HASAN KALYONCU UNIVERSITY
Faculty of Engineering
Course Description Form

COURSE: Data Structures				
CODE: CENG214	**SEMESTER**: SPRING			
LANGUAGE: ENGLISH	**TYPE**: COMPULSORY			
PRE-REQUISITES: CENG112	**THEORY**	**PRACTICAL**	**CREDIT**	**ECTS**
WEEKLY HOURS:	3	2	4	6

CONTENT OF THE COURSE:

The course involves the followings: Introduction to Data Structures: Primitive data structures. Memory representation of information. Arrays and Memory allocation (storage) of arrays. Structures: Arrays of structures. Structures and Functions. Dynamic memory allocation. The Stack: Stack as an Abstract Data Type. Primitive operations. Representing the stack in C. Infix, Postfix, and Prefix notations; Infix-to-Postfix conversion. Recursion Recursive definition. Examples: Factorial function. Fibonacci sequence. Queues: The Queue as an Abstract Data Type. C implementation of Queues. Linked Lists: Inserting and Removing Nodes from a List. Circular Lists, Doubly Linked Lists. Trees: Operations on Binary Trees. Binary Tree Representations. Binary Tree Traversals. Creating a binary tree. Sorting: Efficiency of Sorting. Searching: Sequential Search. Binary Search. Binary Search Trees.

OBJECTIVE OF THE COURSE:

Upon successful completion of the course, students are expected to have the following competencies:

LO1: Organizing data in computer programs for different forms and structures. Designing data structures efficiently in software development. Writing efficient algorithms by choosing suitable data structures.
LO2: Use the C programming language in the implementation, test, and debug of using data structures for engineering applications.
LO3: To produce different, efficient and quick solutions to some real-life problems.
LO4: To use data structures concepts in state-of-the-art problems.

WEEKLY SCHEDULE	
Week	**Topics**
1	Introduction, Primitive data structures. Pointers.
2	Arrays and Memory allocation (storage) of arrays.
3	Structures (Arrays of structures. Structures and Functions.
4	The Stack: Stack as an Abstract Data Type.
5	The Stack: Primitive operations. Representing the :stack in C.
6	The Stack: Infix, Postfix, and Prefix notations; Infix-to-Postfix conversion.
7	The stack and Recursion: Recursive definition. Examples: Factorial Stack.

	Fibonacci. Sequence and Binary search. The Recursion versus Iteration
8	Midterm
9	Queues: The Queue as an Abstract Data Type.
10	C implementation of Queues. Circular queue representation.
11	Linked Lists: Representation of linked list structures.
12	Linked Lists using Dynamic Variables. Type of linked list structures: Circular Lists, Doubly Linked Lists. Main operations using linked list structures.
13	Tree representation, Binary Tree Representations. Operations on Binary Trees. Binary Tree Traversals. Creating a binary tree. Deleting nodes from a binary tree.
14	Sorting and Searching

TEXTBOOK: Data structure using c and c++ , 2nd edition, Prentice - Hall Of India Pvt. Ltd, by Y. Langsam, M. Augenstein And A. M. Tenenbaum.
REFERENCE BOOKS: Data Structures Through C in Depth , 2nd edition, BPB Publications, by Srivastava S. K.

EVALUATION SYSTEM:		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE (%)**
Midterm Exam	1	30
Homework	2	10
Lab	13	5
Quiz	2	10
Final Exam	1	45
TOTAL	19	100
CONTRIBUTION OF INTERM STUDIES TO OVERALL GRADE	18	55
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE	1	45
TOTAL	19	100

COURSE CATEGORY:	**PERCENTAGE (%)**
Mathematics and Basic Sciences	30
Engineering	20
Engineering Design	45
Social Sciences	5

TABLE OF ECTS / WORKLOAD:			
Activities	**QUANTITY**	**Duration (Hour)**	**Total Workload**
Course Duration	13	3	39
Hours for off-the-classroom study (Pre-study, practice)	14	6	84
Laboratory works	13	2	26
Mid-term	1	2	2
Final examination	1	2	2
Homework	2	8	16
Quiz	2	2	4
Total Work Load	**42**	**27**	**173**
Total Work Load / 30			**5,77**
ECTS Credit of the Course			**6**

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
LO1	3	0	3	3	3	0	0	0	0	0	0
LO2	3	0	3	3	3	0	0	0	0	0	0
LO3	1	2	2	0	0	0	0	0	0	0	0
LO4	3	0	3	3	3	0	0	0	0	0	0
	PO: Program Outcomes | LO: Learning Outcomes Values: 0: None | 1: Low | 2: Medium | 3: High										

INSTRUCTOR(S):	Asst. Prof. Dr. Saed ALQARALEH
FORM PREPARATION DATE:	22/5/2019

LEARNING OUTCOMES OF THE COURSE:	**PROGRAM OUTCOMES:**
LEARNING OUTCOMES OF THE COURSE: **LO1**: Organizing data in computer programs for different forms and structures. Designing data structures efficiently in software development. Writing efficient algorithms by choosing suitable data structures. **LO2**: Use the C programming language in the implementation, test, and debug of using data structures for engineering applications. **LO3**: To produce different, efficient and quick solutions to some real life problems. **LO4**: To use data structures concepts in state-of-the-art	**PO1:** Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. **PO2:** Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose. **PO3:** Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose. **PO4:** Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. **PO5:** Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions. **PO6:** Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually. **PO7:** Ability to communicate effectively in Turkish, both

problems.	orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions. **PO8:** Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself. **PO9:** Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice. **PO10:** Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development. **PO11:** Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions.