

# COMPUTER SCIENCE E-1

*Understanding Computers & the Internet*

## SYLLABUS

### Teaching Staff

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### Description

This course is all about understanding: understanding what's going on inside your computer when you flip on the switch, why tech support has you constantly rebooting your computer, how everything you do on the Internet can be watched by others, and how your computer can become infected with a worm just by being turned on. Designed for students who use computers and the Internet every day but don't fully understand how it all works, this course aims to fill in the gaps. Through lectures on hardware, software, the Internet, multimedia, security, privacy, website development, programming, and more, this course "takes the hood off" of computers and the Internet so that students understand how it all works and why. Through discussions of current events, students are also exposed to the latest technologies.

## Course Website

The course's website can be found at <http://cse1.net>. Visit the course website to view videos of lectures and sections, download problem sets, and read announcements.

## Expectations

Students will be expected to attend or watch all lectures and sections. Students will also submit nine problem sets, take two exams, participate on the course's discussion board, and complete a final project.

## Lectures

Lectures will be held on Mondays from 5:30pm–7:30pm in Northwest Labs B101. All lectures will be recorded, and videos will be made available online via the course website.

## Sections

Teaching Fellows will record weekly video segments to review material and discuss topics in greater depth. All videos will be made available online via the course website.

## Problem Sets

Nine problem sets will be assigned throughout the semester. All problem sets will be released on Mondays and will be due at 5:30pm Eastern Time the following Monday (with a seven minute grace period). One point will be deducted from the problem set's score for each minute late it is submitted, with a maximum deduction of 100 points. Extensions will be granted only in cases of emergency; technical difficulties will not be considered emergencies. All problem sets will be completed and submitted electronically, and submission instructions will be posted with each problem set.

## Discuss Participation

The course discussion board can be found at <http://cse1.net/discuss>. If ever confused about the problem sets or anything covered in class, don't hesitate to post a new question! The course staff will field questions as quickly as possible, but also feel free to help your peers.

Many of the topics we'll cover in class relate to current events in the tech world. For at least five of the course's lectures/sections, find an article, paper, or video that discusses a topic presented in class. Then, post a short summary of the article (along with anything you learned or found particularly interesting) to the course discussion board. Feel free to comment on other students' links as well! More detailed guidelines can be found at <http://cse1.net/guidelines/discuss>.

## Final Project

The final project is the culmination of the course. Students will be given the opportunity to develop their very own web site with content of their choosing. The project will be open-ended, and guidelines will be distributed after Lecture 8.

## Grades

Final grades will be computed as follows:

<i>Problem Sets</i>	40%
<i>Exam 1</i>	15%
<i>Exam 2</i>	15%
<i>Final Project</i>	20%
<i>Discuss Participation</i>	10%

## Exams

Exams will be closed-book, and no external aids (laptops, smartphones, calculators, *etc.*) will be allowed. The first exam will cover material presented in Weeks 1–4 (inclusive), and the second exam will cover material presented in Weeks 5–9 (inclusive). Exams will take place in lieu of lecture on those dates. Students who live in New England will be expected to take the exam on campus. Students who live outside of New England are expected to arrange for proctors no later than one week before each exam. See <http://cse1.net/proctors> for additional information. The exam schedule is as follows:

### *Exam 1*

Monday, March 11

5:30pm–7:30pm

### *Exam 2*

Monday, April 29

5:30pm–7:30pm

# Schedule

*Lecture 1: Hardware (January 28)*

ASCII. BIOS. Binary. Bits. Bitwise operators. Booting. Motherboards. Peripherals.

*Lecture 2: Hardware (February 4)*

Caching. CPUs. Hard disk drives. Parallelism. Pipelining. RAM. Registers. Solid-state drives.

*Movie 1: Pirates of Silicon Valley (February 11)*

*President's Day, no lecture (February 18)*

*Lecture 3: The Internet (February 25)*

Domains. DHCP. DNS. IP addresses. NAT. Net Neutrality. Protocols. Routers. Servers. URLs.

*Lecture 4: The Internet (March 4)*

FTP. HTTP. IP. IMAP. Packet switching. SSH. SMTP. TCP. UDP.

*Exam 1 (March 11)*

*Spring Break, no lecture (March 18)*

*Lecture 5: Multimedia (March 25)*

Audio. Bitmaps. Compression. DRM. JPEGs. Video.

*Lecture 6: Security (April 1)*

CSRF. Injection. Malware. Trojans. Worms. Viruses. XSS.

*Lecture 7: Privacy (April 8)*

AES. Caesar. Encryption. RSA. SSL. Vigenère.

*Lecture 8: Website Development (April 15)*

CSS. HTML. XML.

*Lecture 9: Programming (April 22)*

Algorithms. Booleans. Conditions. Loops. JavaScript. Scratch. Statements. Variables.

*Exam 2 (April 29)*

*Movie 2: The Social Network (May 6)*

## Books

No books will be required for this course. The following books are recommended for additional reading:

*Computers Are Your Future*, Complete, 11th Edition

Catherine Laberta

Prentice Hall, Inc., 2010

ISBN 0-135-09276-0

*How Computers Work*, 9th Edition

Ron White

Que Publishing, 2007

ISBN 0-7897-3613-6

*How the Internet Works*, 8th Edition

Preston Gralla

Que Publishing, 2006

ISBN 0-7897-3626-8

*HTML, XHTML, and CSS: Your visual blueprint for designing effective web pages*

Rob Huddleston

Sams Publishing, 2008

ISBN 0-470-27436-0

Each of this course's recommended books has been placed on reserve in Grossman Library, located in Sever Hall 311; the books may not be checked out. The library's hours can be found at <http://www.extension.harvard.edu/2010-11/resources/libraries.jsp>

## Academic Honesty

All work that you do toward fulfillment of this course's expectations must be your own unless collaboration is explicitly allowed by the staff. Viewing, requesting, or copying another individual's work or lifting material from a book, magazine, website, or other source—even in part—and presenting it as your own constitutes academic dishonesty, as does showing or giving your work, even in part, to another student.

Similarly is dual submission academic dishonesty: you may not submit the same or similar work to this course that you have submitted or will submit to another. Nor may you provide or make available solutions to homework or exams to individuals who take or may take this course in the future. Moreover, submission of any work that you intend to use outside of the course (e.g., for a job) must be approved by the staff.

If in doubt as to the appropriateness of some act, contact the staff. All forms of academic dishonesty are dealt with harshly.

## Acknowledgement and Authorization

Harvard plans to make video and audio recordings of Computer Science E-1 (CSCI E-1) lectures and other events and activities related to CSCI E-1, with the aims of making the content of the course more widely available and contributing to public understanding of innovative learning (the "Projects"). The recordings, or edited versions of them, may be made available to other Harvard students, to students at other educational institutions, and to the broader public via the Internet, television, theatrical distribution, DVD, or other means. It is also possible that the recordings may be used to make other derivative works in the future. Students may elect not to appear in video used in the Projects and may still participate fully in CSCI E-1.

When you submit Problem Set 1, you will need to sign online an Acknowledgement and Authorization in the following form:

I understand that, if I do not wish any video footage of me to be used as part of the Projects, I should so inform the course's instructor by emailing [recordings@cse1.net](mailto:recordings@cse1.net) within one week of enrolling in CSCI E-1. In that event, I understand that I should sit in the designated "no film" section of CSCI E-1 classrooms and should not walk in the field of view of the cameras. I understand that Harvard will take reasonable steps, with my cooperation, to avoid including identifiable images of me in Project video shot in classrooms and other course locations after I opt out as just described. I understand that I am free to opt out of the Project videos in this way, and that doing so will not affect my grade or my ability to participate in course activities.

Unless I opt out of the Project videos as described above and take the steps that will be outlined by the instructor to avoid being filmed, I authorize Harvard to make and use video and audio recordings of my participation in CSCI E-1 and activities related to CSCI E-1 (the "Recordings"). I understand and agree that the Recordings may include my image, voice and name. I also understand and agree that, even if I opt out of the Project videos, my voice and spoken name may be picked up by microphones outside the "no film" section and may be included in the Recordings.

I understand and agree that Harvard will have the irrevocable, worldwide right to make, edit, modify, copy, publish, transmit, distribute, sell, publicly display, publicly perform, and otherwise use and make available their respective Recordings and any other works that may be derived from those Recordings, in any manner or medium now known or later invented, and to authorize others to do so as well. I hereby transfer to Harvard any rights, including copyrights, I may have in the Recordings Harvard makes. I will remain free to use and disseminate any ideas, remarks, or other material that I may contribute to course discussions.

I acknowledge and agree that I will not be entitled to any payment, now or in the future, in connection with the Recordings or any works derived from them. This Acknowledgment and Authorization is a binding agreement, and is signed as a document under seal governed by the laws of the Commonwealth of Massachusetts.

Unless you opt out as described in the Acknowledgment and Authorization, you are agreeing, by attending CSCI E-1, that your participation in CSCI E-1 and related activities may be filmed and used by Harvard in connection with the video projects without further obligation or liability to you, even if you do not sign any authorization.

If you have any questions about the above, contact [recordings@cse1.net](mailto:recordings@cse1.net).