Fundamental Algorithms

Syllabus

CS302, Fall 2005

Class web page:  http://www.cs.utk.edu/~parker/Courses/CS302-fall05
TA web page:  http://www.cs.utk.edu/~cs302

Instructor:  Prof. Lynne E. Parker
Office:  Claxton Complex 220
Email:  parker@cs.utk.edu
URL:  http://www.cs.utk.edu/~parker
Office Hours:  Tuesday/Thursday 3:30-4:30 (or send email for appointment at another time)

TAs:
Michael Bailey  Charles Phillips
Office:  Claxton Complex 125d  Office:  Claxton Complex 110g
Email: mbailey@cs.utk.edu  Email: cphillip@cs.utk.edu
Office Hours:  Monday, 1:00–3:00 PM  Office Hours:  Tues./Thurs. 10:00–11:00 AM

Time and Place:  Tuesday/Thursday, 2:10-3:25 PM, Claxton 206
Labs:  Wednesday, 2:30 – 5:30 PM, Claxton 105
       Friday, 9:05 – 12:05 AM, Claxton 105

Course Description:
CS302 provides an in-depth study of the design, analysis, and implementation of fundamental algorithms, such as
sorting and searching, and their data structures. Specifically, CS302 is a bridge course between CS140 and CS360
that gives you both: 1) a more in-depth knowledge of many of the data structures and algorithms presented in
CS140, and 2) additional programming experience that will be valuable in CS360.

Required Textbooks:
•  Data Structures and Algorithm Analysis in C++, by Mark Allen Weiss, 2nd Edition, Addison Wesley, Reading,
   MA, 1999.

Prerequisites:  CS140 and CS160, or consent of instructor.

Evaluation:
Grading will be based on labs and two exams, as follows:

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<tbody>
<tr>
<td>Labs:</td>
<td>35%</td>
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<td>Midterm:</td>
<td>30%</td>
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<td>Final:</td>
<td>35%</td>
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Decisions on borderline grades will be based upon exceptional class attendance and participation

Final grades will be determined by overall average as follows:

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<tr>
<td>A</td>
<td>90 – 100</td>
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<td>B+</td>
<td>85 – 89.9</td>
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<td>B</td>
<td>80 – 84.9</td>
<td>D: 60 – 69.9</td>
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<td>F: 0 – 59.9</td>
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Class Policies:

- **Class attendance**: Class attendance will be taken. Decisions on borderline grades will be based upon exceptional class attendance and participation, as deemed merited by the course instructor. You are responsible for all course material and announcements covered in class. If you miss class, you must obtain the covered material from a willing classmate. Neither the instructor nor the TAs will be available (during office hours or other times) to repeat material covered in class.

- **Labs**: The first labs meet Wednesday, August 31st and Friday, September 2nd. Attendance at the first lab is mandatory, and attendance will be taken. After the first lab, it is highly recommended that you attend the first hour of the lab each week, so that you can hear important announcements by the TAs. You are responsible for all information provided by the TAs during the lab times. You may attend either lab time, as long as space is available. However, if the lab is full, priority goes to students who have registered for that specific lab.

- **Lab assignments**: Lab assignments will be posted on the course web site, along with the due dates. Most labs will be introduced during class time, with further discussion of the labs during the Friday lab meeting times.

- **Collaboration Policy**: Discussing and exchanging ideas is encouraged. You may help each other with your strategy for how to solve the labs. However, except if specifically allowed by the instructor, copying from any outside sources (e.g., fellow students, Internet, etc.) on any material (labs or exams) to be graded is not permitted, and will be considered cheating. Cheating will be dealt with harshly, and may result in failure of the assignment/exam and/or failure of the class. Each student is responsible for securing his or her work from copying. Each student is expected to abide by UT’s policies on Academic Conduct and the Honor Statement. Refer to the University of Tennessee Undergraduate Catalog (2005-2006), pages 38-39, and the HillTopics Student Handbook (2004-2005), pages 11-13, for more details.

- **Due dates and Late Labs**: One (1) lab may be turned in up to one week late and still receive full credit. All labs after this will immediately be given a grade of zero, with no exceptions. All laboratory assignments are due at 23:59:59 on the assigned due date. All labs turned in after this time will be considered late. See the TA web page [http://www.cs.utk.edu/~cs302](http://www.cs.utk.edu/~cs302) for more details.

- **Exams**: The midterm will include all material covered in lectures and labs up to the date of the midterm (unless otherwise specified by the instructor). The final exam will be comprehensive, covering material from the entire course. The final exam will be held during final exam week.

- **Missed exam**: If you have an excusable absence from the midterm exam, your final exam grade may be counted as your missed midterm exam grade (i.e., it will count twice). The instructor reserves the right to administer a make-up exam, at her discretion. Barring exceptional circumstances, you must contact the instructor to explain your absence within 24 hours of a missed exam. Otherwise, the absence will be considered unexcused, and your grade for that exam will be 0. Talk to the instructor now if you have any foreseeable conflicts with the given exam dates.

- **Grading corrections**: Bring any exam grading correction requests to the instructor within 1 week of receiving the grade, or before the end of the semester, whichever comes first. Bring any lab grading correction requests to a TA within 1 week of receiving the grade, or before the end of the semester, whichever comes first. After that, your grade will not be adjusted. If you find any mistake in grading, please let the instructor or TA know. Your grade will not be lowered.

- **Announcement responsibilities**: Important announcements, schedule revisions, etc., will be posted to the class email list. You are responsible for information distributed to this email list.

Exam Dates:

- **Midterm**: Tuesday, October 18th (in class)
- **Final**: Wednesday, December 14th, 5:00 – 7:00 PM
Topics We’ll Study:

1. **C Review and Useful Libraries for CS302 and CS360** (1-2 weeks)
2. **Introduction to Object-Oriented Programming** (3-4 weeks)
   a. Basics of Object-Oriented Programming (Weiss, Ch. 1.4 – 1.7)
   b. Review of data structures from CS140 (Weiss, Ch. 3-5)
3. **Analysis of Algorithms** (1 week) (Weiss, Ch. 2)
4. **Sorting** (3-4 weeks)
   a. Priority Queues (Weiss, Ch. 6.1 – 6.4)
   b. Bubble Sort, Insertion Sort, Selection Sort (Weiss, Ch. 7)
   c. Quicksort, Heapsort, Mergesort, Bucket Sort (Weiss, Ch. 7)
   d. External Sorting (Weiss, Ch. 7)
5. **Searching** (1-2 weeks)
   a. Balanced Trees (Weiss, Ch. 4.4 – 4.6)
   b. Hashing (Ch. 5)
   c. External Searching (Weiss, Ch. 4.7)
6. **Graph Algorithms** (3 weeks)
   a. Basic Terminology (Weiss, Ch. 9.1)
   b. Traversals (Weiss, Ch. 9.6, handouts)
   c. Topological Sort (Weiss, Ch 9.2)
   d. Shortest-Path Algorithms (Weiss, Ch 9.3)
   e. Network Flow (Weiss, Ch. 9.4)

*(Refer to the class web site for lecture notes and a more detailed schedule.)*