KIBABII UNIVERSITY
SCHOOL OF COMPUTING AND INFORMATICS
DEPARTMENT OF COMPUTER SCIENCE
BSC. COMPUTER SCIENCE

COURSE CODE: CSC 227   **COURSE TITLE:** LOGIC PROGRAMMING
ACADEMIC YEAR: 2023/2024   **SEM:** II
Time & Day: _____ _____   **Venue**: _____
Lecturer *Name: Daniel Khaoya 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. 2ndEdition. John Wiley & Sons Ltd.
	2. Spivey, M. (2004). An Introduction to Logic Programming through Prolog. Prentice Hall

Prepared By:

Dr. Khaoya Muyobo   _____   ____02/01/2024____
    Lecturer Name   Signature   Date

Approved By:

_____   _____   _____
    CoD Name   Signature   Date