

CS 5050 Fall 2008

Course Information

Instructor: Dr. Vicki Allan, Vicki.Allan@usu.edu, 421 Old Main, (435)-797-2022

Office Hours: MWF 8:30-9:30 or 3:30-4:20. Other hours by appointment. Send email to set up. I love to talk to students so feel free to drop by and discuss your concerns or interests.

Home Page: <http://www.cs.usu.edu/~allanv/cs5050/cs5050.html>

Course Goal:

- Gain knowledge on a variety of computational problems and their algorithmic solutions.

Learning Outcomes:

- Be able to analyze the time and space complexities of an algorithm.
- Be able to choose appropriate data structures in the design of an algorithm based on their mathematical properties.
- Be able to design algorithms for new problems using standard algorithmic techniques.

Prerequisite: *Grad students who don't pass the placement exam in data structures often end up in this class. HOWEVER, if you cannot pass the placement in data structures, you likely need to take CS2420 NOT THIS CLASS.* Prerequisites include CS 2420 or good algorithm and data structures background. This includes knowledge of complexity, stacks, queues, AVL trees, graphs, hashing and sorting. You also need to be an excellent programmer in C++ or Java. All programming will be done in one of the three languages: C++, Java, C# (you can pick the language). However, I will often give you "starter code" in Java. If you choose another language, you will be allowed to use basic code (found on the web) as a starting point. Many of you know Java already. Java is fairly easy to pick up from C++, so if you are a good C++ programmer you will be fine programming in Java. If you don't know C#, Java, or C++, you should not stay in this class. **Take a look at the course content for cs2420** <http://www.cs.usu.edu/~allanv/cs2420/cs2420.htm>. **If you do not have the background to code the majority of the programming assignments, you would be much better off taking CS 2420 this semester.**

Etiquette: When you come to class late, every person in the class is distracted by your entrance (including your professor). You miss important material. You are saying to your professor, "My time and my schedule are more important than what you have to teach me." On the job, if you don't come to work, you will be fired. If you come late, you will be reprimanded. Come to class and come on time! It is good practice for the real world.

Sleeping during class is inappropriate. If you don't want to attend the class physically and cognitively, do us both a favor and stay home.

Reading the newspaper or a novel in class is offensive. If you find the newspaper or a novel more compelling than what we are doing in class, you need to find another class.

Difficulty: This course is average in terms of difficulty for a senior level course. We will do a fair amount of programming, but since you are good programmers, that shouldn't be a burden. You will be expected to learn material from a variety of sources, so be prepared to read more than just the textbook.

Course Objectives: The student will:

- Be able to analyze the complexity of an algorithm.

- Design and execute a comparative empirical study of the performance of a set of algorithms
- Implement a variety of algorithms utilizing many standard data structures
- Be knowledgeable on many standard types of computational problems and their algorithmic solutions
- Understand many algorithmic design techniques and be able to design algorithms to solve previously unseen problems by adapting and modifying existing algorithms
- Understand why many “clever” algorithms work
- Understand the distinction between polynomial and non-deterministic polynomial (NP) problems
- Be able to apply appropriate approximate algorithmic solutions to NP problems

Holidays: September 1st is a Holiday as is October 17th. According to University policy, Thursday October 16th will be a “virtual Friday”. In other words, you will pretend it is Friday all day. Thus, there will be CS 5050 that day.

Text: Algorithm Design, M.T. Goodrich, R. Tamassia, Wiley Press, 2003 (required).

Attendance: Attendance is mandatory. If necessary, quizzes will be given to ensure your interest in attending.

Preparation: Preparation is necessary for learning. For this class, preparation includes attending class regularly (90% of the time), coming on time, remaining focused until class is dismissed, asking timely questions, trying problems at your seats when directed to do so, answering questions when called upon, completing homework questions, paying attention during lecture, and reading appropriate material before coming to class.

Because you will learn more if you are involved in class discussion, I often ask for class response to a question. However, *do not feel that you need to answer every question*. I would like to hear from everyone in the class not the same two or three people every time. To facilitate hearing from everyone, we will have the *three strikes you are out* rule. After you have verbalized an answer three times in a class period, you are not allowed to answer any more questions that period. If your answer is so wonderful, you will die if it isn't expressed, tell your neighbor and let him/her share it.

Programs:

Program and homework write-ups are available from the class homepage and will not normally be handed out in class. We will have approximately one program every other week. Programs will be due at midnight on the due date. You may use any computer system you desire to write the programs. Each assignment is to be your own work. To the extent you copy the framework or the idea from any source (including the book), be sure to acknowledge that source. Undoubtedly, some of the assignments we do exist somewhere on the web. Copying is *not* permitted.

Programming assignments are graded giving half the points for correct output and half the points for complete, well designed, and documented code. I rarely alter the due date of an assignment, and will not do so unless all students can be informed of the change at least two days before the original due date. Any changes in date would be announced via electronic mail.

Written Homework: Written homework provides an excellent framework for achieving the goals of obtaining a working knowledge of data structures, perfecting programming skills, and developing critical thinking strategies to aid the design and evaluation of algorithms. Since programming has a high overhead in terms of program entry and debugging, all important topics in this course cannot be covered via programming projects. Written homework exercises allow students to learn important material without a high time investment.

Written homework should be typed if at all possible. If you like, you may work together in groups of two or three (for written assignments only). Some people learn better in groups, others don't. You are free to pick the learning technique which is best for you. If you work together, *all names* of the contributors should be written on *one* copy of the answers. If similar work is turned in without designating that you worked together, it is

cheating. Each of you are expected to attempt to complete the assignments individually and then discuss them with other members in your group.

Late work: Written assignments will not be accepted late.

If you make it a practice of having everything completed two days early, life is wonderful. If you make it a practice of having everything completed two days late, life is the pits. The work is the same. It is a matter of discipline. Late work creates difficulties in grading. Unless a very strict policy is enforced, chaos reigns. It is not that I am insensitive to your personal problems, but rather that I must insist that you rise above them. When I grant an extension to one student, it is *unfair* to the other students who would have benefited from such special treatment.

Late programming assignments will be docked 10% each day late (Saturday and Sunday count as one day, not two). No assignments will be accepted for points if they are more than one week late unless there is a compelling reason. However, I realize that sometimes things happen that are beyond your control. Thus, you are allowed to turn in one programming assignment **up to three days late** without penalty and without explanation. **Your first late assignment will be counted as your "free late" assignment.**

We will be using Eagle to turn in programming assignments. See <http://eagle.cs.usu.edu>. Create a new account using this web address so that you can get email and grades from me.

You may be given an F if either your overall average is below 50% or your performance in any one of the above categories is below 40%. I *generally* figure 90-100% is an A, 80-90% is a B, 65-80% is a C, 50-65% is a D, and below 50% is an F. However, grades vary (up or down) somewhat depending on the difficulty of assignments and tests. (At times, I lower the points possible for an exam to make this general assignment of percents to grades more appropriate.)

Standards: All work in this class is graded based on the *best* solution rather than merely solving the problem. Sometimes students feel it is unfair for a teacher to expect the best when they are just learning, but it is important for a student to strive for the real goal. On the job, "just working" is almost *never* adequate. How can one expect to improve or even recognize quality if it has never been demanded?

Exams: There will be midterms held October 10th and November 12th. The final is Wednesday, December 10th, 1:30-3:20.

Grading:

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| Homework | 70 | |
| In Class Exercises | 0-50 | |
| Programs | 160 | |
| Exams | 300 | |
| Total | | 510-560 |

Outline: We will cover chapter 5 through 13. A rough outline is on the class home page, and will be updated throughout the semester.

Cheating: Although you may collaborate on problem solving approaches, each person must write, debug, and test his/her own work. Cheating will be dealt with severely. The penalty given will be worse than not having done the assignment, written the program, or taken the exam (i.e., the least penalty possible is negative points). When cheating occurs, a letter to that effect is placed in your file and a copy is sent to the dean's office. Flagrant cheating involves turning in another's work as your own. However, there are many other forms of dishonesty which are also considered cheating such as allowing others to copy from your work. Do *not* put your

friends in an awkward position by asking them to help you cheat. Please refer to the cheating policy posted on the homework page for this class.

Incompletes: Occasionally, I have students ask for an incomplete to avoid getting a failing grade. According to university policy, incompletes are not to be given for poor performance. There will be no incompletes given except for conditions beyond the student's control. Such conditions have to have written documentation. The term "conditions beyond the student's control" includes (1) incapacitating illnesses that prevent a student from attending classes for a period of at least two weeks; (2) a death in the immediate family; (3) financial responsibilities requiring a student to alter course schedule to secure employment; (4) change in work schedule as required by employer; or (5) other emergencies of this nature. When an incomplete is given, it is anticipated that the remaining work will be finished within two or three weeks. If the course must be retaken to make up the work, an incomplete is not appropriate. In case of emergency, there are provisions to permit a student to withdraw (grade of W) from a course after the regular drop period when it is not feasible to give an I.

Disabilities: If a student has a disability that will likely require some accommodation by the instructor, the student must contact the instructor and document the disability through the Disability Resource Center, preferably during the first week of the course. Any requests for special considerations relating to attendance, pedagogy, taking of examinations, etc. must be discussed with and approved by the instructor. In cooperation with the Disability Resource Center, course materials can be provided in alternative formats- large print, audio, diskette or Braille.

Class Fee: Associated with this class is a class fee. The monies from this fee are used to maintain lab facilities for the class, purchase software and licenses, and supervise the lab. In some cases, students may have their own computing equipment, and thus feel that they do not need to use the lab. However, the labs must be maintained regardless of an individual's use of it, and thus the fee is charged to all registered for the class. If you have questions or concerns about this fee, please see the department head.

Add Date: The last day to add this class is the 15th day of the semester. Attending this class beyond that date without being officially registered will not be approved by the Dean's Office. No assignments or tests of any kind will be graded for students whose names do not appear on the class list.

There are several reasons for this rule. Students who attend classes without registering have an unfair advantage over those who are registered. The unregistered student can choose not to register if their academic performance is poor. There will be no record that the student "withdrew." The registered student must drop the course along with the ramifications of small or no refund in tuition and a possible "W" on his/her transcript.

The university does not receive the headcount credit from the State for students who add any class after the 15th day (September 15th). We lose a significant amount in support funding for those students not registered prior to day 15. Students who attend classes without registering/paying are utilizing campus resources even though they have not paid tuition and fees. Students who are attending classes but not enrolled in them are not subject to the Student Code of Conduct. Thus, we are asked not to allow students to "sit in" on classes for which they are not enrolled.

Drop Date: The last day to drop classes (without any notation) is Sept 15th. The last day to drop classes (with W notation) is October 28th. The last day to drop classes (with WF notation) is Nov 13th. If you find it necessary to drop the class, please notify me immediately.