MASINDE MULIRO UNIVERSTY OF SCIENCE AND TECHNOLOGY
SCHOOL OF COMPUTING AND INFORMATICS
DEPARTMENT OF COMPUTER SCIENCE
BSC. COMPUTER SCIENCE

COURSE CODE: BCS 227 **COURSE TITLE:** LOGIC PROGRAMMING
Time & Day: _____ _____ **Venue**: _____
Lecturer ***Name:*** *Dr. D. K. Muyobo*
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Course Name	**INTRODUCTION TO LOGIC PROGRAMMING**
Credit Units	3
Pre-requisite	Discrete Structures II Introduction to Artificial Intelligence
Purpose	The purpose of this course is to introduce learners to logic-based inference strategies so as to enable them implement logical reasoning systems.
Expected Learning Outcomes	On completion of this course the learners will be able to: 1. Explain the concepts in propositional and predicate calculus. 2. Apply logic-based inference strategies. 3. Use a logic programming language to implement logical reasoning systems. 4. Formulate logical reasoning strategies and models
Week/Lesson	Topic /sub-topic
1	**Introduction to Logic Programming** • What is logic programming • Imperative and declarative languages • Level of language • Aspect of Logic programming • Why Logic programming • Why LP NOT popular as Java, C++ and Python • Why LP is Difficult • History of Logic Programming
2	**Understanding Logic and Logic Programming Languages**

	• What is Logic (syntax , semantic and Inference rule) • History of Logic • Symbolic Logic : Theory of Syllogism, Modus Ponens and Modus Tollens) • Testing for Argument Validity • Common Fallacies
3	• Computation vs Deduction • Connection between Computation and deduction • Judgment, proof and proof search Strategies used by inference Engine: • Backward chaining • Forward Chaining
4	**Calculus: Propositional Logic** • Definition • Examples of Propositions • Sentences that are not propositionas • Alphabets • well-formed formula (wff) • Semantic and Truth Tables • Satisfiable • Contradiction and Tautology • Why Predicate over Propositions
5	**Calculus: Predicate Calculus** • Definition • Alphabets • Terms • Atomic formula • well-formed formula (wff) • number • sets

6	**CAT 1**
7	**Introduction to Prolog** • What is prolog • Background of prolog • Application of prolog • Characteristics of Prolog • Data types in prolog
8	**Logic Systems :** - propositional Logic - predicate Logic - Logic and Horn Clause • Resolution • Unification • Instantiation • Resolution Principle • Resolution Algorithm • Steps for Resolution [LAB 1: Creating Programming Environment] [Sharing Prolog LAB. Manual with Students]
9	**Program Elements** • Relation • Atom • Structure • Facts • Rules • Queries • Unification, Evaluation and Backtracking • Conjunction and Disjunction of Goals • Operators: is, cut (!), nl, (;), (,)

	• Recursion in prolog • List • Tracing execution [**LAB 2:** Database of facts, General programs, consulting and Tracing execution]	
10	**Working with GNU prolog** • Prolog Programs • Example logic programs for Artificial Intelligence – logical agents – Goal-based agent. [**LAB 3:** (Project) Decision based System using Prolog]	
11	**Knowledge representation and reasoning** • Introduction • Expressivity and practicality in KR • KR and semantic Web • Reasoning under certainty • Type of reasoning Systems	
12	• **CAT 2** • **Project Assessment and Revision**	
Mode of Delivery	Lectures , directed reading, Group/class discussions and practical exercises	
Instructional Material and/or Equipment	Whiteboard, computer simulation software, Prolog GNU	
Course Assessment	Type	Weighting (%)
	Examination	70
	Continuous Assessment	30
	Total	100
Core Reading Material	1. Frank P. (2007), Logic Programming, Carnegie Mellon University 2. Andrews, H., J. (2007). Logic Programming: Operational Semantics and Proof Theory. Cambridge University Press	

Recommended Reading Material	1. Nilsson, U., and Matuszynski, J. (2000). Logic, Programming and Prolog. 2nd Edition. John Wiley & Sons Ltd. 2. Spivey, M. (2004). An Introduction to Logic Programming through Prolog. Prentice Hall

Prepared By:

Dr. D. K. Muyobo  02/01/2024

Lecturer Name Signature Date

Approved By:

_____ _____ _____

CoD Name Signature Date