Algorithms
CS 46101/ 56101
Fall 2014

Course Information
Algorithms (3 credit hours) CS 46101/ 56101
Time: TR 3:45 - 5:00 pm Place: 111 SMH Web: http://www.cs.kent.edu/~mallouzi/

Instructor
Maha Allouzi
Department of Computer Science Mathematics and Computer Science Building Kent, OH 44242-0001

Office Hours
MWF 2:30 – 3:30 pm and by appointment Room 251, Mathematics and Computer Science Building

Course Outcomes
After the completion of the course students will have the ability to do the following:
- Demonstrate the correctness of algorithms using inductive proofs and loop invariants.
- Analyze worst-case running times of algorithms using asymptotic analysis.
- Describe the divide-and-conquer paradigm. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
- Explain the major algorithms for sorting.
- Describe the dynamic-programming and the greedy paradigms. And analyze them.
- Explain the major elementary data structures. recite algorithms that employ data structures and how their performance depends on the choice of data structure.
- Explain the major graph algorithms and their analyses and analyze them.

Course Learning Objectives
This course introduces students to the analysis and design of computer algorithms. Upon completion of this course, students will be able to do the following:
- Analyze the asymptotic performance of algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.

Course Prerequisites
- CS 23001 Computer Science II: Data Structures & Abstraction.
- MATH 12003

Text Book
Cormen, Thomas, Charles Leiserson, Ronald Rivest, and Clifford Stein. Introduction to Algorithms. 3rd ed. MIT Press, 2009. ISBN: 9780262033848.

Course Contents

1. **Foundation**: analysis of algorithms, growth of functions, and divide and conquer (Chapters 2-4)
2. **Sorting**: Heap sort, Quicksort, and Sorting in Linear Time (chapters (6-8)
3. **Data structure:** Hash Tables, Binary Search Tree, Red-Black Trees (Chapters 11-13)
4. **Advanced Design and Analysis Techniques:** Dynamic Programming, Greedy Algorithms (Chapters (15-16)
5. **Graph Algorithms**: elementary Graph Algorithms, Minimum spanning trees, single-source shortest paths, and all pair shortest paths (Chapters 22-25)

Evaluation

Exam 1	Thursday, September 25, 3:45- 5:00 p.m.	25%
Exam 2	Thursday, October 30, 3:45- 5:00 p.m.	25%
Final	Friday, Dec 12 7:45-10:00 am	35%
Quizzes, exercises.		15%