Course Specification
— (Bachelor)

Course Title: Data Structure
Course Code: 264 CIS-3
Program: Information system
Department: Computer Department
College: Applied college
Institution: Najran University
Version: TP -153 2024
Last Revision Date: 2 OCT 2024

Table of Contents:

2

A. General information about the course:

1. Course Identification

1. Credit hours: 3(2+1)

2. Course type

A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required			☐Elective	

3. Level/year at which this course is offered: (4th semester)

4. Course General Description:

Study of common Abstract Data Types (ADTs), basic data structures include arrays, design, and analysis of algorithms. Common ADTs: stack, queue, tree, linked lists, hash tables. Basic design and analysis of algorithms covers asymptotic notation, recursive algorithms, searching and sorting algorithms, graphs and trees

5. Pre-requirements for this course (if any):

None

6. Co-requisites for this course (if any):

None

7. Course Main Objective(s):

The main objective of this course is a specialized format for organizing and storing data.

- Demonstrate analytical comprehension of concepts such as abstract data types (Arrays, Vectors and Linked lists), algorithms (Stacks, Queues, Searching and sorting techniques), and Complexity Analysis and Asymptotic notations.
- Design, write and analyze the performance of programs that handle structured data and perform more complex tasks and software projects.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	4 hours per week	95%
2.	E-learning		5%
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning		100%

3. Contact Hours (based on the academic semester)

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

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Describe basic Abstract Data Types (ADTs) and their related data structure implementations.	K1	• Lecture Individual and group discussions	• Exams • Assignments
1.2	Distinguish between ADTs,	K2	• Lecture Individual and group discussions	• Exams • Assignments

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	data structures and algorithms			
1.3	Calculate the costs (space/time) of data structures and their related algorithms using the asymptotic notation.	K3	• Lecture Individual and group discussions	• Exams • Assignments
2.0	**Skills**			
2.1	Explain basic concepts and techniques (recursive, sorting, searching, and graph) used in data structures.	S1	• Lecture • Brainstorming • Small Group Work • Lab Demonstration • Project	• Exam • Group Reports • Lab Reports
2.2	Implement basic algorithms and ADTs using different data structures strategies.	S2	• Lecture • Brainstorming • Small Group Work • Lab Demonstration • Project	• Exam • Group Reports • Lab Reports
…	Select the type of data structures and algorithms in problem solving	S1	• Lecture • Brainstorming • Small Group Work • Lab Demonstration • Project	• Exam • Group Reports • Lab Reports
3.0	**Values, autonomy, and responsibility**			
3.1	Demonstrate projects and assignments in	V1	• Lecture • Brainstorming	• Exam • Group Reports

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	team work to solve data structure problems		• Small Group Work • Lab Demonstration • Project	• Lab Reports
3.2				
…				

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Data Structures: Definition, operation of common Abstract Data Types (ADTs).	2 2
2	basic data structures include arrays and design and analysis of algorithms • Lab: Python Programs on arrays applications.	2 2
3.	Stacks: Definition, Array representation of stack, Operations on stack: PUSH, POP • Lab :Python Program operations and applications of stack	2 2
4.	Queues : Definition, Array representation of queue, Types of queues Program • Lab: Python program Queue operations and applications	2 2
5.	Linked List representation, operations and applications • Lab: Python program linked list application	2 2
6.	Basic design and analysis of algorithms covers asymptotic notation, recursive algorithms • Lab: Python programming recursive algorithms problems	2 2
7.	Searching methods: Linear and Binary search. Trace of algorithms Lab: Python Program on Linear search	2 2
8.	Searching methods: Binary search. Trace of algorithms Python Program on Binary search	2 2
9.	Sorting methods Bubble sort and Quick sort • Lab: Python programming sort methods Bubble, Quick sort	2 2
10	Trees representation and applications • Lab: Python programming trees applications	4 4

11	Graph representation and applications	4
	Lab: Python programming Graph applications	4
12	Hash table	4
	Lab: Python programming hash table	4
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam	8	20%
2.	Homework's	From 3 to 14	10%
3.	Practical exam	15	20%
4	Final exam	16	50%

*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	Goodrich, M. T., Tamassia, R., & Goldwasser, M. H. (2013). *Data structures and algorithms in Python* (pp. 978-1). Hoboken: Wiley.
Supportive References	Hetland, M. L. (2014). *Python Algorithms: mastering basic algorithms in the Python Language*. Apress.
Electronic Materials	https://www.tutorialspoint.com/python_data_structure/index.htm https://www.geeksforgeeks.org/python-data-structures-and-algorithms/ https://pythongeeks.org/python-data-structures/
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	**Classroom with a suitable size for students**
Technology Resources (AV, data show, Smart Board, software, etc.)	**Whiteboard/projector**
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	**None**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student	Direct: Questioners
Effectiveness of students assessment	Teacher Audit and review committees	Direct: CW & HW Exercises and short quizzes Projects Mid and final paper exams.
Quality of learning resources	Teachers and course description committees	Indirect: Benchmarking Self-evaluation External evaluation
The extent to which CLOs have been achieved	Teacher	Direct: Measuring the learning outcomes
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	