Course Specification
(Bachelor)

Course Title:	Discrete Structures 1
Course Code:	CS1100
Program:	Bachelor of Computer Science
Department:	Computer Science
College:	College of Computer and Information Sciences
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	1.0
Last Revision Date:	27 April 2025 *Pick Revision Date.*

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3 Hours)					
2. Course type					
A.	☐University	☑ College	☐Department	☐Track	☐Others
B.	☑ Required		☐Elective		
3. Level/year at which this course is offered: (Level 2 / Year 1)					
4. Course General Description:					
This course will introduce the student to a body of mathematical concepts essential for the mastery of some of the higher-level computer science courses. Topics include: set theory, functions and relations, propositional and predicate logic, proof techniques, machine level representation of data.					
5. Pre-requirements for this course (if any)**:**					
CS1111 Computing Fundamentals and Ethics					
6. Co-requisites for this course (if any)**:**					
No co-requisites					
7. Course Main Objective(s):					
This course will introduce the student to a body of mathematical concepts essential for the mastery of some of the higher-level computer science courses. The main objective of this course is to develop an understanding of propositional and predicate logics, numerical data representation, sets functions and relations, and be able to write clear, correct proofs.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	0
3.	**Field**	0
4.	**Tutorial**	30
5.	**Others (specify)**	0
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the propositional and predicate logics.	K1	Class Lectures Class Tutorial	Written exams (midterm, quizzes and final).
1.2	Define the following concepts: sets, functions, relations, and their properties.	K1	Class Lectures Class Tutorial	Written exams (midterm, quizzes and final).
1.3	Describe the different numbering systems in computer science.	K1	Class Lectures Class Tutorial	Written exams (midterm, quizzes and final).
2.0	**Skills**			
2.1	Reconstruct and manipulate different logical expressions using propositional and predicate logics.	S1 &S2	Class Lectures Class Tutorial	Written exams (midterm, quizzes and final).
2.2	Write clear, correct proofs using the presented proofs techniques.	S4	Class Lectures Class Tutorial	Written exams (midterm, quizzes and final).
...				
3.0	**Values, autonomy, and responsibility**			
3.1				

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Basic Logic: Propositional logic (cross-reference: Propositional logic is also reviewed in IS/Knowledge Based Reasoning) • Logical connectives • Truth tables • Normal forms (conjunctive and disjunctive) • Validity of well-formed formula • Propositional inference rules (concepts of modus ponens and modus tollens…) • Predicate logic o Universal and existential quantification • Limitations of propositional and predicate logic (e.g., expressiveness issues)	20
2.	• Sets o Venn diagrams o Union, intersection, complement o Cartesian product o Power sets o Cardinality of finite sets • Relations o Reflexivity, symmetry, transitivity o Equivalence relations, partial orders • Functions o Surjections, injections, bijections o Inverses	12

	o Composition	
3.	Proof Techniques: Notions of implication, equivalence, converse, inverse, contrapositive, negation, and contradiction • The structure of mathematical proofs •Direct proofs • Proof by contradiction • Proof by contraposition •Vacuous proof •Trivial proof •Proof by cases • Disproving by counterexample • Induction over natural numbers • Structural induction • Weak and strong induction (i.e., First and Second Principle of Induction) • Recursive mathematical definitions • Well orderings	16
4.	Machine Level Representation of Data: Bits, bytes, and words • Numeric data representation and number bases • Fixed- and floating-point systems • Signed and twos-complement representations	12
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz	5, 7, 10, 14	20%
2.	Midterm Exams	9, 13	40%
3.	Final Exam	Final Week	40%

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
...			

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Discrete Mathematics with Applications, Susanna S. Epp, 4th edition, - DePaul University, 2011
Supportive References	Discrete Mathematics and Its Applications, Kenneth H. Rosen, 8th edition, McGraw Hill, 2019
Electronic Materials	Blackboard (Learning Management System)
Other Learning Materials	-

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture room with: • At least 35 seats • A projector connected to a PC preferably with Internet connection • Sliding board
Technology equipment (projector, smart board, software)	N/A
Other equipment (depending on the nature of the specialty)	N/A

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Instructors, Program Leaders	1. Students feedback (collected through course evaluation surveys) 2. Course report submitted by instructors. 3. Reviewing course reports by the program leaders

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Students assessment	Students, Instructors, Program Leaders	1. Students feedback (collected through course evaluation surveys) 2. Course report submitted by instructors 3. Reviewing course reports by the program leaders
Quality of learning resources	Instructors, Program Leaders	1.Direct assessments for students' grades related to CLOs 2. Reviewing course reports (including CLOs achievement) by instructors and program leaders
The extent to which CLOs have been achieved	Program Leaders	1. Reviewing Course Specification and Reports by program leaders
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**COMPUTER SCIENCE DEPARTMENT COUNCIL**
REFERENCE NO.	**1446/3101**
DATE	**29-4-2025**