CS256—Advanced Programming
Syllabus
Spring 2014

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Contact:
Scheduled office hours (tentative):
Dennis 225: T 2:30–4:00, F 1:00–2:30.

Also other times by appointment. You can always get my current schedule via the link in the class homepage or at `http://cs.earlham.edu/~jrogers/classes/schedule.html`.

I strongly encourage you to send questions/requests for clarifications to me via e-mail. Unless you specifically request otherwise (or it seems inappropriate) I will strip identifying information off and send my response to the class list. Since most of your fellow students will have the same questions, you will be doing all of us a favor by making the effort to submit them—very much appreciated.

TA:
TBA. Tutoring hours: TBA

Text:
Michael Main and Walter Savich, *Data Structures and other Objects Using C++, 4ed.*, Addison Wesley.
There will also be occasional handouts from other sources.

You will need the 4th edition, but the international edition of the 4th edition is OK.

Coverage
Chapters 1–10.

Topics:
Our primary focus will be tools and techniques for the design and implementation of reliably correct programs. We will be covering algorithm design techniques including some simple software engineering tools and techniques, basic data structures (bags, lists, stacks, queues, trees) as abstract data types, program checking and testing and

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[1]This syllabus is my best effort to give you the information you need to plan your semester. But the details of the syllabus are subject to revision. No significant revisions be without first discussing them as a class.

basic complexity analysis. Many of the techniques we study will be based on the facilities for abstraction and encapsulation provided by the C++ object mechanism. We will also study this mechanism in its own right. In addition, we will look at certain aspects of the program/operating system interface (argument passing, exit codes, basic shell programming) with particular attention to producing programs that are well integrated into the unix environment. There will be a culminating project which integrates these threads into a program of substantial complexity. Finally, we will touch on topics in the history of computing and on its social and ethical aspects.

In addition, you will be introduced shell scripting, simple graphics programming and basic interactive Graphical User Interfaces.

Reading:
As the classes are intended to be as much discussion as lecture, it will help a great deal if you read the text prior to class. Tentatively, you should plan to have completed the reading for each chapter by the following dates:

Initial reading: Ch 1.1 for Friday, 17/Jan., and 2.1-2.3 for Wednesday, 22/Jan.

Additional reading will be assigned as we go. The current reading assignment will be listed in the class homepage.

The reading is not optional. The classes will go a lot more smoothly if you do the reading prior to class. To help motivate you, there will be very short quizzes (about 5 minutes, ≤ 5 questions) at the *beginning* of class on the days the reading is due. These will be closed-book and closed-notes, but they will cover aspects of the reading that you are almost certain to recall if you have actually done it. You do *not* have to memorize the details of the chapter. You do have to learn where those details are covered.

Structure:
Class discussion is intended to clarify and extend the text, not to replace it—you will be responsible for all the material covered in the reading or in class. We will meet Mondays, Wednesdays and Fridays in Dennis 214 for lecture and discussion and Wednesday afternoons in the Dennis 224 Mac lab for labs. There will be labs most weeks. Sometimes they will be self-contained, other times they will be part of a programming assignment. As the lab sessions are only have one and one-half hour, it will sometimes not be possible to complete the lab during the scheduled lab session, in which case you will be responsible for completing it on your own. I will try to fit these to the time available. Labs are due at the beginning of class on the Monday following the lab.

In addition to the labs there will be frequent programming assignments (usually about two weeks long). These may sometimes be augmented with non-programming (or, perhaps non-implemented) questions as well. The labs and the assignments will be graded separately.

During the last month of the semester you will be working on a relatively large-scale project. This may include some of the earlier projects as components. During this period, there will not be other programming assignments but non-programming assignments may continue.

We will also read a book of fiction (but based on actual experience) written by a woman who was involved in the development of technology underlying distributed applications during the 80's and 90's. There will be periodically be sets of questions which will require written answers through the course of the semester. There will also be class discussions, which you are expected to participate in. The library has the book available as an e-book, so you will not need to purchase it.

Submitting Assignments:
Assignments and problem sets are due at the beginning of class on the due date. It will be *possible* to receive a short extension (no more than a couple of days) of the due date of a programming assignment under the following circumstances:

- You turn in whatever you have at the beginning of class on the original due date.

- You meet briefly with me, preferably right after class and in any case no later than the beginning of the next class period, to discuss what you still have to do, to agree on an extended due date and to agree on the percentage of the grade that will be deducted.

- The extension is *not* automatic. I will agree to it only if the circumstances merit it and you follow the procedure sketched here in both spirit and practice.

- In no case will the extension be longer than two or three days. This is so the solutions can be distributed.

- In no case will the deduction for lateness be less than 10%.

- There will be no extensions on the items due prior to the final due date. These generally count for less than 20% of the grade and it is essential that the solutions to these preliminary components are distributed on time.

- This policy is intended for exceptional circumstances. Requests on multiple projects are increasingly unlikely to be fulfilled.

Work placed in any of my mailboxes will *not* be accepted unless we have agreed ahead of time for you to turn it in this way. If you have received permission to turn work in to my mailbox, you retain responsibility for it until I have notified you that I have received it. You must keep a copy in case the one you turn in gets lost before I get it and you must notify me by e-mail when you place it in the box.

Work may not be submitted by e-mail unless you have prior agreement from me. In any case, it will not be accepted unless it *arrives* prior to the beginning of class on the due date. You are responsible for delays in delivery. Once again, you may not assume I have gotten it until I notify you that I have. In the mean time, you are responsible for it. Therefore, you should keep a copy at least until I have acknowledged receipt.

It is essential that you complete the assigned work on time. It is possible to fail to pass this class and the easiest way of doing so is to fail to complete the assigned work.

Midterms and Final:
There will be two midterm exams and an "ultimate" exam. These will be take-home (open book and open notes). You will have at least two days to complete these.

The ultimate exam is scheduled to be completed prior to the end of the semester, which is why it is not officially a final, but rather a last exam. Nonetheless, it will be comprehensive. I will have this graded and back to you by the end of the semester. This is to give you an opportunity to evaluate your performance for the class as a whole and prepare a "final final"—a short (one or two paragraph) evaluation of your semester in this class—which will be due during finals week. Each of you will meet with me briefly during that week discuss these and my own evaluation of your semester. (Note well, these evaluations are of *your* performance in the class. They have nothing to do with your evaluations of the class and my teaching of it, which I will not see until after grades are turned in.)

Grading:
Expected distribution of weight:

Reading (text)/Quizzes	5%
Labs	15%
Assignments	25%
Programming Project	15%
Reading (novel)/Questions and Discussion	5%
Mid-terms	10% each, 20% total
Ultimate exam	10%
Self evaluation	5%

This is subject to change as the semester progresses. I will consult with the class

prior to making any changes.

I don't generally include participation as an explicit portion of the grade, partly because I don't know how to quantify it and partly because your participation is *expected*. We will cover a significant amount of material that is not covered in the text. Thus you need to plan to make it to class.

Electronic Devices

I ask you to not use electronic devices in class, other than those specifically required by the Academic Enrichment Center. You *may* be permitted to use your laptop/netbook in class to take notes (generally, a very bad idea) or consult on-line editions of the text. *But*, if you choose to do this, you will need to convince me that you are paying attention. The way to do this is to always be the first person to answer a question. I reserve the right to ban use of electronic devices in this way on a per student basis.

All other electronic devices should be shut-up and stowed during class. None of the rest of us should either see or hear them.

Academic Honesty, College Policy:

> "The College trusts students who enroll at Earlham to be honest seekers of truth and knowledge. This trust is extended to all students by other students and by teachers, and is manifested in a variety of forms.... Students must be mindful that, although Earlham encourages cooperative and collaborative, rather than competitive, modes of learning, one's work must still be one's own, unless explicitly assigned to a group. Giving or receiving aid inappropriately on assignments and tests, or plagiarizing by using another person's words or ideas without credit, constitutes a serious breach of our trust in one another and in the integrity of the search for truth."

Learning to think for yourself, assess information judiciously, and speak and write effectively in your own voice is at the heart of a liberal arts education and global citizenship. Treasure and cultivate these skills. Papers and other work, including digital creations, downloaded or copied from other sources, or in which words or ideas belonging to others have been deliberately misrepresented as your own, will receive an automatic F, as they thwart your learning process and damage the integrity of knowledge-discovery. If you have questions about how to find, integrate, and properly cite sources, never hesitate to ask for help.

An excellent place to find help in knowing when and how to cite others' work appropriately can be found on the Libraries page: `http://library.earlham.edu/`

`friendly.php?s=academic_integrity`. The site also includes Earlham's full statement on academic integrity and procedures for addressing academic violations of the Student Code of Conduct.

Academic Integrity, My Commentary

Except when explicitly structured as a group project all of the assignments are to be done individually. While you are welcome to discuss the problems with each other and are encouraged to be available to help each other with the material, the solutions you submit must be your own work. So, break your discussions off before you get into the details—help each other with the concepts, not the specifics.

Similarly, your solutions must not be based on solutions to similar problems you may find elsewhere. While you are welcome, even encouraged, to consult other texts or students who have taken the class in the past, if you should find a problem similar to one you have been assigned you should not consult its solution. The problem sets are assigned as exercises for you to do. They are not research problems for which you should be looking for the answers in reference material.

I take academic honesty seriously—truth is the foundation of our community ethic. While I understand that recognizing the line between serving your fellow students as a resource and helping them inappropriately is not always easy to discern, you must keep these two separate. If you have any doubt at all, please discuss it with me either in person or by e-mail. (Questions of this sort will be kept confidential.) If any doubt remains, err on the side of being less helpful than you might.

Disabilities:

> Students with a documented disability (e.g., physical, learning, psychiatric, visual, hearing, etc.) who need to arrange reasonable classroom accommodations must request accommodation memos from the Academic Enrichment Center and contact their instructors each semester. For greater success, students are strongly encouraged to visit the Academic Enrichment Center within the first two weeks of each semester to begin the process.

It is important to follow this procedure.