APP 4040 DATA STRUCTURES AND ALGORITHMS

CREDIT: 3 UNITS

COURSE DESCRIPTION

Introduction to design and analysis of algorithms. Design techniques: divide-and-conquer, greedy method, dynamic programming; selection of prototypical algorithms; choice of data structures and representations; complexity measures: time, space, upper, lower bounds, asymptotic complexity; NP-completeness. Algorithms and their performance. Data abstraction, queues, linked lists, stacks, trees, graphs, and associated algorithms. Sorting and searching. Implementation of algorithms and data structures in the C++/Java programming language.

Prerequisites: IST 2020, IST 4070

Credit: 3 units

LEARNING OUTCOMES:

- Demonstrate understanding of the relevance of abstraction to problem solving. Understand the fundamental data structures and algorithms.
- Demonstrate understanding of the description, design and implementation of fundamental data structures and their algorithms.
- Be able to apply different data structures and their algorithms to implement solutions to various computational problems.

COURSE OUTLINE

WEEK	TOPIC	ASSIGNMENTS
1.	Introduction to Data Abstraction and Abstract Data Types (ADTs)	
2.	Specifying and implementing ADTs	Hand out assignment 1
3.	Linked Lists	

4	Introduction to recursion	Hand in assignment 1
5.	Stacks	Hand out assignment 2
6.	Queues	
7.	Introduction to design and analysis of algorithms	MID QUARTER EXAM
8.	Recursive algorithms	Hand in assignment 2
9.	Searching algorithms and their efficiency	Hand out assignment 3
10	Sorting algorithms and their efficiency	
11	ADTs Tree	Hand in assignment 3
12	Algorithm design techniques	Hand out assignment 4
13	Divide and conquer, Greedy methods, Dynamic programming	
14	Complexity measures; asymptotic complexity and NP-completeness	Hand in assignment 4
15 and 16	END OF QUARTER EXAMS	

COURSE TEXTS

(1) Data Abstraction and Problem Solving With Java by Frank M. Carron, Paul Helman and Robert Veroff (Third Edition), Prentice Hall (2010), ISBN-10: 0132122308 ISBN-13: 9780132122306

(2) Data Structures, Algorithms and Applications in Java by Sartaj Sahni(Second Edition) Mcgraw-Hill College (2001) ISBN-10: 0072519096 ISBN-13: 978-0072519099

KEY INSTITUTIONAL ACADEMIC POLICES

Plagiarism and cheating

Plagiarism and cheating are considered to be acts of misconduct as per university's academic code of conduct and ethics. Any student who commits plagiarism or cheating in the university examination will be subject to sanctions up to and including dismissal from the university

Absenteeism

Students are expected to attend all classes. Upon being absent from five classes in three unit course, the instructor may give a student an **"F"** grade for the course. If you have to be absent, please contact your instructor in advance.

Marks distribution

Assignments	30 marks
Lab Tasks	30 marks
Mid exam	20 marks
Final exam	20 marks

GRADING

90-100	A
87-89	A-
84-86	B+
80-83	B
77-79	B-
74-76	C+
70-73	C
67-69	C-
64-66	D+
62-63	D
60-61	D-

59-0 F