

**University of Missouri, Columbia**  
**CS 2050 - Algorithm Design & Programming II**  
**Fall Semester 2009 - Course Syllabus**

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**Instructor:** Prof. Jeffrey Uhlmann

**Email:** uhlmannj@missouri.edu

**Office:** EBW- 884-2129

**Office hours:** 11am-noon TR (but I am available much of the time during the week if you want to drop by my office) or by appointment.

**Lecture Hours:** WF 1:00 - 1:50 pm

**Location:** 204 Strickland

**Teaching Assistants (TAs):** Anoop, Dan, and Yi

**TA Office:** TBD

**TA Phone:** 882-8235

**TA Email:** umcEngrCS2050@missouri.edu

**Required Text:**

"Data Structures & Other Objects Using Java"

Author: Main

ISBN: 0321375254

Please see <http://www.mubookstore.com/textbooks.asp> for more information.

**Prerequisites:**

Each student is assumed to have completed CS 1050 (or its equivalent) with no less than a C-grade. This course assumes that each student is familiar with the Java programming language. Java will be used for all assignments, so students unfamiliar with Java should expect to spend some extra time at the beginning of the semester to develop practical proficiency with it.

**IMPORTANT NOTE:** It is assumed that students in this class understand Java and have sufficient understanding of programming to debug syntax errors. Programs that do not compile may be assessed a score of zero without further grading, but you may meet in-person with a TA to explain what parts of the program work and are deserving of credit.

**Course Objectives:**

An "algorithm" defines the logic for solving a given programming problem. The conversion of that logic into code in a particular programming language produces an "implementation" of the algorithm. CS 1050 introduces the basic features of a particular programming language and

assigns programming problems to assess students' abilities to implement relatively simple algorithms. In other words, the focus of CS 1050 is on implementation. The focus of CS 2050, however, is on the design of algorithms to solve nontrivial problems both correctly and efficiently. The programming assignments in CS 2050 are not intended to assess whether students can implement algorithms in Java -- it is assumed that they can -- the assignments are intended to determine whether students can apply the techniques described in the class and text to design algorithms to solve given problems. The implementations of those algorithms are really only required to demonstrate that the algorithms perform as intended and that students follow good software engineering practices. The main objective of the programming assignments is to improve programming proficiency.

The basic structure of the course is as follows: The theory and notation of computational complexity is introduced. This provides a framework in which different algorithms can be compared and assessed. Within this framework it is possible to characterize the relative efficiencies of different algorithms and combinations of algorithms. This is necessary in order to appreciate the advantages of, e.g., binary search over linear search and merge sort over insertion sort.

Topics to be covered:

1. Algorithms, Data Structures, and Software Engineering
2. Abstract Data Types
3. Big-Oh Notation
4. Recursion
5. Binary Search
6. Insertion Sort and Selection Sort
7. Quicksort and Mergesort
8. Multidimensional Arrays
9. Linked Lists
10. Stacks
11. Queues
12. Heaps
13. Binary Search Trees
14. Hashing
15. Code Profiling and Optimization (if time permits)

Grading:

45% Programming Assignments

55% Exams

90% or above of the total points guarantees a grade in the A range; above 80% guarantees a

grade of B- or above; and so on. Similarly, total points in the top 10% of the class guarantees an A- or above; in the top 20% guarantees a B- or above; and so on. The instructor reserves the right to apply a more generous curve (and typically does), but the amount of the curve is discretionary and should not be counted upon.

Note that attendance is required.

**Exams:** TBA

**Final Exam:** Check Registrar's schedule for MWF 1-1:50 classes

**ADA NOTICE:**

If you need accommodations because of a disability, if you have emergency medical information to share with me, or if you need special arrangements in case the building must be evacuated, please inform me immediately. Please see me privately after class, or at my office.

To request academic accommodations (for example, a note taker or extended time on exams), students must also register with the Office of Disability Services (<http://disabilityservices.missouri.edu>), S5 Memorial Union, 882-4696. It is the campus office responsible for reviewing documentation provided by students requesting academic accommodations, and for accommodations planning in cooperation with students and instructors, as needed and consistent with course requirements. For other MU resources for students with disabilities, click on "Disability Resources" on the MU homepage. If you have special needs as cited in the Americans With Disabilities Act and need this publication in an alternate format or have special classroom needs, please contact the Computer Engineering and Computer Science office in Room 201 Engineering West. Every reasonable effort will be made to accommodate your needs.

**WARNING ABOUT CHEATING:**

No credit will be given for work submitted by a student that does not reflect his/her individual efforts. Copying/plagiarism will result in a score of zero being assessed for the exam or program in question. Acts of academic dishonesty that call into question the results of other exams and/or programs may result in a score of zero being assessed for the entire exam and/or program component of the overall course grade.

In such cases the details of the suspected acts of academic dishonesty will be forwarded to the Provost's office for possible disciplinary action. Such action may include one or more semesters of suspension or even permanent expulsion from the university.

**EXAMPLE 1:** If Bob and Sue collaborate on the completion of a programming assignment, then it will not be possible to assess their individual efforts. Did Bob implement half of the methods

and Sue the other half, possibly justifying half credit for each? Or did Sue really do almost all of the work while Bob contributed very little, suggesting that Sue should get credit but not Bob? Because Sue and Bob should know that collaboration on programming assignments is not permitted, submission of the programs as representing their respective individual efforts constitutes academic dishonesty. Therefore, no attempt may be made to try to determine who should receive what percentage of the credit.

**EXAMPLE 2:** The TAs identify that the programs submitted by Bob and Sue have large portions that are virtually identical. Bob insists that he does not know Sue and never collaborated with her. Sue insists that she doesn't know Bob and never collaborated with him. It turns out that Bob and Sue independently did a Google search on the topic of the assignment and found a program that is similar to what was needed for the assignment. Bob and Sue each argue that there was no collaboration. Unfortunately, the bottom line is that the programs submitted by each person did not reflect their individual efforts. Bob argues that "in the real world" programmers are encouraged to make use of existing code rather than trying to reinvent the wheel. The professor agrees but points out to Bob that the context makes all the difference. If a prospective employer asks an applicant for an example of his programming, and the applicant provides a large program written by someone else, the consequence could be a charge of civil or criminal fraud if the applicant is hired on the basis of the misrepresented program.

**EXAMPLE 3:** The TAs identify that Sue, Bob, and Sally all turned in programs with striking similarities. Sue says that although she knew she shouldn't do it, Bob begged and pleaded with her to let him see her program so that he could finish the assignment and avoid failing out of school and being forced to work on his father's decorative feather farm in Oklahoma. She says that Bob swore that he wouldn't let anyone else see her program, but apparently he gave it to Sally. Sue is embarrassed because she recalls the professor describing a situation exactly like this at the beginning of the semester as an example of what can happen if someone gives into the pleadings of someone who can't do the work on his own. Bob is apologetic, tries to take all the blame, and insists that Sue should get full credit. He says that he knew he shouldn't have given the program to Sally, but she had her Spanish II homework to trade to him, so he felt like he had to make the trade in order to avoid ending up on his father's decorative feather farm in Oklahoma. Unfortunately, Sally insists that she was the originator of the program and that Bob and Sue must have stolen it from her somehow. The end result is that all three are reported to the Provost, who will decide what really happened and what consequences are appropriate.

It is important to note that University regulations require cases of suspected academic dishonesty to be reported to the Provost. TAs can lose their positions if it is discovered that a case of academic dishonesty was intentionally disregarded or tolerated.