



Faculty of Computer Studies

MST121 B: Using Mathematics (Part B)

Course Guide

MST121B: Using Mathematics (Part B)

Credit Point / Credit Hours: 15 / 4

Pre-Requisites:

MST121A

Short Description:

This course covers a range of fundamental mathematical techniques of Calculus, differential equations, elementary probability and statistics. Use of computer software (primarily Mathcad and OUSTAT) is part of the course. The skills of communicating results and defining problems are also developed.

Aims:

The aims of this course are:

- to introduce students to concept of differentiation and modeling.
- to introduce students to elementary probability and statistics.
- to enable students to understand concepts of estimating.

Learning Outcomes of MST121B:

The Learning Outcomes of this course are given below:

A. Knowledge / Understanding of:

After studying the course, the student will be able to:

- A1. Calculus and elementary differential equations.
- A2. Elementary probability and statistics.
- A3. Continuous models: probabilistic models.

B. Cognitive Skills:

After studying the course, the student will be able to:

- B1. Appreciate mathematical arguments and carry out mathematical manipulations.
- B2. Analyse simple real world problems and create mathematical models.
- B3. Apply qualitative and quantitative problem-solving skills.

C. Key Skills:

After studying the course, the student will be able to:

- C1. Understand, present and communicate basic mathematical ideas.
- C2. Exhibit some familiarity with a mathematical/statistical software package.

D. Practical and / or Professional Skills:

After studying the course, the student will be able to:

- D1. Apply mathematical concepts, principles and modeling techniques to analyse practical problems.
- D2. Use a mathematical/statistical software package.

Course Structure:

The MST121B course consists of 2 blocks of study comprising a number of units of study.

Table of Contents:

BLOCK C.

Chap C1: Differentiation and modeling

- 1 What is Differentiation?
- 2 Graphs and Optimization
- 3 Differentiating further functions
- 4 Products, quotients and composites
- 5 Optimization with the computer

Chap C2: Integration and modeling

- 1 Basics of integration
- 2 Further Integration
- 3 Modeling motion
- 4 Definite integrals, areas and summations
- 5 Integration with the computer

Chap C3: Differential equations and modeling

- 1 Differential equations and direct integration
- 2 Solution by separation of variables
- 3 Modeling growth and decay
- 4 Differential equations with the computer
- 5 A look ahead

Computer Book C: Continuous models

BLOCK D.

Chap D1: Chance

- 1 Questions of chance
- 2 Exploring the problems
- 3 Equally likely outcomes
- 4 Waiting for a success
- 5 Outstanding problems

Chap D2: Modeling Variation

- 1 Models for variation
- 2 Choosing a normal model
- 3 Fitting a normal model
- 4 Are people getting taller?
- 5 Exploring normal distributions
- 6 Properties of normal distributions

Chap D3: Estimating

- 1 Populations and samples
- 2 Estimating with confidence
- 3 Confidence intervals on the computer
- 4 Why are opinion polls sometimes wrong?

Chap D4: Further investigations

- 1 Memory and age
- 2 Exploring the data
- 3 How to tell a female meadow pipit from a male
- 4 Testing for a difference
- 5 Checking the strength of concrete

Assessment:

- Tutor-marked assignments: 2 TMAs
- Quiz/Mid-term Assessment: 1 MTA
- Final Exam: 1 Final Exam

Grade Distributions:

- Tutor-marked assignments: 35%

- Quiz/MTA: 15%
- Final Exam: 50%

Course Calendar (Indicative Version):

There are 2 Tutor Marked Assignments, 1 Midterm Assessment and 1 Final Exam associated with this course. Course result is determined on the basis of student's scores in TMAs, Midterm Assessment and the Final Exam. To be sure of passing the course, the student needs to score at least 40% (at least 20% in TMA and Quiz/MTA and at least 20% in the final exam) in the above 3 components and achieve an overall average score of 50%.

| Study Week | Blocks | Course text | Other Components/notes | Practical Activates | Assignments / Assessments |
|------------|----------------|-------------|------------------------|--------------------------|---------------------------|
| 1 | BLOCK C | Unit C1 | VC 1149 Band C | | |
| 2 | | Unit C1 | | | |
| 3 | | Unit C2 | | Listen to AC 2289 Band 2 | |
| 4 | | Unit C2 | | | |
| 5 | | Unit C3 | | | |
| 6 | | Unit C3 | | | |
| 7 | BLOCK D | Unit D1 | | | TMA01 due date |
| 8 | | Unit D1 | | | Quiz / MTA |
| 9 | | Unit D2 | | | |
| 10 | | Unit D2 | | | |
| 11 | | Unit D3 | | Listen to AC 2290 Band 1 | |
| 12 | | Unit D4 | | | |
| 13 | | Unit D5 | VC 1149 Band D | | |
| 14 | | Unit D | | | TMA2 due date |
| 15 | | Review | | | |
| 16 | | | Final Exam Period | Will be announced | |

TMA = TUTOR MARKED ASSIGNMENTS

VC = VIDEO CASSETTE

AC = AUDIO CASSETTE