

Kennesaw State University
DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION SYSTEMS
Spring Semester, Year 2009
CS 3402/01: Advanced Data Structures and Algorithms
Section 01 – R 8:00pm – 10:45pm, Clendenin Building- 2007

Instructor: Dr. Yong Shi
Office Number: CL 3041
Office Hours: T 3:00pm - 5:00pm and by appointment
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Course Description:

Study of non-linear data structures with emphasis on specification, representations, and applications to problem solving and programming. Topics include Trees, Graphs, Priority Queues (Heaps), Hash Tables, and analysis of search and sort algorithms and their performance for implementation and manipulation.

Prerequisites: CS 3401 & CS 2350

Textbooks:

Data Structures with C++ Using STL, by William Ford and William Topp. Prentice-Hall Publishing Company, Second Edition, 2002, ISBN #: 0-13-085850-1.

Software:

C++ is the required programming language for this course. All programming assignments are required to be completed using C++. The assignments will be graded using the C++ compiler on CS server Cloudland.

Course Objectives:

The course objectives include the following:

- Learn specifications and presentation of commonly used non-linear data structures.
- Learn advanced search and sort algorithms and their performance issues.
- Learn the use of covered data structure in problem solving and application development.

Learning Outcomes:

Upon successful completion of the course, students will develop:

- understand concepts of non-linear data structures commonly used in applications
- use data structures and associated algorithms in problem solving
- able to implement some non-linear data structures
- able to use professional documentation

Class Policies:

A. Class attendance

Class attendance is required. Concepts and ideas discussed in one class are used as building blocks for more concepts and ideas in subsequent classes. A student can easily get behind by skipping classes, resulting in poor understanding of materials and poor grade in the class. Students are responsible for missed sessions and must obtain missed materials from a classmate.

B. Assignments

All class assignments are part of the course final grade. Missing any assignment counts as incomplete of the class and may result in a failing grade for the course. Assignments must be turned in at the beginning of the class on the due day. **Late assignments will be penalized at the rate of 15% per day including weekends. No late assignments will be accepted after four days of the due date.**

Successfully completed programs must satisfy their requirements outlined in the programming assignments. The maximum score depends on the quality of the program. This scale represents a general grading guideline:

- (a) Partial code is not acceptable --- receives 0 points.
- (b) Complete code that does not compile --- may receive up to 20%
- (c) Complete code that compiles but does not run --- may receive up to 30%
- (d) Complete code that runs but gives incorrect results --- may receive up to 50%
- (e) Complete code that gives complete and correct results --- receives 100%

Points may vary for each assignment depending on the complexity and required effort. However, 10% of the grade for programs in categories (d) and (e) above will be dedicated to proper comments and in-line documentation, and another 10% of the grade will be dedicated to indentation, code organization, and readability. The assignments will be graded using the department server Cloudland.

All assignments are individual assignments. You are encouraged to discuss assignments with other students as long as the following rules are followed:

- (a) You may provide assistance on how to use any of the software used by this course.
- (b) You view another student's code only for the purpose of offering debugging assistance. Students can only give advice on what to look for, but they cannot debug your code for you. All changes to your code must be made by you.
- (c) Your discussion is subject to the empty hands policy, which means that you leave the discussion without any record (electronic or physical) of the discussion.

C. Tests and quizzes

Three tests will be given: Test 1, Test 2, and Test 3; Pop-up quizzes will be conducted at the beginning of selected sessions. A quiz covers materials discussed in the previous class session. To be ready for a quiz, you are encouraged to review the lecture notes for the previous class session. **NO makeup for tests and quizzes.**

D. Electronic Devices

Electronic devices may be used in class as long as they are used for relevant class purposes. Improper usage may result in the loss of this privilege.

E. Emails:

The instructor guarantees replies to emails received from Kennesaw email accounts only. See **Email Policy** section below.

Email Policy:

The instructor guarantees replies to emails received from your Kennesaw email account (netid@students.kennesaw.edu). Emails sent from other email domains may not reach the instructor's mailbox.

Course Schedule (Tentative, subject to change):

Week	Date	Topic	Chapter
1	1/15/09	Discussion of course syllabus, Trees (basics and applications)	Ch-10
2	1/22/09	Binary Trees (basics and binary search trees)	Ch-10
3	1/29/09	Binary Search Tree Applications	Ch-10
4	2/5/09	Binary Search Tree Applications	Ch-10
5	2/12/09	Test I	
6	2/19/09	AVL Trees and their Applications	Ch-10
7	2/26/09	Associative Containers	Ch-11
8	3/5/09	No class (in a conference)	
9	3/12/09	Spring Break	
10	3/19/09	Associative Containers	Ch-11
11	3/26/09	Advanced Associative Structures	Ch-12
12	4/2/09	Test II	
13	4/9/09	Heap, Binary Files and Bit Sets	Ch-14
14	4/16/09	Heap, Binary Files and Bit Sets	Ch-14
15	4/23/09	Heap, Binary Files and Bit Sets	Ch-14
16	4/30/09	No class	
17	5/7/09	Test III 8:00pm - 10:00pm	

Special Dates:

Holiday	January 19, 2009
Last day to withdraw w/o academic penalty	March 6, 2009
Spring Break	March 7 – 13, 2009

Assessment and Grade Evaluation (Tentative, subject to change):

Attendance and Quizzes	10%	A	90 – 100
Assignments	25%	B	80 – 89
Test I	20%	C	70 – 79
Test II	20%	D	60 – 69
Test III	25%	F	59 or below

Diversity Statement:

All courses offered by the Computer Science and Information Systems department will adhere to the KSU policy that prohibits discrimination on the basis of race, religion, color, sex, age, disability, national origin, or sexual orientation.

Withdrawal Policy:

The last day to withdraw the course without academic penalty is **March 6, 2009**. Ceasing to attend class or oral notice thereof DOES NOT constitute official withdrawal from the course. Students who simply stop attending classes without officially withdrawing usually are assigned failing grades. Students wishing to withdraw after the scheduled change period (add/drop) must obtain and complete a withdrawal form from the Academic Services Department in the Registrar's Office.

Links and Additional Resources:

The primary focus of this course is to teach Advanced Data Structures and Algorithms. Each student is expected to possess sufficient C++ programming experience. To strengthen assumed background, each student is strongly encouraged to review and practice the following online tutorials:

C++ Tutorial 1: http://www.intap.net/~drw/cpp/cpp00_01.htm

C++ Tutorial 1: <http://www.cplusplus.com/doc/tutorial/>

For those who wish to use Unix-based development (and learn Unix), you are encouraged to review and practice the following online tutorials:

Unix Tutorial 1: <http://www.ee.surrey.ac.uk/Teaching/Unix/>

Unix Tutorial 2: <http://www.math.utah.edu/lab/unix/unix-tutorial.html>

Unix Tutorial 3: <http://www2.ocean.washington.edu/unix.tutorial.html>

A quick reference to frequently used C++ functions can be found online at the Dinkum C++ Library (conforming implementation of the Standard C++ Library):

Dinkumware C++ Documentation: http://www.dinkumware.com/html_cpl/index.html

Additional resource will be identified as needed.

Enrollment Policy:

Only those students who are enrolled in the class may attend lectures, receive assignments, take quizzes and exams, and receive a grade in the class. If a student is administratively withdrawn from this course, they will not be permitted to attend class nor will they receive any grade for the class.

Electronic Devices:

In order to minimize the level of distraction, **all beepers and cellular phones must be on quiet mode during class meeting times.** Students who wish to use a computer/PDA for note taking need prior approval of the instructor since key clicks and other noises can distract other students. Recording of lectures by any method requires prior approval of the instructor. Students using a laptop in class should not check their email, browse the web, or in other way detract from the focus of the class.

Classroom Behavior:

Students are reminded to conduct themselves in accordance with the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. Every KSU student is responsible for upholding the provision. For more details, visit <http://www.kennesaw.edu/academicaffairs/acadpubs/>. Students who are in violation of this policy will be asked to leave the classroom and may be subject to disciplinary action by the University.

Student Email and Web Account Access:

KSU is moving towards a central authentication server that will allow one username and password to be used by all KSU users to access an increasing variety of applications (email, WebCT etc.) This unified network identification is referred to as your "NetID". The new source for university-provided email and web space for students will be located at students.kennesaw.edu. All students will have access to this system once they have established their NetID. This system will provide email service through a web-based interface, FTP and SFTP.

How to Activate your NetID:

To activate your NetID go to <http://netid.kennesaw.edu> and click on the "Sign up Now!" link. You will be asked to provide information to verify your identity and set your password. This password will only be for NetID enabled applications.

How to Look Up a NetID:

After you have activated your NetID, you can look up other users by logging into <http://netid.kennesaw.edu> and clicking on Directory Search.

How to Send Email:

For student email, your NetID in combination with the new email address would look like netid@students.kennesaw.edu.

Web Address:

For student web address, your NETID in combination with the new server address would look like <http://students.kennesaw.edu/~netid>. If you have problems please call the Service Desk at ext. 6999 or e-mail service@kennesaw.edu.

Computing in the Information Age Scholarship (CIAS):

Funded by the [National Science Foundation](#), the [Computing in the Information Age Scholarship](#) (<http://cias.kennesaw.edu>) provides selected CSIS majors with \$1,500 per semester. The purpose of the scholarship is to increase retention in the computing sciences by providing aid to high-achieving students with financial need, and involving them in scholarly activities with CSIS faculty.

Class Format:

The class meets twice a week. Students will work homework and programming assignments outside the class.

Assignments/Project Requirements:

Assignments requirements will be handed and discussed in class. See the **Policies** section above.

Computer Labs:

Please follow all computer lab user policies at <http://its.kennesaw.edu/labs>.

Burruss Building

The labs on the fourth floor of the Burruss Building are open 7 days a week as follows:

Mon-Thu 6:30am – Midnight; Fri 6:30am – 5:00pm; Sat 7:30am – 7:30pm; Sun 10:00am – Midnight.

The Burruss labs are open most holidays however they are closed during most semester breaks. Be prepared to show your current student ID card upon entering the lab. The telephone number of the Burruss Building lab is 770-423-6110.

Science and Mathematics Building

The lab in SC 228 of the Science and Mathematics Building is open as follows:

M-Th 9:00 am - 8:00pm; Fri & Sat 10am - 3pm; Sun closed

The telephone number of the Science and Mathematics Building lab is 770-499-3351.

Owl Printing System:

Effective Fall Semester, 2001 (9/13), the OwlPrint system (student network printing/copying solution) will be in place in the KSU library as well as all the open labs and lab/electronic classroom combinations across campus.

Students must have an OwlPrint card to use printing/copying services. While in a classroom situation, faculty/staff will use their department OwlPrint cards to give student access to the printer/copier.

Students will not be required to use their own personal OwlPrint card for any printing while in a classroom setting.

Student Evaluation of Course:

A standard questionnaire will be administered during the last two weeks of the semester in all classes. Additional questions developed by the college or instructor(s) may be included as well. It is important that each student provide meaningful feedback to the instructor(s) so that changes can be made in the course to continually improve its effectiveness. We value student feedback about the course, our teaching styles, and course materials, so as to improve our teaching and your learning. At a minimum, the following two questions will be asked: 1) Identify the aspects of the course that most contributed to your learning (include examples of specific materials, exercises and/or the faculty member's approach to teaching and mentoring), and 2) Identify the aspects of the course, if any, that might be improved (include examples of specific materials, exercises and/or the faculty member's approach to teaching and mentoring).

Acquiring Final Grades:

In an effort to better utilize our technology resources, Kennesaw State University has instituted the reporting of end of term grades by phone. This is in addition to the web version of grades, which has been in effect for several terms. All current semester term students may call 770-420-4315 and select Option Number 4 to secure their end of term grades. With this new development, printed grade reports will not be mailed at the end of the term. Students needing verification of grades or enrollment should request either an official transcript or enrollment verification through the Office of the Registrar.

Academic Integrity Statement:

Every KSU student is responsible for upholding the provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. Section II of the Student Code of Conduct addresses the University's policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to University materials, misrepresentation and falsification of University records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the University Judiciary Program, which includes either an "informal" resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct's minimum one semester suspension requirement.

Students are encouraged to study together and to work together on class assignments and lab exercises; however, the provisions of the STUDENT CONDUCT REGULATIONS, II. Academic Honesty, KSC Undergraduate Catalog will be strictly enforced in this class.

Frequently students will be provided with "take-home" exams or exercises. It is the student's responsibility to ensure they fully understand to what extent they may collaborate or discuss content with other students. No exam work may be performed with the assistance of others or outside material unless specifically instructed as permissible. If an exam or assignment is designated "no outside assistance" this includes, but is not limited to, peers, books, publications, and the Internet. If a student is instructed to provide citations for sources, proper use of citation support is expected. Additional information can be found at the following locations.

<http://www.apa.org/journals/webref.html>

<http://www.lib.duke.edu/libguide/citing.htm>

<http://bailiwick.lib.uiowa.edu/journalism/cite.html>

<http://www.cas.usf.edu/english/walker/papers/copyright/ipdummie.html>

<http://www.indiana.edu/~wts/wts/plagiarism.html>

<http://plagiarism.phys.virginia.edu/links.html>

<http://www.arts.ubc.ca/dao/plagiarism.htm>

<http://alexia.lis.uiuc.edu/%7ejanicke/plagiary.htm>

<http://webster.commnet.edu/mla/plagiarism.htm>
<http://www.virtualsalt.com/antiplag.htm>
http://www.engr.washington.edu/~tc231/course_info/plagiarism.html
<http://quarles.unbc.edu/lsc/rpplagia.html>

APA Documenting Examples:

All MSIS students are required to have a copy of the American Psychological Association (APA) Publication Manual, available in the KSU bookstore and elsewhere.

When any portion of another author's work is used, whether it be from a course textbook or outside work, including the World Wide Web, in whole, in part, or paraphrased, that work must be cited. Proper citation formats are provided on the reverse of this document. Failure to do so can result in Academic Misconduct Proceedings. Acceptable Reference Formats (from North and Blade, 1998 (see below) reprinted with permission)

There are two components to a proper citation: the text citation and the reference or endnote. The text citation will usually consist of the author's or authors' last name(s) and the year of the publication. The endnote citation will read as follows:

Books

(Author. Date. Book Title. Publication Data.)

A reference for a single-author book:

North, M. M. (1996). Virtual reality technology. New York: Best Press.

A reference for a multi-author book:

North, M. M. & Blade, R. A. (1998). How to build skills for research. Colorado Springs: IPI Press.

Journals

(Author. Date. Article Title. Journal Title. Publication Data.)

Journal Reference

Kelly, F. G. (1997). Networking made efficient. Journal of Computer Networking. 45(3), 54-61.

(Here is an article in Volume 45, Issue 3, spanning pages 54-61)

Conference Proceeding

Vanner, F. D. (1996). A survey of medical issues using virtual reality. Proceedings of the Virtual Reality Medical Technology. 119-132. Nice, France.

World Wide Web (from <http://www.apa.org/books/pubmant.html>):

Available references from the web include: newspaper articles, newsletters, journals, research papers, government reports, online books or brochures)

Minimum requirements for documenting a reference from the web should include: a document title or description, a date (either the date of publication, update, or retrieval date), a complete URL.

(Author. Date. Page Title. Publishing Information. Retrieval Date. WWW URL)

Entire site no specific page

Kidspsych is a wonderful interactive Web site for children (<http://www.kidspsych.org>).

No reference entry is needed.

Citing Specific Documents on a Web Site:

American Psychological Association. (1995, September 15). APA public policy action alert: Legislation would affect grant recipients [Announcement]. Washington, DC: Author. Retrieved January 25, 1996, from the World Wide Web: <http://www.apa.org/ppo/istook.html>

An independent document (no author identified): 1

Electronic reference formats recommended by the American Psychological Association. (2000, August 22). Washington, DC: American Psychological Association. Retrieved August 29, 2000, from the World Wide Web: <http://www.apa.org/journals/webref.html>

If the primary author is not available for the body citation, the first key word is to be used (Electronic, 2000).

Acknowledgement and Acceptance of Academic Honest Statement

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<http://www.indiana.edu/~wts/wts/plagiarism.html>

<http://plagiarism.phys.virginia.edu/links.html>

<http://www.arts.ubc.ca/doa/plagiarism.htm>

<http://alexia.lis.uiuc.edu/%7ejanicke/plagiary.htm>

<http://webster.commnet.edu/mla/plagiarism.htm>

<http://www.virtualsalt.com/antiplag.htm>

http://www.engr.washington.edu/~tc231/course_info/plagiarism.html

<http://quarles.unbc.edu/lsc/rpplagia.html>

CS 3402/01: Advanced Data Structures
Course Name

Dr. Yong Shi
Instructor Name

Print Name

Student ID Number

Signature

Date