MANUEL V. GALLEGO FOUNDATION COLLEGES, INC.
Cabanatuan City, Philippines
(www.mvgfc.edu.ph)

COURSE INFORMATION:

Course Code/Catalog No. Data Structure and Algorithm/

Course Description The course covers the standard data representation and algorithms to solve computing problems efficiently (with respect to space requirements and time complexity of algorithm) this covers the following Stacks. Queues Trees Graphs. Maps and Sets Thorough discussion of sorting and searching algorithms and hashing is covered.

Credit Unit: _____3____

Contact Hours: ____3_______

Pre-requisite: _________

Intended for: Computer Science

Instructor/Professor: __Mr. Joseph Y. Reyes

Major in: Web Development

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VISION	MISSION
MVGFC shall be among the leading educational institution in Nueva Ecija that is known for its accredited academic programs, high ratings in nationally recognized examinations and high employment rate of its graduates.	In the pursuit of its Vision, MVGFCI shall assure quality and relevance in its curriculum, instruction, extension, and student services through continuous quality improvement.

PROGRAM OUTCOMES (PO)/PERFORMANCE INDICATORS (PI)

On completion of the degree program, the student is expected to be able to do the following:

PROGRAM OUTCOMES	PERFORMANCE INDICATORS
1. Analyze complex problems, and identify and define the computing requirements needed to design an appropriate solution.	Demonstrate a mastery in Data Structure with Algorithm
2. Apply computing and other knowledge domains to address real-world problems.	Create a data flow diagram for a data into storage
3. Design and develop computing solutions using a system-level perspectives	Graphing a linked list, array, tree base data structure
4. Utilize modern computing tools	Creation of “Ordering management system” with graphs of data structure and proper algorithm with (GUI)

RELATIONSHIP BETWEEN CO AND PO

After completion of the course, the student should be able to:

CO Code	COURSE OUTCOMES	PO1	PO2	PO3	PO4
CO1	Discuss all data types and retrieving data with add edit delete records				
CO2	Categorizing stacks by queuing array, circular list and priority queue.				
CO3	Organizing Data algorithm with the use of different types of lists				

CO4	Create a dataflow chart for Ordering Management system with (GUI)				

LEGEND: I – Introduce; P – Practice; D – Demonstrate

INTENDED LEARNING OUTCOMES

KNOWLEDGE:

TOPIC 1

1. The process of storing lots of data on the disk
   - Discuss an additional C++ data type/structure
   - A written Explanation about steps in storing the large amount of data on the disk
   - Actual hands-on Computer program
2. Retrieve saved data on the disk
   - Add, Edit and Delete a record from a list of data

TOPIC 2

1. Implement and use the different types of lists :
   - Flat list, sieve of Eratosthenes and sets, recursion and iteration, and hierarchical list
   - Internet articles Sample computer program
2. Differentiate the type of stacks
3. Similarities and differences of queue by array, circular list and priority queue.

TOPIC 3

1. Discus the methods procedures of string searching Rabin's algorithm
2. Compare and discuss the similarities and differences between the different types of recursion namely: linear, mutual, binary, N-aray, and permutation
   - Content map showing the procedures in the binary, parse, recursive, breadth-first traversal, and height-balance trees.
3. Analyse the different ways of sorting algorithms.

TOPIC 4

1. Discuss the essence of numerical accuracy, polynomials, mean, standard deviation and integration in data
2. The advantages and disadvantages of the set by tables and table by unsorted array. Also discuss their similarities and differences
3. Compare the following methods as to its advantages, disadvantages, similarities

Differentiate: binary trees, parse trees, recursive trees, breadth-first traversal, and height-balance trees.

SKILLS:

TOPIC 1

1. Use array as storage for handling text and Numbers Sort values using arrays

TOPIC 2

1. Demonstrate advantages and disadvantages of specific algorithms and data structures,
2. Select basic data structures and algorithms for autonomous realization of simple programs or program parts

TOPIC 3

1. Demonstrate bugs in program, recognise needed basic operations with data structures
2. Create criteria for evaluating algorithms and data structures in terms of time and memory complexity of basic operations.

TOPIC 4

1. Create new solutions for programing problems or improve existing code using learned algorithms and data structures,
2. Integrating static and dynamic data structures and relevant standard algorithms for them:
 Stack, queue, dynamically linked lists, trees, graphs, heap, priority queue, hash tables, sorting algorithms, min-max algorithm,

ATTITUDES:

TOPIC 1

1. Acknowledge data structure as an efficient tool for managing data.

TOPIC 2/TOPIC 3

1. High level of thinking for identifying errors in the fields of data structure

TOPIC 4

1. Appreciate the Methodology of data structure and algorithms

Adopted December 19, 2017

THE LEARNING PLAN

In order to achieve the outcomes of this course, the learners will go through this learning plan:

CO	TOPIC	TEACHING/ LEARNING ACTIVITIES	LEARNING RESOURCES	ASSESSMENT TASKS/TOOLS	TIME FRAME
CO1	**1. Introduction to Data Structure** 1.Data Structures Defining Structure Putting data in structure variables The Data Type Array of structures Union Data Types 2. Arrays One dimensional Array Two Dimensional Array Multi-dimensional Array Array of character and strings Sorting Arrays 3.Disk Files Opening Files Open Function Write Function Close Function Using sequential files	• Lecture • Class Discussion • Collaborative Learning	• Handouts • PowerPoint Presentation • Video Clips • Website Article	• Quizzes • Seatwork • Laboratory activity	PRELIMS
	2. List, Stacks and Array 1.List Implementation of Flat List	• Lecture • Class Discussion • Visual	• Handouts • PowerPoint Presentation • Video Clips	• Laboratory • Quizzes • Seatwork	SECOND PRELIMS

CO2 CO2	The sieve of Eratosthenes and sets by lists Hierarchical List Recursion and Iteration 2.Stacks by Array Stack by List 3. Queues Queue by Array Queue by circular List Priority Queue	presentation	• Website Article		
CO3	**3. String** 1. String String Searching Rabin's algorithm 2. Recursion Linear recursion Mutual recursion Binary recursion N-ary recursion and Permutations 3. Sorting Insertion sort Quick sort Merge sort Heap sort Radix sort	• Lecture • Class Discussion • Collaborative Learning	• Handouts • PowerPoint Presentation • Video Clips • Website Article	• Essay • Quizzes • Seatwork • Oral Examinations	MIDTERM
CO4	**4, Numerical**	• Lecture	• Handouts	• Essay	FINALS

	1.Numerical accuracy Polynomials Mean and standard 2.Tables sets by tables table by unsorted array 3.Trees Binary trees Parse trees Recursive trees Breadth-First Traversal Height-Balance Trees Implementationof Binary trees by arrays Full trees by arrays	• Class Discussion • Collaborative Learning • Immersion	• PowerPoint Presentation • Video Clips • Website Article	• Quizzes • Seatwork • Oral Examinations	

MAJOR COURSE OUTPUTS (MCO)

As evidence of attaining the course outcomes, students are required to do and submit the following:

MCO CODE	REQUIRED OUTPUT	PERFORMANCE TARGET	CO SATISFIED	DUE DATE
MCO1	Graphing data structures and algorithms with all properties of algorithm	100% (70% at least with a score of 3 or higher in rubrics)	CO1/ CO2	During final examinations week.
MCO2	Ordering Menu System flow chart and process	100% (70% at least with a score of 3 or higher in rubrics)	CO1/ CO2/ CO3/ CO4	During final examinations week.

Rubrics

	Poor	**Fair**	**Good**	**Very Good**	**Excellent**
Understanding DS Understands the Problem and Requirements	Poor Student's work shows incomplete understanding of problem and/or requirements	Fair Student's work shows slight understanding of problem and requirements	Good Student's work shows understanding of problem and most requirements	Very Good Student's work shows complete understanding of problem and all requirements	Excellent Student recognizes potential conflicts b/t requirements and seeks clarification from client/user
Algorithm Uses Appropriate Algorithms	Poor Student 'hacks out' program with no thought to algorithm design	Fair Student chooses/ designs algorithm(s) that are incorrect	Good Student chooses/ designs algorithm(s) that is/are correct but somewhat inefficient	Very Good Student chooses/ designs efficient algorithm(s)	Excellent Student researches tradeoffs b/t different algorithms & implements the results of this research
Select DS Uses Appropriate Data Structures	Poor No use of ADTs (aggregate data types/structures)	Fair Use of ADTs; but are none are appropriate for task	Good Use of ADTs; but some are not most appropriate for task	Very Good Use of ADTs; all are appropriate for task	Excellent Uses advanced ADTs that improves program performance
Design Designs Appropriate User Interface	Poor Implements very poor I/O functionality	Fair Only implements basic I/O functionality	Good Some concepts of 'user-friendly' I/O used (e.g. prompts on input & labels on output)	Very Good Uses well-designed 'user-friendly' I/O interface appropriate for task and client	Excellent 'User-friendly' I/O interface with GUI components

SYSTEM GRADING

Grades/performance of students will be evaluated as follows

Attendance	5%	Pre-Prelim	15%
Case Study Analysis/Seatwork	20%	Prelim	15%
Quizzes	30%	Midterm	30%
Term Exam/Advertisement	40%	Final	40%
Total	100%:		

COURSE POLICIES AND STANDARDS

- Learners are expected to dress in a professional manner thus they are restricted from wearing sleeveless shirts, mini-skirts or anything that reveals too much skin and may represent any form of informality, as for footwear sandals, open shoes and slippers are prohibited.
- Learners are expected be in the classroom on time but due to different circumstances they will be given a 15-minute allowance to be marked as present, learners who exceed the allowance will be marked absent but will be allowed to enter the classroom to listen but will not be permitted to participate in assessment activities.
- Learners are expected to comply with set course requirements and partake in assessment activities and exams thus failure to take the aforementioned will result as a failing grade for the said activity or exam; special exams will only be given to those with valid reasons such as illnesses and fortuitous events.
- The passing grade for the course is a final grade of 75% or 3.0.
- Any form of cheating will result to an automatic “zero” for that activity and subject to punishment to be carried out by the course instructor and the college dean.
- The use of gadgets are allowed but only for taking notes; using gadgets outside the permissible purpose will be punished by marking the offender absent for that day and writing an apology letter for misconduct.

REFERENCES:

Website References:

https://www.tutorialspoint.com/data_structures_algorithms/algorithms_basics.htm
https://www.studytonight.com/data-structures/introduction-to-data-structures
https://www.youtube.com/watch?v=bum_19loj9A

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