

COT 4400 –Design and Analysis of Algorithms
Course Syllabus - Fall 2005
Seq.# 11052, GS 115, TR 8:00-9:20AM, Boca Raton

Description: Builds upon existing skills in the mathematical analysis of algorithm complexity, including lower bounds, worst-case and average-case behavior. General techniques in algorithm design (such as divide and conquer, greedy and dynamic programming approaches) in the context of problem domains like graph, sorting, and optimization problems. Introduction to the topic of NP-complete problems.

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Office Hours: TBA.

Textbook: T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to Algorithms", 2nd Edition, MIT Press/McGraw Hill, 2001

Reference Book: S. Baase, S and A. Van Gelder, "Computer Algorithms: Introduction to Design and Analysis", 3rd edition. Addison Wesley, 2000

Objectives:

1. To enhance the students' problem solving abilities.
2. To provide a working knowledge of algorithm complexity and lower bounds of problems.
3. To apply both top-down (divide-and-conquer) and bottom-up (dynamic programming) design.
4. To apply the greedy approach in problem solving.
5. To apply graph algorithms in problem solving.
6. To present algorithms using pseudo code.

Prerequisites by Topics:

Data Structures (COP3530), Discrete Math (MAD 2104).
Familiar with C or C++ programming.

Topics:

1. Mathematical foundation: growth of functions, summations, recurrences.
2. Analysis of sorting methods: quick sort, heap sort, sorting in linear time.
3. Medians: minimum and maximum.
4. Basic data structures: list, tree, and graph.
5. Dynamic programming: matrix-chain multiplication and longest common subsequence.
6. Greedy algorithms: action-selection problem and Huffman codes.
7. Graph algorithms: representation, traversal techniques, minimum spanning tree, shortest path algorithms.

Grading policy:

1. Homework: 20%
2. Programming Projects: 20% (10% each)
3. Tests 1 & 2: 20% (10% each)
4. Final exam: 40%.

STUDENT LEARNING OUTCOMES	RELATED TOPICS
2. Proficiency in the areas of software design and development, data structures, and operating systems	<ul style="list-style-type: none"> • Divide-and-conquer • Incremental design • Greedy approach • Dynamic programming
3. An ability to plan and execute an engineering design to meet an identified need	<ul style="list-style-type: none"> • Project: Problem solving and coding
4. Proficiency in mathematical and scientific principles relevant to computer science	<ul style="list-style-type: none"> • Asymptotic analysis • Recurrences • Summation

Other information (Please take the time to read the documentation. You are responsible for the information outlined in it):

1. Cheating: Students are required to adhere to the policy on academic irregularities contained in the FAU student handbook. Cheating will not be tolerated in this class. All homework assignments and projects are to be the individual work of each student and are not a collaborative effort. If some homework assignments or projects are substantially equivalent, all involved parties will be punished to the fullest extent, up to and including assignment of a failing grade for the course.

2. Penalty for late submission of homework and project: Assignments submitted after the due date will be subject to a penalty of up to 5 points per day late, up to a maximum of 50%.

3. Attendance policy and missed tests: It is the students' responsibility to attend each and every class, but if for some reason he or she cannot attend, he or she is still responsible for all material presented in class. No makeup tests will be given, except with documentation from a Doctor. Special arrangements for situations involving business travel should be made 2 weeks in advance.

4. Homework submission: Unless otherwise specified, programs will be submitted in two forms

- Electronic submission of source code through Blackboard system via <http://bb.fau.edu>.
- Submission of printed copy of code and printed output from testing, together with other type of exercises.

5. Please refer to the supplement documents for more information.

- Blackboard_use.doc
- Calendar.doc
- How_to_use_vc.doc (Visual C++ 6.0 is recommended to use for the programming)

Note: All the course materials and information could be found in the Blackboard system (<http://bb.fau.edu>). The students are required to use it to keep being informed. The student username for Blackboard is their FAUNet ID. If the student does not know their FAUNet ID they should go to <http://accounts.fau.edu> to check.