

# CS193i — Internet Technologies

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<http://www.stanford.edu/class/cs193i/>

## The Course in a Nutshell

CS193i is a programming oriented survey of current Internet technologies. The course explores the authoring, distributing, and browsing technologies that make the Internet. Each topic area includes a programming project. Topics include...TCP/IP: namespace, connections, and protocols. Client/server structures. World Wide Web/HTTP/HTML techniques for text, images, links, and forms. Server side programming with CGI. Server side programming with java Servlets and JSPs. Network effects, the prisoner's dilemma, protocol inertia, Spam externalities, security, privacy, and other social issues.

Programming projects cover both client and server side projects working in Perl and Java. The emphasis will be on understanding, exploiting, and extending Internet technologies. The prerequisite for the course is moderate programming skill and a basic ability to get around Unix (described below). The basics of the Perl and Java languages will be explained in lecture (or in a special section), but the coverage will be pretty quick, so you need to have a good enough programming background to pick up the language material quickly.

## Coverage

We will spend enough time on each topic to understand the fundamentals of how it works, see how it fits into the overall scheme, and implement a non-trivial homework assignment. As a practical matter, this means spending two or three weeks per topic. The goal is to understand the fundamentals of each of the major technologies which make up the Internet. The course will not pursue extreme depth in any one area, but I think that the topics are accessible enough that a few weeks can cover the most interesting material and give you a sense of the big picture.

## Prerequisites

CS193i students should have programming experience at the level of CS106B, CS106X, or CS193U: software engineering, writing and debugging significant programs, pointers, recursion, dynamic memory management. CS106A may be sufficient, but it's more of a reach. Students need to be proficient programmers because CS193i does not teach programming, but its assignments, in exercising various areas of Internet technology, will require programming and debugging skills. There's no C programming in the course, instead we use Perl and Java. You need sufficient programming and debugging background to help you absorb the technologies we use without any basic programming hand-holding. If your programming background is not that strong, you will need to be extra committed to starting the assignments early so you can pick up what you need as

we go. Students should also have a basic understanding of editing, compiling, and debugging programs in the Unix environment because many of the projects will need to be tested on a Unix.

## Topics

*TCP/IP* Understand how TCP/IP works to provide a namespace and to get bytes back and forth between computers. Datagram and socket oriented communications. As a project, create a program on a Unix machine, which uses TCP/IP to communicate in some interesting way. Understand the foundation TCP/IP provides for all that is built on it.

*Perl* A quick introduction to the Perl language. At least some of this will be in a special after-hours section.

*HTML/HTTP* Understand how HTML and HTTP work to build the Web. HTML content issues: syntax, content types, links, site structure. How the HTTP protocol works. Write a client side program that exercises HTTP in some significant way.

*HTTP Server programming* Understand how HTML forms and the CGI interface can build dynamic HTTP content. As a project, create some interesting CGI application.

*Java* (a) how to program in Java, and (b) using Java for server-side programming. I will not assume students know Java already, but students should have a strong enough programming background that they can pick it up from quick Java lectures. As with Perl, some of the language material will be covered in an after-hours section.

*Internet Truisms and Applications* Throughout the term, there will be opportunities to discuss truisms and issues of the Internet and its current applications: what's on the Internet, the Internet as a medium in comparison with traditional media such as newspaper and television, network effects on market share and standards, Internet "culture," indexing and searching technology, security and privacy issues, the future of the Internet. I will intermix this material within all the programming material as time and as my limited editorial restraint allows.

## Instructor

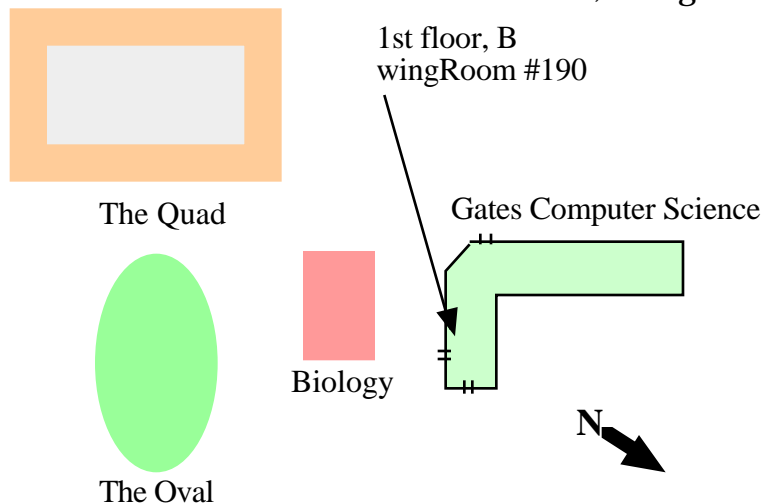
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<http://www-cs-faculty.stanford.edu/~nick/>

(650) 725-4727

Nick's Office: Gates 190. On the first floor, facing the Biology building...



Nick's Office Hours — I'll list my regular office hours along with the staff's on a separate handout. However, I'm often in my office in the afternoon and evening — feel free to call or stop by.

### Lecture Location and Time

Where: Terman Aud  
 When: MWF 1:15-2:05  
 Channel: E3

Lecturers may also available at <http://stanford-online.stanford.edu/>

### Electronic Materials — Course Web Page

The irony would be unbearable if this course were not to make good use of electronic materials. All course materials will be available on-line off our course page at <http://www.stanford.edu/class/cs193i/>. The course page will include all manner of information of interest to CS193i, including assorted links and FAQs for the assignments. Handouts should appear on the course page at least an hour before lecture. The course page also includes all sorts of class related materials: links of interest, homework materials, and handouts from previous years.

### Paper Handouts

I will provide ample paper copies of the handouts for all who attend class in person + 20% or so. Leftover paper copies of the handouts from class are kept in the bins down the hall from my office. Once those run out, please use the electronic versions— I am not committing to keeping the paper bins perpetually full. I'll make plenty for class time, and when they're gone they're gone, and there's no handout fee.

### Books

There is not a specific required textbook for the class. No single book currently exists which covers all of our topics to great depth. We will have class handouts and free online materials to provide basic coverage for each topic. That does not

mean that books are not useful, they are just not required. The first two books in the following list are fine choices — it covers many CS193i topics and it's most detailed for Java which is our most complex topic.

*Webmaster in a Nutshell*, by Spainhour, 1999. Brief coverage of HTML, HTTP, CGI.

*Core Servlets and JSPs*, by Marty Hall, 2000. Good coverage of Java servlets and JSPs, which are our last two topics. Does not teach Java.

*Core Web Programming*, by Marty Hall, 1998. Teaches Java from the ground up but with an Internet emphasis. Discusses many Internet technologies including HTML, HTTP, and CGI.

*How to Set Up and Maintain a Web Site*, 2nd Ed, 1997, by Lincoln D Stein. Covers many topics in moderate detail: HTML, HTTP, basic CGI structure. Has examples in several languages.

*Just Java 1.2*, 1998, by Peter van der Linden. A good Java book — there are many good Java books available, and they all pretty much cover the material we will be using.

*Learning Perl*, by Schwartz. More detail on Perl than we will need, but a good book anyway. We use a pretty moderate subset of the Perl language, so any Perl book will be fine.

## Staff

Once the staff is finalized, I'll produce a list of everyone's contact information and office hours on the web page.

## Email Question Address

We'll maintain a universal e-mail question queue at `cs193i@cs.stanford.edu`. If a question is common enough, we'll add it to the FAQ list on the course page. If your question is going to require stepping through code, looking at variables, etc...please bring it to office hours so someone can look at it properly. When framing your question, try to articulate what you are trying to do, what you have tried, and what you think is going wrong. Short, specific questions work well by email. More involved questions work best by coming to office hours, or calling during office hours so at least there's a dialog. I will provide a handout summarizing the time, location, and phone number for all of the staff hours once we get that sorted out.

## Grading

The grading in the class is divided between a four or five projects during the quarter (50%) and a final exam (50%). SITN students are encouraged but not required to take the exam on campus. A passing grade on the final exam is required to pass the class.

## P/NC Students

Students taking the course P/NC may work in teams of 2 on the assignments, and the assignments will have slightly reduced requirements. The idea is to help make the course accessible to people with a general interest in the material.

## Computers

Some of the assignments will require using a Stanford leland account. For the most part, the assignments will use industry standard components — C, CGI, Perl...Where possible, we will allow you to develop your projects on the platform of your choice, but we'll have you move it to leland for final testing and submission. If you do not have a leland account, you need to get one — call (650) 725-2101.

## Late Submissions

Instead of having to ask for extensions on a catastrophe by catastrophe basis, everyone gets three calendar “late days” to extend the due dates of any of the assignments. In keeping with the all electronic, 24-hours a day theme of the post-Internet world, late days will be measured in straight calendar days with no distinction for weekends or holidays. All homework deadlines will be at midnight Pacific time. (The semantic nit in the audience will note that due to the start of daylight savings time, at some point in the quarter you will *lose an hour*. Any student concerned about this can bring a Federation approved temporal containment module to my office at the end of the quarter, and I will refund the hour.)

These late days are intended to deal with the ordinary events of student life, both frivolous and serious: 2 midterms that day, inadvertently spent all night playing WarCraft II, disk crash, med. school interview, illness, started way too late...After your late days are used up, late work loses pretty quickly— about a half a letter grade per day. Come and see me in person in exceptional circumstances. Note that disk failure and other computer or network problems probably *do not* represent exceptional occurrences. Hoard your late days “just in case”, or spend them early and fly with no parachute— it's up to you.

Giving students their own late-day supply seems more fair since all the students are on the same footing. However it means you now need to make your own decisions about when to use a late day, and when to just turn in what you have. It should allow you to do a better job and hopefully learn more in the cases where your schedule gets disrupted. However, three late days do not provide too large a cushion. You should plan to finish your homeworks on time and reserve the late-days for real problems.

By default, I'm assuming that SITN students and all other non in-class-in-person-the-traditional-way students have exactly the same deadlines as everyone else. The handouts and materials go up on the web at the same time planet wide. TVI or other large-latency SITN students should contact their TA (once they've been assigned) to work out a schedule to account for their logistical delay.

## Honor Code

You are free to discuss ideas and problem approaches with others, but all the work you hand in should be your own creation. **In particular, sharing or copying code is not OK.** If you feel a particular bit of collaboration may have crossed the line, just clearly cite what help you got and from whom. You can never get in Honor Code trouble if the help is clearly credited.

## Class Quote

“It has been claimed that a very large number of monkeys, armed with a very large number of typewriters, would eventually reproduce the great works of mankind. It would appear that the internet is well on its way to proving *that* wrong.” (From the .sig of Michael J. Stango)

## Lecture Plan

Here's the initial lecture and homework plan for CS193i. It basically allows 2 weeks for each major topic area from page 2 except for Java which gets 3. The assignments are due about once every two weeks and will often be due on Tues and Thurs nights at midnight.

Week/Mon	Topics
1 Apr 2	Introduction. What is the Internet and why is it interesting. Begin TCP/IP. LAN technology. Routers.
2 Apr 9	Basics of TCP/IP code. Basic Perl.
3 Apr 16	Sockets for sending and receiving. Services and protocols.
4 Apr 23	HTML and HTTP. (TCP/IP due)
5 Apr 30	Finish HTTP
6 May 7	CGI (HTTP due)
7 May 14	Finish CGI. Start Java
8 May 21	Servlets and JSPs (CGI due)
9 May 28	(Memorial day) Finish Servlets and JSPs. Security and privacy. Advanced topics.
10 jun 4	Advanced topics. (Servlets due)
Finals	<b>Final exam: Wed Jun 13th, 8:30-11:30 a.m. slot</b> There will be a single alternate time for the exam, but it may be very near to the regular time, so you will need to be available.