



University: *Fayoum University*
 Faculty: *Computers and Information*
 Department: *Computer Science*

Course Specification

1- Basic Information			
Code: INF 270	Course Title: Data Structures	Year/Level: Second year – Second term	
Programme: B.Sc degree in Computer Science	Number of units:	Lecture:	3 hrs/ week
		Tutorial:	0 hrs/ week
		Practical:	2 hrs/ week

2- Aims of Course:	This course investigates abstract data types (ADTs), including lists, stacks, queues, priority queues, trees, sets, and dictionaries. The emphasis is on the trade-offs associated with implementing alternative data structures for these ADTs.
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3- Intended Learning Outcomes	
A- Knowledge and Understanding:	<p>A6. Explain essential concepts, principles, and theories related to computer-application development such as: databases, information systems development.</p> <p>A9. Identify programming fundamentals and languages, algorithms analysis, and data structures..</p> <p>A12. Selects advanced topics to provide a deeper understanding of some aspects of the subject such as Unified Process, object-oriented analysis and design, e-commerce technologies, and Decision support systems</p> <p>A13. Define the mapping of real-world problems to algorithmic solutions</p> <p>On completing the course, students should be able to: .</p> <p>a.1 Describe the tests to measure the impact of the way data is structured on program performance and functionality.</p> <p>a.2 Differentiate between a data structure and its implementations.</p> <p>a.3 Define the basic data structures, such as lists, stacks, and queues, with their linked list and array-based implementation.</p> <p>a.4 Define intermediate data structures, such as binary trees, binary search trees, graphs, and hash tables.</p> <p>a.5 List the sorting algorithms and recognize their types</p>
B- Intellectual Skills:	<p>B1. Analyze real problems, and appropriate problem solving methods that satisfy commercial or industrial constraints and analyze results</p> <p>B2, Determine different computer- system application attributes, components, relationships, patterns, architecture, and source of errors</p>

	<p>B5. Discuss factors other than computational efficiency that influence the choice of algorithms, such as programming time, maintainability, and the use of application-specific patterns in the input data.</p> <p>On completing the course, students should be able to:</p> <ul style="list-style-type: none"> b.1 Analyze running time of algorithms and operations using asymptotic analysis. b.2 Validate and construct loop invariants of basic sorting algorithms. b.3 Evaluate the appropriateness of a particular data structure to a particular problem. b.4 Examine linked list operations to spot memory errors.
<p>C- Professional and Practical Skills:</p>	<p>C4. Outline basic designs for data storage conceptual schemes.</p> <p>C8. Deploy appropriate tools for the construction and documentation of computer-based systems that are used to solve practical problems</p> <p>On completing the course, students should be able to:</p> <ul style="list-style-type: none"> c.1 Analyze programming problems and select appropriate data structures and sorting algorithms. c.2 Apply advanced problem solving techniques, such as recursion and data abstraction.

<p>4-Course Content:</p>	<ol style="list-style-type: none"> 1. Abstract Data Types (ADT). Stacks: Definition and operations, 2. Implementation of stacks with array and records, applications of stacks. 3. Queues: Definitions, 4. Implementation of circular queues, applications of queues. 5. Linked lists: Singly linked lists, linked stacks, 6. linked queues, doubly linked lists, 7. Application of linked lists. 8. Tree structures, binary trees: binary tree traversals, binary tree search. 9. Searching Definitions, sequential search. 10. Sorting: Definitions, insertion sort, selection sort. 11. Hashing: Hash functions, perfect Hash functions.
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<p>5- Teaching and Learning Methods:</p>	<ol style="list-style-type: none"> 1. Lectures 2. Tutorials 3. Practical lab work 4. Class discussions 5. Independent Work 6. Problem-based Learning
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6- Teaching and Learning Methods for handicapped students :	-
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7- Student Assessment	
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A- Assessment Methods:	1. Assignments and Quizzes 2. Midterm written exam 3. Practical exam 4. Final written exam
B- Assessment schedule:	Midterm examination: Week 7 Practical examination : Week 13 Oral examination: Week 14 Final examination: Week 15
C- Weighting of assessments:	Assignments and Quizzes: 10 % Mid-Term Examination: 10% Practical Examination: 15% Final-term Examination: 65%

8- Books and References	
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A- Notes:	Handed out to the students part by part.
B- Essential Books (Text Books):	<ul style="list-style-type: none"> ▪ Adam Drozdek, "Data Structures and Algorithms in C++," by Brooks/Cole, Thomson Learning 2nd edition, 2001.
C- Recommended Books:	<ul style="list-style-type: none"> ▪ Richard F. Gilberg and Behrouz A. Forouzan, <i>Data Structures: A Pseudocode Approach with C++</i> . 2015
D- Periodicals, Web sites, ... etc	-

Course Professor: Dr Hala Abdel Hameed Department Head: Dr. Amira Edress

Course Content Intended Learning Outcomes Matrix

Course Title: Data Structures

Course Code: INF 270

Course Content	Week	Knowledge & Understanding					Intellectual Skills				Professional & Practical Skills	
		a.1	a.2	a.3	a.4	a.5	b1	b2	b3	b4	c1	c2
1. Abstract Data Types (ADT). Stacks: Definition and operations,	1	x		x							x	x
2. Implementation of stacks with array and records, applications of stacks.	2	x	x	x			x				x	
3. Queues: Definitions,	3	x		x								
4. Implementation of circular queues, applications of queues.	4	x	x	x			x		x		x	
5. Linked lists: Singly linked lists, linked stacks,	5	x		x						x		
6. linked queues, doubly linked lists,	6	x		x						x		
7. Application of linked lists.	7	x	x	x			x		x	x	x	
8. Tree structures, binary trees: binary tree traversals, binary tree search.	8	x	x	x	x		x		x			
9. Searching Definitions, sequential search.	9	x		x	x		x		x		x	
10. Sorting: Definitions, insertion sort, selection sort.	10	x		x	x	x	x	x	x		x	
11. Hashing: Hash functions, perfect Hash functions.	11	x		x	x		x		x			

Course coordinator: ... Dr. Halla Hameed

Head of Department: .Dr. Amira Ideres.