

The background of the slide is a light gray gradient. In the top-left and bottom-right corners, there are several realistic-looking water droplets of various sizes, rendered with soft shadows and highlights to give them a three-dimensional appearance.

CPS 305 - COMPUTER LOGIC AND DISCRETE STRUCTURES

BASIC INFORMATION

- **Institution:** School Of Information Technology & Communications (ITC)
- **Department:** Computer Science
- **Semester:** 2024/2025, Semester 2
- **Course Code:** CPS 305
- **Course Title:** Computer Logic And Discrete Structures
- **Number of Credit Hours:** 3 Units
- **Prerequisite:** Non
- **Course Duration (# of Weeks):** 12 Weeks
- **Days, Time And Venue:** Fridays, 11:00 – 13:30, Lecture Room 3

LECTURER INFORMATION

- **Name:** Dr. Isatou Hydara
- **Qualifications:** BSc in Computer Science, Master's in Software Engineering, and PhD in Software Engineering
- **Office address:** Staff Room, School of ITC, Faraba
- **Office hours:** wed# 12:00-13:20 to be confirmed
- **Phone numbers:** 3554227
- **E-mail:** ihydara@utg.edu.gm OR ishahydara@gmail.com
- **Preferred methods of contact:** WhatsApp

COURSE DESCRIPTION

This course discusses the approaches to mathematical concepts of discrete mathematics in computer science and how to use them in practice. It introduces students to particular set of mathematical facts and how to apply them logically. It focuses on four important themes: mathematical reasoning, combinatorial analysis, discrete structures, and algorithmic thinking. It covers the fundamental topics such as fundamental principles of counting, fundamentals of logic, set theory, mathematical induction, functions, relations, and recurrence relations.

COURSE CONTENT

The topics covered include:

- Fundamentals of logic: Propositional logic, Predicate logic, Proofs
- Elementary number theory and methods of proof
- Sequences, mathematical induction, and recursion
- Set theory: definition, properties, Boolean algebras
- Cryptography
- Properties of functions and relations: combining relations, closures, equivalence, partial ordering
- Counting and Probability: discrete probability. Expected values and variance
- Graphs and Trees: directed graphs, undirected graphs, rooted trees, spanning trees
- Generating functions

COURSE OBJECTIVES

The course is designed for the students to be able to:

- Construct and interpret propositions expressed using logic expressions.
- Demonstrate an understanding of predicate calculus
- Determine the correctness of and construct non-inductive proofs.
- Determine the correctness of and construct inductive proofs.
- Define properties of and operations on sets and sequences.
- Construct recursive definitions of functions, sets, and strings.

COURSE LEARNING OUTCOMES

After completing the course, the students should be able to:

- Explain the concepts of discrete structures such as sets, relations, and functions, relationships between them, and their properties,
- Learn to reason correctly,
- Solve discrete structures problems.
- Transform mathematical abstraction into computer science models.

COURSE MATERIALS

- Susanna S. Epp (2019) Discrete Mathematics with Applications, 5th ed., Cengage Pub., Boston, USA. ISBN; 978-1-337-69419-3.
- Judith L. Gersting (2014) Mathematical Structures for Computer Science – Discrete Mathematics and its Applications, 7th ed. Macmillan Higher Education Co., USA, ISBN: 13-978-1-4292-1510-7.
- Kenneth H. Rosen (2007) Discrete Mathematics and its Applications, 7th ed., McGraw-Hill Publishing, USA, ISBN; 978-0-07-338309-5
- Garnier, R. And Taylor, J. (2002) Discrete Mathematics for New Technology, 2nd ed., IoP Publishing Philadelphia USA, ISBN; 0750306521

DELIVERY METHOD

A blended approach will be used in the delivery of the course. It will be delivered in a semester basis and students will learn topics in computer logic and discrete structures. Students will be engaged in group activities, there will be one- to-one tutorial as well as individual research tasks. The course will be delivered in lecture sessions, tutorials, assignments and hands-on exercises.

DELIVERY POLICIES

- All students are required to complete their registration formalities
- Students who are not registered after add/drop period will not be allowed to sit to the exams.
- It is the responsibility of the student to adhere to UTG registration policy guidelines.

COURSE ASSESSMENT

There will be continuous assessment as the semester rolls out. This will contribute 50% of the total mark. At the end of the course there will be an examination that gives 50% of the total mark. The scores of the continuous assessment and the end of semester exams will total 100%.

- Attendance (minimum 75%): 10%
- Written assignments: 20%
- Tests: 20%
- Examination: formal (written): 50%
- Total Score: 100%

COURSE SCHEDULE

Week	Course Unit	Topics
1	Introduction	Course Introduction
2	Fundamentals of Logic	Variables and Statements
3	Propositional Logic	Logical Forms and Logical Equivalence
4	Propositional Logic	Conditional Statements, Valid and Invalid Arguments
5	Predicate Logic	Predicates and Quantifiers
6	Fundamental Principles of Counting	The Rules of Sum and Product, Permutations

COURSE SCHEDULE

Week	Course Unit	Topics
7	Fundamental Principles of Counting	Combinations: The Binomial Theorem, Combinations with Repetition
8	Set Theory	Sets and subsets, set operations and the laws of set theory, counting and Venn diagrams
9	Relations	Properties, Combining relations, Closures, Equivalence, Partial ordering
10	Functions	Generating Functions
11	Graphs	Directed and Undirected Graphs
12	Cryptography	Introduction to cryptography



THANK YOU

**QUESTIONS?
COMMENTS
SUGGESTIONS**

