COURSE NUMBER: 3320 - Spring 2014

NAME OF COURSE: Algorithms and Data Structures

DEPARTMENT: COSC (Computer Science)

NAME OF INSTRUCTOR: Verma, Rakesh

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The information contained in this class syllabus is subject to change without notice. Students are expected to be aware of any additional course policies presented by the instructor during the course.
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Learning Objectives

Advanced data structures including tree structures, graphs and hashing. Data structures for sets. Algorithm design and analysis, heuristics. Amortized analysis, average-case analysis and worst-case analysis. Time, Space, I/O and Parallel Complexities. NP-completeness. Implications of these techniques in software development.

The purpose is to prepare the students for applying sophisticated data structures and techniques in dealing with complex problems and applications.

Upon completion of this course, students will be able to:
1.   Analyze problems and design/select efficient data structures and algorithms for them
2.   Analyze the time, space, and I/O complexities of the data structure and algorithms involved
3.   Estimate the real-world implications of the data structures and algorithms designed/selected
4.   Identify any source of disappointments or pitfalls in the real-world performance of theoretically data structures and algorithms

Major Assignments/Exams

Students are to read each assigned chapter of the textbook **_before_** it is presented in class.

- **Written Assignments**
  Students are required to submit written home works and assignments on various topics in Algorithms and Data Structures.

- **Exams (subject to change)**
  There will be four quizzes in this course and one final exam. Quiz 3 is **cumulative**. Of course, since the material has a certain dependence on basics it is not possible to completely eliminate all previous material on the other quizzes.

- **Evaluation and Grading (subject to change)**
  4%   CLASS Participation.
  4%   Every student will be given 5 minutes to report on the current status of a problem that the student has worked on for the semester.
  6%   Homework   - there will be practice exercises that you must do completely on your own and some Problem Sets that you can discuss with others in class, but you must write up the solution on your own. You must also note the names of the people you discussed the problem with. Posting problems/practice exercises on Internet or searching for solutions in books or Internet or other sources except those listed here is strictly prohibited. You can ask the TA and me for clarification of the assigned problems/exercises but do not expect us to debug your solutions or give you hints on where to start. You are always welcome to discuss us with us problems that are not assigned and not similar to assigned ones and even show us your work. These policies also apply to the semester long problems. First violation of academic honesty policy will result in F grade for the course and possibly additional disciplinary actions.
  11% Quiz 1 – January 28
  11% Quiz 2 – February 18
  11% Quiz 3 – March 4
  11% Quiz 4 – April 3
  16% Three semester long problems and journal to be kept by student and turned in once every 10 days or so. Due dates will be announced in class.
  35% Final Exam – check Final Schedule published by UH
  The lowest quiz grade will be dropped. The other grades cannot be dropped for any reason. All quizzes will be 75-80 minutes long.

Required Reading

Selected Chapters of Cormen, Leiserson, Rivest and Stein's, Introduction to Algorithms, MIT Press, 3rd edition, 2009.

Recommended Reading

A Programmer's Companion to Algorithm Analysis by Ernst Leiss, Chapman and Hall, 2007.

List of discussion/lecture topics

This course will include the following topical (content) areas:
1. Data structures for trees, sets, graphs
2. Sorting including decision-tree lower bound, searching and selection.
3. Hashing
4. Algorithm Design and Analysis Techniques
5. Amortized Analysis
6. Time/Space/ I/O Complexity Analysis
7. NP-completeness
8. The Software Side: Disappoints and How to Avoid Them
9. Mathematical Preliminaries

Course Requirements

The class prerequisites are COSC 2320 or equivalent. MATH 3336 is recommended strongly.

Policy on grades of I (Incomplete):
Students will be given an incomplete only under special circumstances (like medical emergency or serious schedule conflicts). Students will not be given I for failure to turn in work.

CLASS PROCEDURES:
(i) CLASS TIME is very valuable and you must treat it that way. There will be no eating, no drinking except water, no surfing the net and no texting in class. No computers or cell phones of any size, shape or form can be used during class.
(ii) You must treat each other with respect and maintain decorum in class at all times.
(iii) Raise your hand before you speak.
(iv) If you come late to class, please disrupt the class as little as possible and close the door gently.
(v) All cell phones must be in silent mode during class. First violation of this   policy will result in a warning, second violation will result in cell phone being kept by instructor for the class period and third violation will result in cell phone being kept by instructor for the class period for the duration of the course.

Addendum: Whenever possible, and in accordance with 504/ADA guidelines, the University of Houston will attempt to provide reasonable academic accommodations to students who request and require them. Please call 713-743-5400 for more assistance.