COURSE SYLLABUS
CS 574
Data Structures
Dr. Tim McGuire
3 Semester Hours
Fall Semester 2007

Section 01 – 11:00 –11:50 a.m., MWF, room TBD

Office: AB1-212G
Office Hours: 10:00 – 11:00 a.m. MWF; 9:30 – 11:00 a.m. TTh; 1:00 – 2:00p.m. MWF

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Catalog Description: A number of important concepts and algorithms, with emphasis on correctness and efficiency, are reviewed. The advanced treatment of sorting, searching, hashing, and dynamic storage management is provided. Advanced data structures, such as advanced tree structures, graphs, and networks, are introduced. Applications to distributed file structures, database management systems, internet/intranetworks are covered.

Prerequisite: CS 362

Methodology: Lecture with outside laboratory assignments. The examinations will cover the material in the lectures, and will require that the student understand, apply, and extend that knowledge.

Objectives: This course will be an advanced treatment of both data structures and also the design and analysis of computer algorithms. The student in this course will:
- Compare alternative implementations of data structures with respect to performance.
- Choose the appropriate data structure for modeling a given problem.
- Use big-O, big-Omega, and big-Theta notation to give asymptotic upper, lower, and tight bounds on time and space complexity of algorithms.
- Deduce recurrence relations that describe the time complexity of recursively defined algorithms.
- Understand various algorithmic design strategies, including divide-and-conquer, greedy, dynamic programming, etc.
- Solve problems using fundamental graph algorithms, including DFS and BFS, transitive closure, MST, etc.
- Explain the significance of NP-completeness

Required Textbook:
- Thomas H Cormen, et al, *Introduction to Algorithms*, 2nd edition, McGraw-Hill/MIT Press, 2001.

Grading: There will be 2 major exams during the course of the semester. Each of these will count as 20% of the total grade. There will be a final exam which will count as 20% of the grade. There will be several problem sets and lab assignments which will count as 40% of the grade. One of these assignments will entail researching a topic in computer algorithms or data structures chosen by the instructor and preparing a lecture and handout for the class.

Grading Scale: The following grade scale is used:

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90 ≤ A ≤ 100
80 ≤ B <  90
70 ≤ C <  80
60 ≤ D <  70
 0 ≤ F <  60
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Absences: See http://www.shsu.edu/syllabus/

Academic Integrity: See http://www.shsu.edu/syllabus/

Proper Classroom Demeanor: See http://www.shsu.edu/syllabus/

Americans with Disabilities Act: See http://www.shsu.edu/syllabus/

Visitors in the Classroom: See http://www.shsu.edu/syllabus/

Tentative Course Schedule:

WEEK	TOPICS
1	Mathematical preliminaries, algorithms, asymptotic notation
2	Recurrence relations, sorting algorithms
3	Advanced sorting algorithms, selection
4	Elementary data structures, hash tables, binary search trees
5	Balanced trees, Dynamic programming
6	Greedy algorithms, amortized analysis
7	B-trees and other advanced data structures
8	Union-Find, elementary graph algorithms
9	Minimal spanning trees, shortest-path
10	Mathematical algorithms
11	String matching
12	Computational geometry
13	NP-completeness
14	Approximation algorithms
15	Other topics