Course Specifications

Institution:	College of Science at AzZulfi
Academic Department :	Computer Science and Information.
Programme :	Computer Science and Information
Course :	CSI 312 Data Structure...
Course Coordinator :	Dr. Wael Khedr
Programme Coordinator :	Dr. Yousry Azzam
Course Specification Approved Date :	22/ 12 / 1435H

A. Course Identification and General Information

1 - Course title : CSI 312	Course Code: Data Structure
2. Credit hours : 3 hrs(2 lec + 2 lab)	
3 - Program(s) in which the course is offered: Computer Science &Information	
4 – Course Language : English.	
5 - Name of faculty member responsible for the course: Dr. Wael Khedr	
6 - Level/year at which this course is offered : **Level 5**	
7 - Pre-requisites for this course (if any) : **CSI 221 and CSI 212**	
8 - Co-requisites for this course (if any) : • **N /A**	
9 - Location if not on main campus : **Al Zulfi**	

10 - Mode of Instruction (mark all that apply)

A - Traditional classroom	√	What percentage?	80 %
B - Blended (traditional and online)	√	What percentage?	**10 %**
D - e-learning	√	What percentage?	**10 %**
E - Correspondence		What percentage?	……. %
F - Other		What percentage?	…….%

Comments :

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B Objectives

What is the main purpose for this course?

The purpose of this course is to provide the students with solid foundations in the basic concepts of computer science: Time and Space. The main objective of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might encounter. This course is also about introducing the student to the basic concepts of studying algorithms, their correctness and computational complexity. This course offers the students a mixture of theoretical knowledge and practical experience using C++. Topics includes:

1. Review of Basic concepts: Definition of an algorithm, asymptotic analysis of upper and average complexity bounds. Identifying differences among best, average and worst case behaviors. Big O, little o, omega, and theta notations. Time and space tradeoffs in algorithms. Algorithms strategies.
2. Basic algorithms: Sorting (insertion sort, merge sort), searching (linear search, binary search).

3. Basic data structures: Lists, linked lists, double linked lists, stacks, queues.
4. Advanced data structures: Graphs, trees, heaps, dynamic sets, and has tables.

Briefly describe any plans for developing and improving the course that are being implemented :
1. Using group discussion
2. Updating the materials of the course to cover the new topics of the field.
3. Motivate students to solve practical problems using C++ programming language.

C. Course Description

1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
Review Basic topics of C++ Classes and Structures	2	8
Basic data structures. Arrays (Insertion & Deletion) . Sorting(non-recursive)	2	8
Linked Lists(single , doubly and circularly)	2	8
Stacks and Queues (static and dynamic)	2	8
Recursion and Sorting Algorithms	1	4
Trees	2	8
Searching algorithms	1	4
Hashing	**2**	8
Graphs , Networks, and File Structure	**1**	4

2. Course components (total contact hours and credits per semester):

	Lecture	Tutorial	Laboratory	Practical	Other:	Total
Contact Hours	30	-	30	-	-	60

Credit	30	-	15		-	45

3. Additional private study/learning hours expected for students per week.

5

The total workload of the student in this course is then: 60 + 5* 15 = 135 work hours.

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Recall the basic data structures and their relative advantages and disadvantages.	• Developing basic communicative	• Homework.
1.2	Describe data structure types and their process (insertion, deletion , and search).	• Ability through short and varied	• Group Discussion
1.3	Describe the common search algorithms techniques.	situated discourse.	• Presentation
		• Lecturing	• Mid-term exam
		• Team work	• Final test
		• Exercises	
2.0	**Cognitive Skills**		
2.1	An ability to implement and use common data structures	• Problem solving	• Class Participation
		• Class discussion	
		• presentation	
2.2	An ability to implement and use data structure types (linked list, tree , stack, and queue) in storing , insertion, deletion , and searching data on a disk file.	Individual meeting with the instructor (encouraging students	• Presentation
			• Essay Question
2.3	Apply the common search algorithms techniques on data structures types types (linked list, tree , stack, and queue) .	to discuss different topics outside the classroom)	• Research

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
3.0	**Interpersonal Skills & Responsibility**		
3.1	Work in a group and learn time management.	• Discussion with students • Making students aware about time management in completing their assignments and C++ programs . • Counsel students how to make a good presentation in data structure. Encourage students to help each other.	• Respecting deadlines. • Showing active class participation. • Helping other students to understand tasks in the class. • Giving clear and logical arguments Performing seriously on midterms and final exams.
3.2	Learn how to search for information through library and internet.		
3.3	Present a short report in a written form and orally using appropriate scientific language		
4.0	**Communication, Information Technology, Numerical**		
4.1	Communicate with teacher, ask questions, solve problems, and use computers.	• Exercises • Problem solving • oral quizzes • Essay questions • Encourage students to use programming by C++ or C#	• Write reports • Exercises related to specific topics
4.2	Illustrate deal with confidence with differential equations, integrations, and differentials.		
4.3	Operate questions during the lecture, work in groups, and communicate with each other and with me electronically, and periodically visit the sites I recommended.		
5.0	**Psychomotor**		
5.1	....	………………	………………
5.2	....	………………	………………

5. Schedule of Assessment Tasks for Students During the Semester:

	Assessment task	Week Due	Proportion of Total Assessment
1	First exam*	6	15%
2	Second exam*	12	15%
3	Lab. Exam	15	15%
4	Presentation	One/ semester	
5	Homework	Every week	
6	quizzes	End topics	
7	Discussions	Every week	15%
8	Team group	Three time/ semester	
9	Tutorials	Every sub topic	
10	Computer tools used	Every report and presentation	
11	Project	-	
12	Peer project	-	
13	Final exam *	End of the semester	40%
	Total		100 %

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)
2. At least 6 well-declared office hours per week are available for all the students.

3. Supervision and reviewing of activities are conducted directly.

4. E-mail is permanently available.

E. Learning Resources

1. List
- Robert Sedgewick: Algorithms in C++, Parts 1-4: Fundamentals, Data Structure, Sorting, Searching, 2011, Addison-Wesley.
- Michael T. Goodrich , Roberto Tamassis, and David Mount ,Data structures& Algorithms in C++, second edition, John Wiley ,2011
- A.V. Aho,J.E. Hopcroft and J. D. Ullman, Data Structure and Algorithms. Reading , MA: Addison-Wesley,1983.
- Larry Nyhoff, ADTs, Data Structures and Problem Solving with C++, 2nd Ed. , Printice Hall, 2005.
- Malik, Data Structures using C++, Thomson , 2003.

2. List Essential References Materials :
- T. Budd, An Introduction to Object-Oriented Programming. Reading, Mass: Addison-Wesley,1999.

3. List Recommended Textbooks and Reference Material :
- Clifford Shaffer, A practical Introduction to Data Structures and Algorithm Analysis, 2nd Ed. , Prentice Hall, 2001.

4. List Electronic Materials :
http://sheekh-3arb.info/islam/library/books/programming/data-structure-course.pdf
http://www.sanlp.org/malik/ads/cpcs 324 – algorithms and data structures 01.pdf
http://www.sanlp.org/malik/ads/cpcs 324 – algorithms and data structures 04.pdf
http://www.pvpsiddhartha.ac.in/syllabus_07_08/it/ii-i/advanced data structures and algorithms lab.doc

5. Other learning material :
Non

F. Facilities Required

1. Accommodation
Lecture rooms are well equipped with:
- Air conditioned with at least 20 adequate seats.
- Interactive/smart Board.
- Up-to-date projector.

An Auditorium is well equipped with:
- Air conditioned with at least 100 adequate seats.
- Interactive/smart Board.
- Up-to-date projector.

2. Computing resources
- Personal computer with necessary up-to-date software.
- DBS Smart Systems.
- Interactive Board.
- Laptop

3. Other resources
- Colored Printer (needed).

- Central laser-Printer, and Scanner.
- Wall Boards (are essentially needed.).
- Internet inside the classroom (missed.).
- Library: Up to date scientific books, in the library.
- Wi-Fi and internet connections are available inside the teaching staff rooms, and the seminar room.

G   Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching:
- Questionnaires (course evaluation) achieved by the students and it is electronically organized by the University.
- Students-faculty management meetings.

2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor :
- Discussions within the staff member teaching the course.
- Departmental internal review of the course.
  Outside reviewer of the course.

3 Processes for Improvement of Teaching :
- Providing the computer labs with up-to-date computers and software.
- Conducting and attending workshops given by experts on the teaching and learning methodologies.
- Periodical departmental and outside revisions of its methods of teaching.
- Monitoring of teaching activates by senior faculty members (course and program reports).
- Training Courses.

4. Processes for Verifying Standards of Student Achievement

Efficiency of course will be reflected on the results of the class, so reviewing the final exam questions and a sample of corrected papers is essential. This could be achieved by members of the teaching staff (or/and external reviewers) in addition to other duties such as discussing ideas and ways of teaching and learning. The course should be developed periodically to ensure that it contains the latest developments in the field of study. Development could be put as an objective in the report of the course to be achieved each semester.

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement :
- Course Evaluation
- Exam Evaluation
- Improvement plan
- Program Outlearning with course outlearning
- Outlearning from the pre-requisite course

Course Specification Approved
Department Official Meeting No (6) Date 22 / 12 / 1435 _H_

Course's Coordinator		**Department Head**	
Name :	Dr. Wael Khedr	*Name :*	Dr. Yousry Azzam
Signature :	....	*Signature :*	....
Date :	22/12 /1435 _H_	*Date :*	22/ 12 / 1435 _H_