**Course Profile:**

**Course Title: Discrete Mathematics Course Code: CSE 103**

**Level/Term: 1/2 Section: A, B, C**

**Credit:** 03 **Contact Hours:33**

**Prerequisite: N/A Type: Core/Major: Core**

**Session:** Fall 2022

**Rationale:**

This course is designed to introduce the students to ideas and techniques from discrete mathematics that are widely used in science and engineering.

**Course Objectives:**

Discrete mathematics is designed to provide students of computer science with several topics and ideas that will help them to

1. Develop and analyze algorithms as well as enable them to think about and solve problems in new ways.
2. By the completion of this course students should be able to express ideas using mathematical notations and solve problems using the tools of mathematical analysis.
3. Evaluate elementary mathematical arguments and identify fallacious reasoning.

**Course Outcomes (COs):**

Upon successful completion of this course, students will be able to

1. Use logical notation to define and reason about fundamental mathematical concepts
2. Prove elementary properties of modular arithmetic and explain their applications in computer science.
3. Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction.
4. Understand basic concepts in formal language and computability.
5. Apply knowledge about discrete mathematics in problem solving.

**Text and Reference books:**

1. Discrete Mathematics: Kenneith H. Rosen
2. Discrete Mathematics: Richard Johnson

**Teaching Strategy:** Typical methodologies are Class lectures, web-access, self-study, problem formulation, and student presentation.

**Assessment Strategy:** class attendance (10%), quiz/assignments/home works (10%),Class tests(10%), midterm exam(20%) and final exam(50%).

**CO delivery and assessment:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Cos | Corresponding Pos | Bloom’s taxonomy domain/level  *(C: Cognitive, P: Psychomotor A: Affective)* | Delivery methods and activities | Assessment tools |
| CO1 | PO1, PO2, PO3 | C2 | Lecture, Problem solution, Video, Web Link | Final Exam (Comprehensive) |
| CO2 | PO1, PO2, PO3 | C2 | Lecture, Problem solution, Video, Web Link | Class Test-2 (Online assignment), Final Exam (Comprehensive) |
| CO3 | PO1, PO2, PO3 | C2 | Lecture, Problem solution, Video, Web Link | Class Test-1 (Comprehensive), Midterm Exam (Presentation), Final Exam (Comprehensive) |
| CO4 | PO1, PO2, PO3 | C2 | Lecture, Problem solution, Video, Web Link | Assignment (Home task)  Final Exam (Comprehensive) |
| CO5 | PO1, PO2, PO3 | C3 | Lecture, Problem solution, Video, Web Link |  |

*(Recall:*

*2. Domains and Levels of Bloom’s Taxonomy*

* “Cognitive” Domain (C): C1 - Recall data, C2 - Understand, C3 - Apply, C4 - Analysis, C5 - Synthesize, and C6 - Evaluate.*

* “Affective” Domain (A): A1 - Receive, A2 - Respond, A3 - Value, A4 - Organize personal value system, and A5 - Internalize value system.*

* “Psychomotor” Domain (P): P1 - Imitation, P2 - Manipulation, P3 - Develop precision, P4 -Articulation, and P5 - Naturalization. )*

**CO-PO Mapping (Theory course):**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CO/PO mapping | | | | | | | | | | | | |
| Cos | Program Outcomes (POs) | | | | | | | | | | | |
| PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | √ | √ | √ |  |  |  |  |  |  |  |  |  |
| CO2 | √ | √ | √ |  |  |  |  |  |  |  |  |  |
| CO3 | √ | √ | √ |  |  |  |  |  |  |  |  |  |
| CO4 | √ | √ | √ |  |  |  |  |  |  |  |  |  |
| CO5 | √ | √ | √ |  |  |  |  |  |  |  |  |  |

**PUC Logo**

**Department of Computer Science and Engineering**

**Lesson Plan:**

**Course Title: Discrete Mathematics Course Code: CSE 103**

**Level/Term: 1/2 Section: A, B, C**

**Credit:** 03 **Contact Hours:33**

**Prerequisite: N/A Type: Core/Major: Core**

**Instructor: Syed** Farhana Shirin Chowdhury

**Class schedule:**

Saturday: 10.00 AM-11.30 AM (C) 1.00 PM-2.30 PM (B)

Sunday: 11.30 AM-1.00 PM (A)

Monday: 11.30 AM-1.00 PM (A)

Wednesday: 11.30 AM-1.00 PM (C) 1.00 PM-2.30 PM (B)

**Counseling Time:**

**Sunday: Tuesday 2.30 pm-4.00 pm**

**Room No:** 607

**Email address: farhana.**pucse@gmail.com **Phone No:** 01674364870

**Session:** Fall 2022

**Rationale:**

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**Assessment Strategy:** class attendance (10%), quiz/assignments/home works (10%),Class tests(10%), midterm exam(20%) and final exam(50%).

**Weekly schedule:**

**Day wise schedule:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Day** | **Topic** | **Teaching strategy** | **Course outcome** | **Assessment Strategy** |
| Day 1 | Graph Terminology, Types of graph | Lecture, Problem solution, Video, Web Link | CO3 | Class Test, Midterm, Final Examination |
| Day 2 | Types of graph(cont.), Konigsberg Bridge Problem | Lecture, Problem solution, Video, Web Link | CO3 | Class Test, Midterm, Final Examination |
| Day 3 | Handshaking Theorem, Walk, Trail, Path, Cycle and Circuit | Lecture, Problem solution, Video, Web Link | CO3 | Class Test, Final Examination |
| Day 4 | Graph Isomorphism, Corresponding matrix | Lecture, Problem solution, Video, Web Link | CO3 | Class Test, Midterm, Final Examination |
| Day 5 | Planar graph, Euler Graph | Lecture, Problem solution, Video, Web Link | CO3 | Midterm, Assignment, Final Examination |
| Day 6 | Hamiltonian graph, Bipartite Graph, Graph coloring | Lecture, Problem solution, Video, Web Link | CO3 | Class Test, Midterm,  Final Examination |
| Day 7 | Tree terminology | Lecture, Problem solution, Video, Web Link | CO3 | Midterm, Final Examination |
| Day 8 | Shortest-path problems | Lecture, Problem solution, Video, Web Link | CO5 | Class Test, Assignment, Final Examination |
| Day 9 | Number Theory: Modular Arithmetic (Addition, Subtraction, Multiplication and Division) | Lecture, Problem solution, Video, Web Link | CO2 | Class Test  Final  Examination |
| Day 10 | Prime Number (Naïve approach,  sieve of Eratosthenes and segmented sieve | Lecture, Problem solution, Video, Web Link | CO2 | Final Examination |
| Day 11 | GCD: Euclidean Algorithm, Extended GCD, | Lecture, Problem solution, Video, Web Link | CO2 | Class Test, Assignment,  Final Examination |
| Day 12 | LCM, Modular Inverse (Basic) | Lecture, Problem solution, Video, Web Link | CO2 | Class Test,  Final Examination |
| Day 13 | Modular Inverse, Modular Exponentiation | Lecture, Problem solution, Video, Web Link | CO2 | Class Test, Assignment,  Final Examination |
| Day 14 | Big mod, Congruence | Lecture, Problem solution, Video, Web Link | CO4 | Class Test  Final Examination |
| Day 15 | The foundation: Logic, Propositional logic | Lecture, Problem solution, Video, Web Link | CO4 | Class Test,  Assignment  Final Examination |
| Day 16 | Propositional Connectives | Lecture, Problem solution, Video, Web Link | CO4 | Class Test  Assignment, Final Examination |
| Day 17 | Propositional equivalence | Lecture, Problem solution, Video, Web Link | CO1 | Class Test  Assignment, Final Examination |
| Day 18 | Predicates and Quantifiers | Lecture, Problem solution, Video, Web Link | CO4 | Assignment, Final Examination |
| Day 19 | Method of Proofs | Lecture, Problem solution, Video, Web Link | CO4 | Final Examination |
| Day 20 | Counting methods: Pigeonhole principle and applications | Lecture, Problem solution, Video, Web Link | CO1 | Final Examination |
| Day 21 | **Review** |  |  |  |
| Day 22 | **Review** |  |  |  |