

Kathmandu University School of Management
Bachelor of Business Information Systems
Course Syllabus

Course Title	DATA STRUCTURE AND ALGORITHMS
Course Code Number	COM 312
Credit Hours	3
Course Objective	
Main Objective	The objective of the course is to make the participants aware of the structures and algorithms used in object oriented programming languages. The course also aims to cover various aspects of data representation, their use in problem solving methodologies.
Learning Unit	
Learning Unit One Net Contact Hours - 3 hrs	1. Introduction to Data Structure and Algorithms History of Algorithms, Classical Examples of Algorithms: Greatest Common Factor, Square Root, Algorithms vs. Programs, Data Structures, and Abstract Data Types.
Learning Unit Two Net Contact Hours - 3 hrs	2. Algorithms Principles, Efficiency, Examples: Simple and Smart Power Algorithms, Complexity: Space and Time, Asymptotic Notation: Big Oh Notation, Omega, Theta and Little Oh Notations, Recursion. Example: Simple and Smart Recursive Power Algorithms, Tower of Hanoi.
Learning Unit Three Net Contact Hours - 6 hrs	3. Array Data Structures Properties of Arrays and Subarrays, Insertion, Deletion, Searching: Linear and Binary Search, Merging, Sorting: Bubble, Selection, Insertion, Merge, Quicksort.
Learning Unit Four Net Contact Hours - 6 hrs	4. Linked List Data Structures Linked Lists: Singly-Linked and Doubly-Linked, Insertion, Deletion, Searching.
Learning Unit Five Net Contact Hours - 4 hrs	5. Abstract Data Types Data Types: Values, Operations, and Data Representation, Abstract Data Type: Values and Operations Only, Requirements, Contract, Implementation(S), Design of Abstract Data Types, String Abstract Data Types, Abstract Data Types in the Java Class Library.
Learning Unit Six Net Contact Hours - 4 hrs	6. Stack ADTs Stack Concepts, Stack Applications: Infix and Postfix Expressions, A Stack ADT: Requirements, Contract, Implementations of Stacks: Using Arrays, Linked Lists, Stacks in the Java Class Library.
Learning Unit Seven Net Contact Hours - 4 hrs	7. Queue ADTs Queue Concepts, Queue Applications, A Queue ADT: Requirements, Contract, Implementations of Queues: Using Arrays, Linked Lists, Queues in the Java Class Library.
Learning Unit Eight Net Contact Hours - 6 hrs	8. Binary Tree Data Structures Binary Trees and Binary Search Trees, Searching, Insertion, Deletion; Traversal, Implementation of Sets Using Bsts.
Learning Unit Nine Net Contact Hours - 6 Hrs	9. Graph Algorithms Graphs : The Graph ADT ; Data Structures for Graphs : Edge List Structure, Adjacency List Structure, Adjacency Map Structure, Adjacency Matrix Structure, Java Implementation ; Graph Traversals : Depth - First Search, Breadth - First Search.
Learning Unit Ten Net Contact Hours - 6 hrs	10. Hash Table Data Structures Hash-table Principles, Closed-bucket and Open-bucket Hash Tables, Searching, Insertion

	Deletion, Hash-table Design, Implementations of Sets and Maps Using Hash Tables.						
Total contact Hours 48	48 hrs (excluding assessment, laboratory work and final examination)						
Basic Text	<ol style="list-style-type: none"> 1. David A. Watt, Deryck F. Brown (2001), Java Collections: An Introduction to Abstract Data Types, Data Structures and Algorithms, Wiley. 2. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser (2014), Data Structures and Algorithms in Java, 6th Edition, Wiley. 						
Other References	SartajSahni (2005), Data Structures Algorithms and Applications in JAVA , 2 nd Edition, University Press.						
Evaluation Scheme	<table> <tr> <td>In-Semester evaluation</td><td>50%</td></tr> <tr> <td>End-Semester evaluation</td><td>50%</td></tr> <tr> <td>Total</td><td>100%</td></tr> </table>	In-Semester evaluation	50%	End-Semester evaluation	50%	Total	100%
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