



T-104
2022

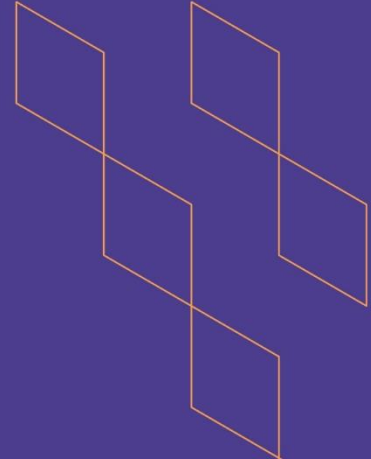
Course Specification





T-104
2022

Course Specification



Course Title: Algorithms and Data Structure
Course Code: 1332 CIS
Program: Information Systems
Department: NA
College: Applied College
Institution: King Khalid University
Version: 1
Last Revision Date: 6 August 2023



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A. General information about the course:

Course Identification	
1. Credit hours:	3
2. Course type	
a.	University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Track <input type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	2nd Level
4. Course general Description: This course enhances the programming skills of the students. Data Structures (Array, Stacks, queues, strings, graph and trees) are described as abstract data types with their methods by training extensive examples and applications. Designing and analyzing different searching and sorting algorithms in terms of time and space, which must be taken into consideration in any program. Brief introduction to binary trees and graphs is also covered.	
5. Pre-requirements for this course (if any): 1331CIS	
6. Co- requirements for this course (if any):	
7. Course Main Objective(s):	
<ul style="list-style-type: none"> ▪ Familiarize with the concepts and fundamentals of basics Data structures and algorithms. ▪ Describe generic principles for data representation and manipulation with a view for efficiency, maintainability, and code-reuse. ▪ 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. ▪ Categorize complexities of algorithms and data structures. Select appropriate methods for organizing data files and implement file-based data structures. ▪ Design, write and analysis the performance of programs that handle structured data and perform more complex tasks and software projects. ▪ Recent research on Algorithms and Data Structures will be incorporated. 	

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	64	100
2.	E-learning		
3.	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 		



No	Mode of Instruction	Contact Hours	Percentage
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	32
2.	Laboratory/Studio	32
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	64



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	Define basic concepts of data structures and algorithms with its relevant types.	k1	Lectures + Lab	Exams, Assignments, Quizzes
1.2	State the differences between linear and nonlinear data structures.	k2	Lectures + Lab	Exams, Assignments, Quizzes
1.3	Describe the searching and sorting techniques.	k2	Lectures + Lab	Exams, Assignments, Quizzes
2.0	Skills			
2.1	Construct the algorithms for various data structures like Stacks, Queues, Linked List, tree and graph.	s1	Lectures + Lab	Exams, Assignments, Quizzes
2.2	Evaluate the complexity of algorithms for the linear and Non-linear Data Structures.	s2	Lectures, Lab, group discussion	Exams, Assignments, Quizzes
2.3	Applications of linear and Non-linear data structures.	s3	Lectures, Lab, group discussion	Exams, Lab Assignments, Quizzes
3.0	Values, autonomy, and responsibility			
3.1	Assess the complexity of various linear and Non-linear data structures	v1	Lectures, Lab	Exams, Lab Assignments and presentation
3.2	Implement data structures in real world.	v2	Presentation, Labs	Exams, Lab Assignments and presentation

C. Course Content

No	List of Topics	Contact Hours
1	Course Overview and Complexity Analysis: Algorithm and its properties and Computational and Asymptotic Complexity, Complexity Notations – Big-Omega(Ω) and Theta(Θ) Notations, The Best, Average and Worst-Case Analysis	10
2	Definition of Data structures, Types of data structures, Arrays and Vectors in JAVA, Abstract data types	9



3	Linked Lists: Introduction, Singly Linked List and its basics operations – Insertion, Deletion and Search, Circular Linked Lists, Case Study	9
4	Stacks: Introduction to Stack, Basic Operations on Stacks – clear, push and pop. Applications of Stack, Case Study	9
5	Queues: Introduction to Queue, Basic operations on Queue – clear, enqueue, dequeue. Applications of Queue, Priority Queues.	9
6	Introduction to tree, Binary Tree, Graph and Searching: Sequential and Binary Search.	8
7	Sorting: Sorting Techniques, Insertion Sort, Selection Sort, Bubble Sort, Quick Sort and Merge Sort, Case Study	7
8	Revision	3
Total		64

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quiz 1	4	5
2.	Midterm Exam 1	7	10
3.	Practical Assessment	1 to 16	30
4.	Midterm Exam 2	12	10
5.	Quiz 2	14	5
6.	Final Exam	After week 16	40

*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	<i>Data Structure and Algorithms in Java, Adam Drozdek. Cengage Learning 2008 (3rd Edition). Data Structure and Algorithms in Java, by Michael T. Goodrich 2014 ISBN-13: 978-1118771334</i>
Supportive References	i) <i>Data Structures with Java by John Hubbard, Tata McGraw Hill Education Pvt. Limited</i> ii) <i>Data Structures and problem Solving Using Java, Mark Allen Weiss, Addison Wesley, 2005</i> <i>Data Structures and Algorithms in Java, Robert Lafore, Sams, 2002</i>
Electronic Materials	i) https://www.acm.org/ ii) https://ieeexplore.ieee.org/Xplore/home.jsp
Other Learning Materials	All other materials will be made available via course's Blackboard page

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	<ul style="list-style-type: none"> Lecture Room with enough capacity Chairs Projector/Screen. Laboratories with Computers
Technology equipment (projector, smart board, software)	Windows Operating System Java Libraries (JDK and JRE) IDE : JCreator, eclipse, NetBeans
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of students assessment	Course Teacher	Direct
Quality of learning resources	Program Supervisor, Quality Unit	Direct
The extent to which CLOs have been achieved	Course Teacher	Direct
Other	Course Teacher, Quality Unit	Direct

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

Assessment Methods (Direct, Indirect)





G. Specification Approval Data

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	

