

**MAKERERE UNIVERSITY
MAKERERE UNIVERSITY BUSINESS SCHOOL
JINJA REGIONAL CAMPUS
DEPARTMENT OF MARKETING & MANAGEMENT**

COMPUTING MATHEMATICS

PROGRAMME : Bachelor of Business Computing (BBC)
COURSE CODE : BBC1114 **CREDIT HOURS: 4**
YEAR OF STUDY : One
ACADEMIC YEAR : 2023/2024 **SEMESTER: One**
COURSE FACILITATORS : Mr. Bwiino Keefa & Mr. Bamuwalaze Jonah

Course Description:

The course aims at providing the mathematical foundations for the main computational approaches to programming. These comprise techniques and methods for the numerical solution of linear systems and methods for solving constrained and unconstrained optimization problems. This requires understanding the connections between propositional and predicate logic techniques, sets, functions and relations, and optimization algorithms. The course focuses on presenting the main algorithmic approaches and the underlying mathematical concepts, with attention to the implementation aspects using MATLAB and/or Octave.

Course Objectives:

- To develop students' competencies in problem-solving, mathematical computation, mathematical thinking, and conceptual development.
- To develop students' abilities in applying mathematical skills that are significant in Business Computing
- To introduce students to different methods of modelling and solving optimization problems

Learning Outcomes:

Upon successful completion of the course, students should be able to:

- Understand the importance of numbering systems (binary, decimal, and hexadecimal) in the field of computing.
- Apply concepts and techniques of linear algebra in solving Computational and business problems.
- Understand and apply algorithmic approaches to solving a range of Mathematical problems.
- Differentiate between unconstrained and constrained optimization problems
- Apply software tools to solve computational and optimization problems.
- Demonstrate cognitive skills of critical thinking and analysis

Detailed Course Content

No.	Topics	Lesson Details	Hours
1.	Data Representation in Computer Systems	Introduction; Positional Numbering Systems; Decimal to Binary Conversions, Signed Integer Representation; Floating-Point Representation, importance of binary and hexadecimal number systems in computing, Character Codes: Binary-Coded Decimal, EBCDIC, ASCII, Unicode	6
2.	Propositional and Predicate logic	Truth Tables, The Algebra of Propositions, Logical Arguments	6
3.	Sets and Relations	Sets, Operations on Sets, Binary Relations, Equivalence Relations, Partial Orders	6
4.	Functions	Domain, Range, One-to-One, Onto Inverses and Composition, One-to-One Correspondence and the Cardinality of a Set	6
5.	Algorithms	What is an algorithm?, properties of algorithms, Control structures, pseudo-code representation of algorithms, complexity of algorithms, Further examples of algorithms,	9
6.	Introduction to Linear Algebra	Matrix algebra Systems of linear equations.	6
7.	Introduction to optimization	Unconstrained optimization and systems of equations, constrained optimization and systems of equations, numerical methods for solving optimization problems	9
8.	Software tools for numerical computations	MATLAB, Octave, etc.	12
	Total Hours		60

Mode of Delivery

- Lectures
- Group and class discussions
- Practical demonstrations

Mode of Assessment

- Coursework 30%
- End of semester examination 70%

References:

- Willem Conradie and Valentin Goranko; Logic and Discrete Mathematics: A Concise Introduction, 2015, John Wiley and Sons Ltd
- Charles A. Cusack and David A. Santos; An Active Introduction to Discrete Mathematics and Algorithms, 2015.