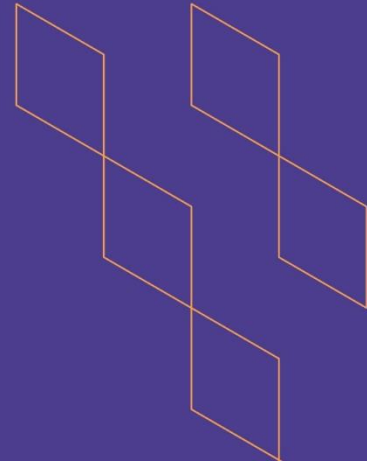T-104
2022

Course Specification

Course Title: **Data Structure**

Course Code: **264 CIS -3**

Program: **information system**

Department: **computer**

College: **Applied college**

Institution: **Najran University**

Version: **1**

Last Revision Date: **12/2/1445**

Table of Contents:

A. General information about the course:

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: first year third 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):
183CIS-3

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

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.

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	4 hrs per week	
2.	E-learning		
3.	Hybrid • Traditional classroom • E-learning		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	28
2.	Laboratory/Studio	28
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	56

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	Lectures/discussions in forums/seminars	Discussion-based evaluation Practical tests Application duties research
1.2	Distinguish between ADTs, data structures and algorithms	K2		
1.3	Calculate the costs (space/time) of data structures and their related algorithms using the asymptotic notation.	K3		
2.0	Skills			
2.1	Explain basic concepts and techniques (recursive, sorting, searching, and graph) used in data structures.	S1	Discussion and dialogue style / problem solving behavior / scientific statement style / workshop style / group activities / cooperative education / case study style	Tests and assignments
2.2	Implement basic algorithms and ADTs using different data structures strategies.	S2		
	Select the type of data structures and algorithms in problem solving	S3		

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility			
3.1	The student is committed to work ethics in the work environment	V1	Individual and group activities cooperative education Worksheet	Note cards
3.2	The student is Communicates effectively in writing and orally.	V2		
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Data Structures: Definition, operation of common Abstract Data Types (ADTs).	4 4
2.	basic data structures include arrays and design and analysis of algorithms Lab: Java Programs on arrays applications.	4 4
3	Stacks: Definition, Array representation of stack, Operations on stack: PUSH, POP Lab :Java Program operations and applications of stack	2 2
4	Queues : Definition, Array representation of queue, Types of queues Program Lab: Java program Queue operations and applications	4 4
5	Linked List representation, operations and applications Lab: Java program linked list application	2 2
6	Hash table Lab: Java programming hash table	2 2
7	Mid-term exam Lab: Review	2 2
8	Searching methods: Linear and Binary search. Trace of algorithms Lab: Java Program on Linear search	2 2
9	Searching methods: Binary search. Trace of algorithms Java Program on Binary search	2 2

10	Sorting methods Bubble sort and Quick sort	2
	Lab: Java programming sort methods Bubble, Quick sort	2
11	Graph representation and applications	2
	Lab: programming Graph applications	2
Total		56

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	assignments	4 , 6	10%
2.	Midterm exam	8	20%
3.	Practical exam	13	20%
4	The final exam	13	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	Data Structures and Algorithms in python, Michael T. Goodrich, Department of Computer Science,University of California, Irvine Roberto Tamassia,Department of Computer Science Brown University Michael H. Goldwasser,Department of Mathematics and Computer Science,Saint Louis University,2013
Supportive References	
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**A classroom equipped with a projector (imageand sound) and a smart board**
Technology equipment (projector, smart board, software)	**Business automation lab equipped with computers and connected to the Internet**
Other equipment (depending on the nature of the specialty)	**Electrical connections to use when necessary**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	students	Questionnaires
Effectiveness of students assessment	**Faculty members / quality committee / peer reviewer**	**Direct observation/peer review/correction of a sample by another member of a similar programmer**
Quality of learning resources	**Faculty members and leaders/students**	**Achievement file / typical tests and answers / assessments and assignments / questionnaires**
The extent to which CLOs have been achieved	**Planning and curricula committee/students/faculty members**	**Expert pinion /questionnaires/ workshops**
Other	**Students and faculty members**	**Questionnaires/note card**

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	12/2/1445