and calculate conditions for a fair game
- describe the conditions needed a binomial distribution
- calculate probabilities and statistics using the binomial distribution
- describe the conditions for a normal distribution
- interpret the spread of data in a normal distribution curve
- calculate z-scores in a standard normal distribution
- explain the significance of the z-score value
- calculate probabilities using a normal distribution
- estimate and interpret sample means
- estimate and interpret sample variance and standard deviation
- use a statistical package to describe and analyse data
- estimate and interpret sample sizes
- find the difference between two sample variances and standard deviations and comment on them
- calculate the probability of sample means
- use the Central Limit Theorem to test samples
- identify unusual samples
- use confidence intervals to describe samples and populations.

2.3 Subject Content

- Topic 1: Financial Mathematics
- Topic 2: Probability
- Topic3: Statistics.

2.4 Teaching Method/Strategies

FOUN045 will consist of 12 lectures and 36 tutorials over 12 weeks. Each week consists of one lecture and three tutorials. Working in groups and independent study will be used in classes.

2.5 Assessment

Assessment Type	When	Weighting	Learning Outcomes Assessed
Internal	Mid-Term Test Week 7	15%	Topic 1 Financial Maths
	Statistical assignment Week 8 -11	10%	Topic 3 some
Final Examination	Week 13	75%	Topic 2 Probability and Topic 3 Statistics

2.5.1 Assessment Strategy

Formal Written Mid-Term Test (in week 7)

Duration: 50 minutes

Included: all work covered in topic 1.

The test will consist of two compulsory questions.

Question	Type of	Marks allocation
1	10 parts, short answer	20
2	3-5 parts worth equal marks, problem solving	30
Total		50

Assignment: Statistics and SPSS: Week 8-11: students will be issued with a problem solving investigative exercise covering the topic Statistics. They are expected to answer the assignment questions using the correct statistical language with the correct use of the software package SPSS. Students should produce their work to a high standard. Students will have about two weeks to complete the assignment.

2.5.2 Hurdle Requirement

In order to pass this paper, students must obtain an overall mark of 50% (C-) or better.

2.5.3 Assessment Details

Assessment	Content/ Format	Time	Details												
Internal Assessment mid term test	all work covered in topic 1 Financial Maths	50 minutes	See above												
Internal Assessment Statistics Assignment	Written assignment	Over 3-4 weeks	See above												
Final Examination	all work covered in topic 2 Probability and 3 Statistics	2 hours	The examination will consist of four compulsory questions.												
			<table border="1"> <thead> <tr> <th>Question</th> <th>Type</th> <th>Marks allocation</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>10 parts, short answer, 4 marks each</td> <td>40</td> </tr> <tr> <td>2 - 4</td> <td>3 problem solving context questions, worth 20 marks each.</td> <td>60</td> </tr> <tr> <td>Total</td> <td></td> <td>100</td> </tr> </tbody> </table>	Question	Type	Marks allocation	1	10 parts, short answer, 4 marks each	40	2 - 4	3 problem solving context questions, worth 20 marks each.	60	Total		100
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2.6 Prescribed and Recommended Reading

Prescribed Text: none. Use Student Workbooks

Recommended Reading: none prescribed

Websites: none prescribed

3. Subject Details

See learning outcomes above

Week	Lecture (1 hour)	Tutorial (1 hour)	Tutorial (1 hour)	Tutorial (1 hour)
1	Introduction to paper and Topic 1 Financial Mathematics Simple Interest and hire purchase	Using the calculator	Rates and currency conversions	Simple Interest <u>Set homework:</u> Interest
2	Compound interest and AER	Hire-purchase	Compound Interest	Working in groups: Commission
3	Break-even analysis, linear	AER	Break Even analysis 1: Cost and Revenue equations	Break-even analysis 2 Use of st line graphs <u>Set Homework:</u> Appreciation Depreciation
4	Price- demand analysis	Break Even analysis 3: price demand eqns	Break Even analysis 4: Optimising Yields use of quadratic graphs	Working in groups: Optimising Yields
5	Future Value of an Annuity & Present Value of an Annuity	Future Value of an Annuity	Present Value of an Annuity	Revision or catch up
6	Topic 2 Probability	Intersection and union of events Revision for test	Complement of events, odds of an event Revision for test	Revision or catch up
7	Mid term tests Test (15%)	Mid term tests	Successive Events and Decision Diagrams	Use of Two way tables
8	Topic 3 Statistics Types of Data, Measures of Statistics	Measures of Central Tendency 1	Measures of Central Tendency 2 Assignment: Statistics and SPSS issued and details	Working in groups: Statistical Graphs
9	Discrete Probability distribution, Binomial	Measures of Spread 1	Measures of Spread 2	Discrete Distributions Assignment queries
10	Normal ditribution	Binomial Distribution Assignment queries	Normal Distribution Tables Assignment queries	Normal Distribution Applications Assignment queries
11	Estimation and Confidence intervals Assignment: due (10%)	Estimation 1	Estimation 2	Estimation 3
12	Confidence intervals	Confidence intervals	revision	revision