Course Objectives

This is the third and final course in the introductory computer science sequence. This course focuses on the design, implementation and analysis of elementary data structures. Students will learn fundamentals of efficient sorting and searching and the mathematical theory underlying tree and graph structures. Students will also apply formal mathematical reasoning, including inductive proof techniques and complexity analysis based on recurrence relations, to such structures and algorithms. Programming will emphasize object-oriented design and will be done in Java.

Intended Learning Outcomes: At the end of the course the successful student will be able to

1. analyze the efficiency of various data structures and algorithms.
2. prove the correctness and efficiency of various data structures and algorithms.
3. evaluate the practical implications of different implementations of data structures and algorithms.
4. develop programs that utilize various data structures and algorithms using the Java programming language.

Course Content

Prerequisite: CPSC 170


Assignments: There will be several graded assignments during the semester. These assignments are designed to give the student the opportunity to put into practice the problem solving and programming skills they have learned. As such they are one of the most important aspects of the course both for student learning and for assessment. The assignments, most of which involve writing programs, will vary in length and difficulty. You are encouraged to start on them immediately when assigned and get help from the instructor as needed.

Important: Assignments are to be done individually. You may ask class members, lab assistants, and others for help with system questions (e.g., "How do I run my Java program in Eclipse?", "How do I get a printout of my program?") or general information about a topic covered in class (e.g. "What is the symbol for boolean AND?") provided you can do so without divulging or receiving information specific to the solution of the assignment problem. You may not discuss any aspect of the design or coding of a program with anyone except the instructor. This policy will be strictly enforced; see the section on Academic Integrity below.

Quizzes, Tests, and Exams: Short quizzes will be given to make sure you are understand the
concepts and are keeping up with the course work. Quizzes will be at the beginning of class. The lowest quiz grade will be dropped when final grades are calculated. No make-up quizzes will be given. Two tests and one comprehensive final exam will be given.

**Test Dates:**
- Test #1: Monday, September 28
- Test #2: Monday, November 9
- Final Exam: Monday, December 14 (8:30AM-11:30AM)

**MCSP Conversations:** The Department of Mathematics, Computer Science, and Physics (MCSP) is offering a series of discussions that appeal to a broad range of interests related to these fields of study. These co-curricular sessions will engage the community to think about ongoing research, novel applications, and other issues that face our disciplines. You are invited to attend all of these events but participation in at least 3 is mandatory. Within one week of attending an event you must submit a one page paper reflecting on (not just summarizing!) the discussion. If you do not turn the paper in within the one week time frame you may not count that event as one you attended. The MCSP discussions are generally scheduled for Wednesdays at 5:30 or Tuesday or Thursday at 7:00. A schedule will be provided soon and will be posted on the course web page. Please discuss scheduling conflicts with the instructor ASAP.

**Grading:** Course grades are assigned based on the following weights and scale:

<table>
<thead>
<tr>
<th>Grade Weights</th>
<th>assignments...33%</th>
<th>quizzes........10%</th>
<th>co-curricular......5%</th>
<th>tests............32%</th>
<th>final exam........20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Scale</td>
<td>93-100 A</td>
<td>83-86 B</td>
<td>73-76 C</td>
<td>63-66 D</td>
<td></td>
</tr>
<tr>
<td></td>
<td>90-92 A-</td>
<td>80-82 B-</td>
<td>70-72 C-</td>
<td>60-62 D-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>87-89 B+</td>
<td>77-79 C+</td>
<td>67-69 D+</td>
<td>below 60 F</td>
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</tbody>
</table>

**Course Policies**

**Academic Integrity:** It is accepted that you have read and understood the standards for academic integrity at Roanoke College. All tests, exams, and assignments are to be the work of the individual student. You are encouraged to get help from the instructor if you need help with any aspect of the course including programs and assignments. Student assistants, tutors, and classmates may help you understand course concepts but may not show you how to do any particular aspect of an assignment. Students may discuss lab work (including the pre-lab assignments) and help each other out but in all cases the work you turn in must be your own. Copying someone else's work or turning in someone else's work is NEVER allowed. Using someone else's work or ideas as your own is plagiarism and an academic integrity offense. Examples of academic integrity violations include copying a program or part of a program (even one line) from someone else, writing code for someone else, telling someone else how to solve a problem or having someone tell you how to solve a problem. Discussion among students about programming projects should be limited to general concepts, not specific aspects of how to complete the work.

**Computer Use Policies:** All students must abide by the Computer Use policies of Roanoke College. Failure to do so will result in involuntary withdrawal from the course.

**Attendance Policy:** Class attendance is vital to your success in this course; material covered during missed sessions is the responsibility of the student. Conversations held in class illuminate the published class materials and are subject to evaluation on subsequent tests and quizzes. Moreover, quizzes and in-class assignments are not available for make-up.

**Late Assignments:** Unless otherwise specified, assignments are to be turned in before the start of class on the due date. If you anticipate being unable to meet a deadline, talk to me at least 24 hours
before the deadline. In extenuating circumstances we may be able to make special arrangements. Please note that this must be discussed -- just sending an email does not automatically grant you extra time. If you have not been granted extra time ten percent per calendar day (24 hours) will be deducted for late work (including weekends and holidays); work more than 2 days late will receive no credit. Electronic "glitches" do not waive your responsibility to submit your work in a timely manner.

**Make-up Policy:** Everyone is expected to take tests, quizzes, and the exam at the scheduled time. Make-ups will be given only for legitimate, documented absences that the instructor has been notified of ahead of time. Make-up tests, if given, may be oral. There will be no make-up quizzes.

**Electronic Devices:** All cell phones and pagers must be turned off prior to entering the classroom or lab. The use of any electronic device during a test or quiz is prohibited. This includes cell phones, PalmPilots, Blackberrys, PocketPCs, and laptops. Any use of such a device during a test or quiz will be considered a breach of academic integrity.

**Special Services:** If you are on record with the College's Special Services as having special academic or physical needs requiring accommodations, please meet with me during my regular office hours or schedule an appointment as soon as possible. We need to discuss your accommodations before they can be implemented. Also, please note that arrangements for extended time on exams and testing in a semi-private setting must be made at least one week before every test or exam. If you believe you are eligible for accommodations but have not yet formally contacted Special Services, please call 375-2248 or drop by the Center for Learning and Teaching in Fintel Library.