CS 2302 Data Structures  
Fall 2010

1. General Information

Instructor:

Olac Fuentes
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www.cs.utep.edu/ofuentes
(915) 747-6956
Office hours: Tuesdays and Thursdays 1:30-3:00, or by appointment, in CSB 208 (feel free to drop by at other times if my door is open).
Chat: olacfuentes@gmail.com – ask questions if I’m available

Teaching Assistant (TA):

Jaime Nava
Email: jenava@miners.utep.edu
Office hours: Tuesdays 6:00 – 8:00 p.m. in CSB 300 (main lab) or by appointment in CSB 124
Chat: jenava@miners.utep.edu

Lectures

- TTh 10:30-11:50, CSB 322

Class web site:

http://www.cs.utep.edu/ofuentes/cs2302.html

2. Objectives and Outcomes

This is the third and final course in the fundamental computer science sequence. Students will learn about fundamental data structures and analysis and design of algorithms.

Level 3 Outcomes: Synthesis and Evaluation:

Level 3 outcomes are those in which the student can apply the material in new situations. This is the highest level of mastery. On successful completion of this course, students will be able to:

1. Given a problem, define the data structures that are required to solve it efficiently.
2. Given a non-recursive algorithm, examine its loop structure, infer its asymptotic running time, and express it using big-O notation.
3. Given a recursive algorithm, examine its structure, pose and solve a recurrence equation defining its running time, and express it using big-O notation.

Level 2: Application and Analysis:

Level 2 outcomes are those in which the student can apply the material in familiar situations, e.g., can work a problem of familiar structure with minor changes in the details. Upon successful completion of this course, students will be able to:

1. Describe, implement, and use the following data structures:
   - Heaps
   - Hash tables
   - Balanced trees
   - Graphs
   - Disjoint set data structure

2. Describe, implement, and apply the following graph algorithms:
   - Connected components
   - Bread-first search
   - Depth-first search
   - Topological sorting
   - Minimum spanning trees (Kruskal's and Prim's)
   - Single-source shortest paths

3. Trace the behavior of recursive programs using activation records.

4. Identify, explain and apply the following algorithm design techniques:
   - Greedy algorithms
   - Divide and conquer
   - Dynamic programming
   - Backtracking

Level 1: Knowledge and Comprehension

Level 1 outcomes are those in which the student has been exposed to the terms and concepts at a basic level and can supply basic definitions. On successful completion of this course, students will be able to:

1. Explain the concept of NP completeness.
2. Explain the utility of randomized algorithms.
3. Define the procedure for conducting an external sort.

3. Policies and Other Information

Prerequisites: Minimum "C" grade in CS2401 and MATH 2300.

Textbook: Reading and laboratory assignments will be drawn from Data Structures and Algorithm Analysis in Java (Second Edition) by Mark Allen Weiss. You are required to obtain this book for use in this course. Note that photocopied textbooks are a violation of copyright law. Any student caught with a photocopied book will be referred to the Dean of Students for discipline.
**Grading:** Final grades will be based on a combination of lab projects, homework assignments, in-class attendance and performance, four partial exams, and a final exam. The approximate percentages are as follows:

- 25% - Lab projects
- 8% - Written homework assignments
- 6% - In-class exercises, quizzes, and anti-quizzes
- 36% - Partial Exams (3 exams, 12% each)
- 25% - Final Comprehensive Exam

The nominal percentage-score-to-letter-grade conversion is as follows:

- 90% or higher is an A
- 80-89% is a B
- 70-79% is a C
- 60-69% is a D
- below 60% is an F

Additionally, any one of the following will result on a final grade of F, even if the overall average is greater than 60%.

- Obtaining an average of less than 60% on the lab projects
- Obtaining a grade of less than 50% on the final exam
- Obtaining an average of less than 50% on the partial exams

We reserve the right to adjust these criteria downward, e.g., so that 88% or higher results in an “A”, based on overall class performance. The criteria will not be adjusted upward, however. You must earn a “C” or better to be able to register for upper division computer science courses.

**Late homework submission:** Homework up to a day late will receive up to 80% of full credit, and it will not be accepted after that.

**Collaboration:** Collaboration among students is strongly encouraged. It is OK to:

- Talk with other students about approaches and ideas.
- Get ideas and extra information from the internet, books, etc.

However, it is not OK to:

- Share code with another student (if a piece of code is submitted by two or more students, both students are guilty of cheating, regardless of who wrote the original code).
- Use code acquired from an outside source (the internet, a friend, etc.)
- Look at another student’s code
- Debug another student’s code

We will use software to detect plagiarized programs and take appropriate disciplinary actions if necessary.

**Cellular telephones are prohibited** during lecture and lab sessions. Students are required to turn off their cellular telephones before entering the classroom or laboratory session.

**Disabilities:** If you feel that you may have a disability that requires accommodation, contact the Disabled Student Services Office at 747-5184, go to Room 106E Union, or email dss@utep.edu
4. Lab Submission Guidelines

Lab assignments will be posted on-line. Each lab grade will be computed from the following three elements:

- Report (35% of grade)
- Source code (65% of grade)
- Demo session (pass/fail)

Report:
You must submit a printed report of every lab that includes the following items:

- Introduction – Description of the problem you are trying to solve
- Proposed solution design and implementation – How did you solve (or attempt to solve) the problem? Provide an informal, high-level description. Description of your code (not the actual code). Explain the design choices you made, including how you broke the program into modules, your user interface, input and output, etc.
- Experimental results – Describe the experiments you performed to test your program. The experiments must be described in a way that allows anybody to replicate them using your code.
- Conclusions – Explain what you learned from the project.

Reports will be graded as follows:

- Completeness (8%)
  Does your report cover all required aspects in enough detail?
- Clarity (8%)
  Are those aspects clearly explained?
- Language (8%)
  Is the report written with proper grammar and spelling?
- Presentation (6%)
  Is the formatting appropriate?

Source Code:
Working programs must be submitted online to both your TA and instructor, using the e-mail addresses listed below. Labs not submitted this way will not be eligible for credit.

- Olac Fuentes: olacfuentes@gmail.com
- Jaime Nava: jenava@miners.utep.edu

Source code will be graded using the following guidelines:

- Correctness (42%)
  Does the program compile?
  Does the program run correctly?
- Design (7%)
  Are operations broken down into methods in a reasonable way?
- Style (7%)
  Is the program indented correctly and consistently?
  Do methods and variables have meaningful names?
- Robustness (7%)
  Does the program handle erroneous or unexpected input gracefully?
• Documentation (7%)  
  Do all program files begin with a comment that identifies the course, author, assignment, instructor, T.A., date of last modification, and purpose of program?  
  Are all methods clearly documented?  
  Are all non-obvious code segments clearly explained?

Demo session:  
After submitting your program, you must schedule a one-on-one session with your TA in which you will explain how your code works and he/she will ask questions to test your understanding of the program being submitted. The TA will then assign a pass/fail grade for this session. A student receiving a failing grade in this session will receive a grade of zero for the whole lab; otherwise he/she will receive the grade corresponding to the combination of submitted report and source code. Demo sessions will last between fifteen and twenty minutes and will normally be scheduled during the T.A.’s office hours. A signup sheet will be posted outside the instructor’s office.

Policy on late projects:  
Lab project grades will be reduced by a factor of 8% for each working day or fraction they are late.

Official turn-in dates:  
For grading purposes, the official turn-in date for labs is when all three parts are finished. Thus, a lab will be considered to be late if ANY of the three parts is late. There will be a three-working-day grace period for reports and demo sessions. For example, if a lab is due on Monday, the source code must be submitted on or before Monday, and the report must be submitted and the demo shown on or before Thursday.

5. Standards of Conduct and Academic Dishonesty

You are expected to conduct yourself in a professional and courteous manner, as prescribed by the UTEP Standards of Conduct: http://studentaffairs.utep.edu/Default.aspx?tabid=4386

Academic dishonesty includes but is not limited to cheating, plagiarism and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying data (for example program outputs) in laboratory reports. Plagiarism occurs when someone represents the work or ideas of another person as his/her own. Collusion involves collaborating with another person to commit an academically dishonest act.

Professors are required to - and will - report academic dishonesty and any other violation of the Standards of Conduct to the Dean of Students.