



## **Faculty of Computer Studies**

### **MST121 A: Using Mathematics (Part A)**

## **Course Guide**

## **MST121A: Using Mathematics (Part A)**

**Credit Point /Credit Hours:** 15/4

### **Pre-Requisites:**

EL111

### **Short Description:**

This broad introduction to the nature of mathematics and its uses in the modern world shows how mathematics can be used to investigate and answer questions from science, technology and everyday life. It covers a range of fundamental techniques, in particular recurrence relations and sequences; lines and circles; matrices and vectors. Use of computer software (primarily Mathcad) 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 the students to the concepts of recurrence relations and sequence.
- to enable students to understand concepts of Vectors and Matrices.
- to introduce students to mathematical formulas.

### **Learning Outcomes:**

The Learning Outcomes of this course are given below:

#### **A. Knowledge / Understanding of:**

- A1. Sequences, Lines, Circles and Functions.
- A2. Vectors ,matrices and linear systems .
- A3. Discrete 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 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 software package.

### **Course Structure:**

The MST121 course consists of 2 blocks of study comprising 3 units each.

### **Table of Contents:**

#### **Block A Chap A0: Starting Points**

- 1 Installing the course software
- 2 Introduction to Mathcad
- 3 Calculation
- 4 Algebra

#### **Block A Chap A1: Sequences**

- 1 What is a sequence?
- 2 Arithmetic sequences
- 3 Geometric sequences
- 4 Linear recurrence sequences
- 5 Long-term behaviors of sequences
- 6 Investigating sequences with the computer
- 7 Sequences and modeling

#### **Block A Chap A2: Lines and circles**

- 1 Lines
- 2 Circles
- 3 Trigonometry
- 4 Parametric equations
- 5 Parametric equations by computer

### **Block A Chap A3: Functions**

- 1 What is a function?
- 2 Quadratic functions
- 3 Trigonometric and exponential functions
- 4 Inverse functions
- 5 Functions, graphs and equations on the computer

### **Computer Book A: Mathematics & Modeling**

#### **Block B Chap B1: Modeling with sequences**

- 1 Modeling car ownership
- 2 Populations: exponential model
- 3 Populations: logistic model
- 4 Logistic recurrence sequences on the computer
- 5 Sequences and limits

#### **Block B Chap B2: Modeling with matrices**

- 1 Networks and matrices
- 2 Matrix manipulation
- 3 A population problem
- 4 Computing with matrices
- 5 Simultaneous linear equations and matrices

#### **Block B Chap B3: Modeling with vectors**

- 1 Vectors and geometry
- 2 Modeling displacements and velocities
- 3 Sine Rule and Cosine Rule
- 4 Modeling forces
- 5 Analyzing force problems

**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	<b>REVIEW</b>	Unit A0	Preparatory Pack. Read review notes. Examine materials.	Install Math Cad and Become Familiar with Commands. Go over Handbook.	
2	<b>REVIEW</b>	Unit A0	Become acquainted with preliminaries. VC1149 Band A(i)	Become familiar with calculator commands through exercises. Listen to AC2707	
3	<b>BLOCK A</b>	Unit A1	VC 1149 Band A(ii)	Listen to AC 2817 Band 1	TMA01 due date
4		Unit A1		Listen to AC 2777 Band 1	
5		Unit A2	VC 1149 Band A(iii)		
6		Unit A2	VC 1149 Band A(iv)		
7		Unit A3	VC 1149 Band A(v)	Listen to AC 2817 Band 2	
8		Unit A3			Quiz / MTA
9	<b>BLOCK B</b>	Unit B1		Listen to AC 2288 Band 1	TMA02 due date
10		Unit B1		Listen to AC 2817 Band 2	
11		Unit B2		Listen to AC 2289 Band 1	

<b>12</b>		Unit B2			
<b>13</b>		Unit B3	VC 1149 Band B		
<b>14</b>		Unit B3			
<b>15</b>		Review			
<b>16</b>			Final Exam Period	<b>Will be announced</b>	

TMA = TUTOR MARKED ASSIGNMENTS

VC = VIDEO CASSETTE

AC = AUDIO CASSETTE