Course Details

Course Title: Fundamentals of Business Mathematics	**Credit Hours:** 3
Course Code: MATH – 114	**Prerequisite:** None
Program: BS T&HM 2k23	**Sections:** ------

Course Description

The course of Fundamental of Business Mathematics helps student learn the basic concepts of Mathematics required to solve problems in business scenarios. The students will learn the concepts related to linear equations, mathematical functions, mathematics of finance, matrix algebra, differentiation, optimization techniques. The students are given examples in business settings as word problems where these mathematical techniques and concepts are applicable.

Course Learning Outcomes

By the end of the module students will be able to:

CLO 1: Show an understanding of the basic mathematical concepts in business setting.

CLO 2: Relate mathematical concepts to business decision making.

CLO 3: Apply the mathematical tools to business problems.

CLO 4: Model solutions for optimization problems in business setting.

Program Goals & Learning Objectives

Goal 1: Students will acquire knowledge to analyse business problems

Learning Objective 1.1: Students will be able to understand problems in a business setting.

Learning Objective 1.2: Students will be able to analyse problems using business knowledge.

Goal 2: Students will work in team settings

Learning Objective 2.1: Students will be able to work towards achieving team goals

Learning Objective 2.2: Students will be able to demonstrate effective team behaviour.

Goal 3: Students will learn to communicate effectively

Learning Objective 3.1: Students will be able to communicate effectively in oral presentations.

Learning Objective 3.2: Student will be able to create professional reports.

Goal 4: Students will deal with the ethical dilemmas that arise in a business environment.

Learning Objective 4.1: Students will be able to identify ethical concerns emanating from a business situation

Learning Objective 4.2: Students will be able to apply ethical guidelines to address business problems by examining set of alternatives.

Mapping - CLOs with LOs

Learning Objective	LO 1.1	LO 1.2	LO 2.1	LO 2.2	LO 3.1	LO 3.2	LO 4.1	LO 4.2	Not mapped	Evaluation Item
CLO 1	✓									Class activities/Quiz
CLO 2	✓									Class activities/Assignment
CLO 3	✓									Quiz/Exams
CLO 4	✓									Assignments/Exams

Legend: ✓ indicates mapped and assessed CLO, ● mapped but not assessed and x unmapped CLO.

Required Course Material

Textbook(s): Textbook: Frank S Budnick, Applied Mathematics for Business, Economics, and The Social Sciences, 4th Edition, McGraw Hill Inc.

Lecture notes and slides will be posted on NUST LMS portal regularly. The students are advised to complete the relevant practice problems posted there along with the lecture. Additional material will be provided by the module leader.

Course Evaluation (Grade Breakup)

Grading will be done as per NBS criteria. The breakup of the grade points is as follows:

Final Exam	40 %
Mid Semester Exam	25 %
Assignment	20 %
Quizzes	10 %

Course Content (Weekly)

Week	Lecture No. and Topic	Preparation Material	Session Outcomes (Students should be able to…)
1	Lectures 1 & 2 Systems of linear equations	Chapter 2 & 3 (Sections 2.1 – 2.6, 3.1 – 3.4) Linear equations & Systems of linear equations: Equation of a straight line. Two variable systems of equations, Gaussian elimination method, applications.	CLO 1 CLO 3
2	Lectures 3 & 4 Mathematical functions	Chapter 4 (Sections 4.1 – 4.3) Definition, Domain and Range, types, graphical representation.	CLO 1
3	Lectures 5 & 6 Linear function	Chapter 5 (Sections 5.1 – 5.3) Characteristics, break even models.	CLO 2 CLO 3
4	Lectures 7 & 8 Quadratic functions	Quiz # 1, Chapter 6 (Sections 6.1 – 6.3) Characteristics and applications.	CLO 3
5	Lectures 9 & 10 Exponential and Logarithmic functions	Chapter 7 (Sections 7.1 – 7.3) Characteristics and applications. Assignment # 1	CLO 3
6	Lectures 11 & 12	Chapter 8 (Sections 8.1 – 8.2) Interest and its	CLO 1 CLO 3
	Mathematics of finance	computation, single payment computations.	

7	Lectures 13 & 14 Mathematics of finance	Chapter 8 (Sections 8.3 – 8.4) Annuities and their future value, annuities and their present value. Quiz # 2	CLO 2 CLO 3
8	Lectures 15 & 16 Matrix algebra	Chapter 9 (Sections 9.1 – 9.3) Introduction, types and matrix operations.	CLO 1
9	Mid-Term Exam Week		
10	Lectures 17 & 18 Matrix algebra	Chapter 9 (Section 9.4 – 9.5, 9.6) The determinant, the inverse of a matrix, Cramer's rule, applications.	CLO 1 CLO 3
11	Lectures 19 & 20 Differentiation	Chapter 15 (Sections 15.1 – 15.8) Limits, continuity and their properties, average rate of change. The derivative, differentiation and its rules, instantaneous rate of change interpretation and higher order derivatives.	CLO 1
12	Lectures 21 & 22 Optimization: Methodology	Chapter 16 (Sections 16.1, 16.2) Derivatives additional interpretations; increasing and decreasing functions. Concavity and inflection points, identification of maximum and minimum. Quiz # 3	CLO 1 CLO 2

13	Lectures 23 & 24 Optimization: Applications of derivatives	Chapter 17 (Sections 17.1 and 17.2) Applications of derivatives. Maxima Minima of a function.	CLO 3
14	Lectures 25 & 26 Linear Programming	Chapter 10 (Section 10.1 and 10.2) Introduction, graphical solutions. Optimal, No feasible and unbounded solutions	CLO 4
15	Lectures 27 & 28 Applications of Linear Programming and problems solutions using Simplex method	Chapter 10 (Section 10.3) Applications. Chapter 11 (Section 11.1) Simplex Preliminaries	CLO 3 CLO 4
16	Lectures 29 & 30 Optimization Simplex method	Chapter 11 (Section 11.2) The simplex method:	CLO 1 CLO 4
17	BUFFER WEEK		
18	**Final Exam Week**		

Details of Assessments

Assignments (15%)

Two assignments will be given during the semester. First assignment will be given before and the second one after the mid-term exam. All deliverables are due at the start of the class unless advised otherwise. Either of the assignments can possible be carried out during the class time as a marked class activity. In this case, there will be a prior announcement by email/LMS for the date/time of the assignment. The assignments will carry word problems in business scenario and will be assessed for student's understanding of a concept, its application and presentation of the solution. The assignments are to be done by the student independently. Negative marking will be done in the case of plagiarism. Late submissions are not accepted.

Quizzes (10%)

- There will be a total of 3 quizzes in the class. At least one quiz will be unannounced.
- Late comers will not be allowed to join the class.
- Any cheating means used or suspicion created during the quiz will result in cancelation of the quiz.

Examination (70%)

- The course will have two exams, i.e., a midterm (25%) and a final exam (45%), to measure the student's understanding of the subject, mid-term in the 9th and final in the 18th week of the course.
- Each exam will have mostly unseen word problems. Students are supposed to give detailed and clear answer according to the requirement of the questions.
- The students are allowed to use basic scientific calculators only for calculations. Exchange of calculators is strictly prohibited.
- Any cheating means used or suspicion created during the quiz will result in disciplinary action.

Dates to Remember

The dates/weeks provided below are a reasonable estimate of due dates for quizzes, assignments, and project-related material submissions. These may be subject to modification by the instructor due to unforeseen circumstances/minor modifications in the course. However, until informed so, please consider these dates/weeks as final.

Week	Date	Assessment Activity
4	5th October 2023	Quiz 1
5	13th October 2023	Assignment 1
7	26th October 2023	Quiz 2
9	6th November 2023 onwards	Mid-Term Exam
13	5th December 2023	Quiz 3
14	12th December 2023	Assignment 2
18	9th January 2023 onwards	Final Exam