AU11752
COMPUTER SCIENCE 11752
Theory of Algorithms

PART I.

• Catalog Description:

Methods for designing and analyzing algorithms. Presenting efficient Algorithms in variety of problems such as graph Algorithms, number theoretical algorithms, searching, sorting and pattern matching. Amortized analysis, Fibonacci heaps and splay trees. Parallel algorithms, Geometric algorithms and online algorithms. Theory of NP-completeness and approximation algorithms.
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Pre: 5565: Graduate standing in EE, CPE, CS, IT; STAT 4714. (3H, 3C)

• Transcript Title: Theory of algorithms.

PART II.

Major, Measurable Learning Objectives

Having successfully completed this course, the student will be able to:

(a) Prove correctness and analyze running time for basic algorithms.
(b) Design algorithms using Dynamic programming, Greedy and divide and conquer algorithm design techniques.
(c) Design graph related algorithms.
(d) Prove NP completeness for basic NP complete problems.
(e) Design efficient data structures.

PARTIII. Texts and Special Teaching Aids

- Required Texts: Introduction to Algorithms By Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein
- Algorithm Design by Jon Kleinberg , Éva Tardos

PART IV. Topics

Follows the textbook coverage of topics.

Amortized analysis (5 %)
Binomial queue and Fibonacci heaps (15 %)
Graph Algorithms (25 %)
Searching sorting ordered statistics (10 %)

Dynamic Programming and Greedy algorithms (20 %)
NP Complete and approximation algorithms (12 %)
Red Black trees and splay trees (8 %)
Bitonic Sorting network (5 %)

PART V. Tentative Grading

Type	Week	Percentage %
Home Works	1-14	20%
Mid Term	8	20%
Take Home Exams	1-14	20%
Projects and presentations	1-14	Extra Credit
Final-Exam	15	40%

Part VI: Honor Code

The Alexandria University honor code will be strictly enforced.