CS 1060: Explorations in Computer Science

Administrative Details and Syllabus
Fall 2009

Description. Applications of modern computing have transformed the ways that people communicate, govern, learn, play, shop, socialize, and work. The rapid pace at which computational innovations appear, combined with the surface complexity of the digital world, lead most people to despair of ever learning how it all works. The good news, however, is that mastering a small number of scientific principles and engineering strategies leads directly to a high-level understanding of the vast field of computing. The scientific principles—representation, abstraction, and algorithm—date back many hundreds of years and are the intellectual basis of computing. The engineering strategies—digital circuits, stored programs, programming languages, and networks—date back roughly sixty years and are the practical basis of computing. This course introduces these seven principles and shows how they make possible such disparate technologies as web search engines, computer-animated movies, computer games, digital music, and artificial intelligence.

There are no pre- or co-requisites for this course. The course assumes no background in computing beyond the ability to use a computer to send email, browse the web, and write papers. The course is appropriate for students seeking an understanding of computational principles that will complement their major field of study.

This course satisfies the Applied Science (AS) Intellectual Explorations requirement.

This is not a computer literacy course.

Instructors. D. Erin Parker. *Email:* `parker@cs.utah.edu`. *Office:* 3190J MEB *Office Hours:* See the class website.

David Johnson. *Email:* `dejohnso@cs.utah.edu`. *Office:* 2875 WEB *Office Hours:* See the class website.

Teaching Assistants. TBA. See the class website for the TA consulting schedule.

Class Meetings. Mondays, Wednesdays, and Fridays 10:45-11:35a in 1230 WEB and 1250 WEB (unless otherwise indicated).

Communication. The class website is `www.learning.eng.utah.edu` (select CS 1060). It will be updated throughout the semester with the class schedule, assignments, links to course software, and much more. The website requires users to log in, and first-time users will need to establish a new account (the enrollment key is **1060**). *It is critical that students become familiar with the class website right away.*

To send urgent messages to everyone in the class, such as corrections to assignments or changes in due dates, the course staff will make use of the email addresses that students provide when establishing a new account on the class website. *Students are expected to check their email and the class website regularly.*

Students who would like to ask a question of the course staff should use the staff mailing list (`teach-cs1060@eng.utah.edu`). The course staff will respond to each question directly.

Text and clickers. *Computer Science Illuminated* by Nell Dale and John Lewis, 3rd ed, Jones and Bartlett Publishers, 2007 (ISBN-13: 978-0-7637-4149-5, ISBN-10: 0-7637-4149-3) is required.

Clickers (from TurningPoint Technology, ISBN: 9788440139160) are required and available at the University Bookstore. *Students must "click" using their UID.*

Lectures. This class will meet for lecture three times a week for fifty minutes. The instructor will often make use of slides during lecture, and the slides (along with any other materials pertinent to the lecture) will be posted on the class website. Students are encouraged to take notes in class and should not expect to rely solely on posted slides to recall the material covered in each lecture. Lectures will often involve in-class demonstrations and experiments. *Students are expected to participate actively by asking and answering questions.*

The lecture schedule is posted on the class website as a weekly outline, and each lecture has a corresponding reading assignment.

Guest speakers. For many of the topics covered in this course, an engineer or scientist from industry or academia will be invited speak to the class. Each guest will describe his or her work and how it relates to the topic, complementing the narrower view of the textbook and giving students a broader view of the topic. Further, students will have an opportunity to see how scientists and engineers work and think. *Attendance at class meetings that feature guest speakers is expected and will be graded (see below).*

Assignments. Students will practice the concepts learned in the classroom by completing weekly assignments. Most assignments will be computer-based and will entail investigating computational phenomenon using provided software.

Each assignment will clearly indicate how and when students should submit their solutions. *Students are expected to submit completed assignments by the posted due date and time.*

Testing. Student progress will be evaluated frequently throughout the semester by a number of quizzes to be given in class. Quiz dates will be announced with at least one-week notice.

Further, a number of practice tests will be administered through the class website, and *completion of such practice tests will be graded (see below).*

The final exam for this class is cumulative and will be given on Monday, December 14, 10:30a–12:30p in 1230 WEB.

Grading. The final course grade will be based on a number of evenly-weighted assignments (45% total), a number of evenly-weighted quizzes (25% total), a final examination (20%), and class participation (10%). The class participation grade will be based on attendance of guest lectures, completion of practice tests, clicker use, and overall contribution to class meetings.

Scale for assigning letter grades:

		89-87	B+	79-77	C+	69-67	D+		
100-93	A	86-83	B	76-73	C	66-63	D	59-0	E
92-90	A-	82-80	B-	72-70	C-	62-60	D-		

Students who wish to appeal a grade on an assignment or a quiz, must do so within one week of receiving the grade.

Working Together. Students are encouraged to discuss assignments with fellow classmates, but each student is responsible for writing her own answer. *Cheating is:* sharing written or electronic work either by copying, retyping, looking at, or supplying a copy. *Cheating is not:* discussing concepts, answering questions about concepts or clarifying ambiguities, or helping someone understand how to use the class tools and software.

Of course, there must be no collaboration during examinations. Please see the University of Utah Student Code (`www.regulations.utah.edu/academics/6-400.html`) for a detailed description of the university policy on cheating.

Students with Disabilities. The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. Students who need accommodations in this class should give reasonable prior notice to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with the student and instructor to make arrangements for accommodations.

Syllabus. The following are the key topics planned for study, the approximate number of lectures devoted to each, and the corresponding chapters in the course text.

Getting Started (2 lectures) Chapter 1
- Administrative details and course overview
- Layers of computing

Information Layer (5-6 lectures) Chapters 2-3
- Positional notation (bases 2, 8, 10, 16)
- Binary arithmetic
- Representing integers, reals, text, colors, audio data, images

Hardware Layer (10-11 lectures) Chapters 4-5
- Logic gates and truth tables
- Circuits
- Adders and multiplexers
- Integrated circuits
- Essential subcircuits (ALU, control unit, memory)
- Data and control paths
- Fetch-decode-execute cycle

Programming Layer (9-10 lectures) Chapters 6-9
- Algorithms
- Pseudocode
- Problem solving
- High-level and low-level programming
- Object-oriented and imperative programming
- Abstract data types
- Algorithm analysis

Operating Systems Layer (2-3 lectures) Chapter 10
- Operating systems
- Memory management
- Virtual memory

Applications Layer (9-10 lectures) Chapters 12-14

- Databases
- Cryptography
- Artificial intelligence
- Simulation
- Graphics
- Virtual reality

Communications Layer (2 lectures) Chapters 15-16

- Networks
- World wide web