Republic of the Philippines
SULTAN KUDARAT STATE UNIVERSITY
Isulan, Sultan Kudarat
College of Computer Studies
1st Semester S.Y. 2024-2025

CS 114
Discrete Structures II
Syllabus

1st Semester
School Year 2024 - 2025

Republic of the Philippines
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UNIVERSITY VISION

A leading University in advancing scholarly innovation, multi-cultural convergence, and responsive public service in a borderless Region.

UNIVERSITY MISSION

The University shall primarily provide advance instruction and professional training in science and technology, agriculture, fisheries, education and other related field of study. It shall also undertake research and extension services, and provide progressive leadership in its areas of specialization.

CORE VALUES

P – Patriotism
R – Respect
I – Integrity
Z – Zeal
E – Excellence in Public Service

STRATEGIC GOALS

a. Deliver quality services to stakeholders to address current and future needs in instruction, research, extension, and production.
b. Observe strict implementation of the laws as well as the policies and regulations of the University.
c. Acquire with urgency state-of-the-art resources for its service areas.
d. Bolster the relationship of the University with its local and international customers and partners.
e. Leverage the qualifications and competence in personnel action and staffing.
f. Evaluate the efficiency and responsiveness of the University systems and processes.

Program Objectives and its relationship to University Goals:

PROGRAM OBJECTIVES (PO)	OBJECTIVES						
A graduate of BS in Computer Science can:	a	b	c	d	e	f	g
a. Design and implement effectively the innovative researches.	√	√			√		√
b. Apply proficiently the algorithmic theories and related computational system in conducting researches	√	√	√	√	√	√	√
c. Solve societal problems through producing sustainable research outputs; and	√	√	√	√	√	√	√
d. Demonstrate professionalism in the social, environmental, and legal aspects of computer science.	√	√	√	√	√	√	√

1. Course Code : CS 122
2. Course Title : Discrete Structures 2
3. Prerequisite : CS 111 - Discrete Structures I
4. Credits : 3 UNITS

5. Course Description:
This course is a continuation of the study on Discrete Structures I, which is an essential knowledge for any computer science student. In this part, students will start with an introduction recursion and sequences, which they can use to write simple programs for the succeeding topics. Then students will be able to learn graphs and trees and its applications in network models and some other real-world applications such as the problem of minimizing and maximizing flow in a network will also be discussed thoroughly, and the finite state machines.

6. Course Learning Outcomes and Relationships to Program Educational Objectives

Course Learning Outcomes	Program Objectives			
At the end of the semester, the students can:	a	b	c	d
a. Identify and apply recursion and sequences;	√	√	√	√
b. Discuss the concept of graphs and identify its many real-world applications;	√	√	√	√
c. Explain what trees apply it in real-world problems; and	√	√	√	√
d. Discuss and apply finite state machines.	√	√	√	√

7. Course Content

Course Objectives, Topics, Time Allotment	Desired Student Learning Objectives	Outcome-Based Assessment (OBA) Activities	Evidence of Outcomes	Course Objectives	Program Outcomes	Values Integration
Topic: VGMO, Classroom Policies, Course Overview, Course Requirements, Grading System (3 hour)						
1. Discuss the VGMO of the University, Classroom Policies, scope of the course, course requirements, and grading system	1. Students can be aware of the VGMO of the University, Classroom Policies, scope of the course, course requirements, and grading system	➢ Individual class participation in class discussion	➢ Signed Orientation Form	a	a, c, d	Value of appreciation Value of participation
Topic 1: Recursion (12 hours)						
1. Definition of recursion. 2. Examples of sequences	• Students can define recursion. • Students can apply recursion in sequences	➢ Online class lecture ➢ Module engagement ➢ Activity: Comparing Algorithms ➢ Quiz ➢ Exercise	➢ Quiz scores ➢ Exercise Scores	a, b, d	a, b, c, d	Value of Self-learning Value of problem-solving Value of critical thinking

Topic 2: Graphs (12 hours)						
1. Basic Graph Theory 2. Trails, Paths, and Circuits 3. Graph Traversals 4. Graph Optimization	• Students can distinguish and create trails, paths, and circuits. • Students can understand and solve graph traversals and graph optimization problems.	➢ Online class lecture ➢ Module engagement ➢ Video viewing ➢ Quiz ➢ Exercise	➢ Quiz scores ➢ Exercise Scores	a, b, d	a, b, c, d	Value of Self-learning Value of problem-solving Value of critical thinking
Topic 3: Trees (12 hours)						
1. Introduction to Trees 2. Spanning, Rooted, and Binary Trees 3. Tree Traversals	• Students can identify and give examples of spanning, rooted, and binary trees. • Students can identify spanning trees and use weighted graphs in solving shortest path problems.	➢ Online class lecture ➢ Module engagement ➢ Video viewing ➢ Quiz ➢ Exercise	➢ Quiz scores ➢ Exercise Scores	a, b, d	a, b, c, d	Value of Self-learning Value of problem-solving Value of critical thinking

Topic 4: Finite State Automata(12 hours)						
1. Finite State Machines 2. State Transition Diagrams 3. Finite State Machine States	• Students can discuss different finite state machines • Students can model and draw finite state machines using State Transition Diagrams.	➢ Online class lecture ➢ Module engagement ➢ Video viewing ➢ Quiz ➢ Exercise	➢ Quiz scores ➢ Exercise Scores	a, b, c	a, b, c, d	Value of Self-learning Value of problem-solving Value of using logical reasoning Value of research
Lecture: 51 hours Exams: 3 hours **Total: 54 hours**						

8. 8. Course Evaluation

Course Requirements: Midterm and Final Exams
At least 80% of Graded Activities/Quizzes

Grading System:

Graded Quizzes and Activity/Exercises	40%
Midterm/Final Exam	60%
TOTAL	100%

- equivalent scores will be computed using the 0 = 0% base.

Textbook:

- Johnsonbaugh, Richard. *Discrete Mathematics 7th ed*, Pearson Education, Inc. 2018

References:

1. Epp, Susanna, *Discrete Mathematics with Applications 4th ed.* Brooks/Cole Cengage Learning, 2011
2. Gallier, Jean, *Discrete Mathematics*, *2nd ed.* Springer, 2017
3. Leighman, Eric, et al, *Mathematics for Computer Science,* Creative Commons Attribution-ShareAlike 3.0 license, 2017
4. Rosen, Kenneth H, *Discrete Mathematics and Its Applications, 7th ed*. McGraw-Hill, 2012

Supplemental:

1. Notes: A Course in Discrete Structures by Rafael Pass and Wei-Lung Dustin Tseng
2. Notes: Discrete Structures Lecture Notes by Vladlen Koltun (Standford University, Winter 2008)
3. Video: Introduction to Graph Theory, https://www.youtube.com/watch?v=HkNdNpKUByM
4. Video: Isomorphic Graphs, https://www.youtube.com/watch?v=xcOrrJGxzu8
5. Video: Determine if two graphs are isomorphic, https://www.youtube.com/watch?v=RoDR40UG--s
6. Video: Spanning Trees, https://www.youtube.com/watch?v=wVtE00YodYs
7. Video: Applications of Network Models, https://www.youtube.com/watch?v=DSNHjG4MFOg
8. Video: Finding the Maximum Flow and Minimum Cut within a network, https://www.youtube.com/watch?v=7jFoyLk2VjM

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