

## Syllabus

**Course:** CS4244: Internet Software Development  
**Class:** 12:30PM - 1:45PM Tuesday, Thursday  
**Room:** McBryde 307  
**URL:** <http://courses.cs.vt.edu/~cs4244/spring.09/>  
**Listserv:** CS4244\_11902@listserv.vt.edu

**Instructor:** Dr. Eli Tilevich  
**E-mail:** tilevich@cs.vt.edu (please, use CS4244 for the subject line).  
**Office:** McBryde 122  
**Office Hours:** Tuesday, Thursday 3:15-4:15 or by appointment  
**GTA:** Yang Jiao  
**E-mail:** jiaoyang@vt.edu  
**Office:** McBryde 106 or 110  
**Office Hours:** Tuesday, Thursday 4:00-5:00 or by appointment.

### Overview:

The last decade and a half has witnessed unprecedented changes in our society caused by the Internet revolution. One cannot imagine a world without the Internet and its many applications, including the WWW, e-mail, and search engines. The society critically depends on the Internet for both information and entertainment. The Internet of today presents a slew of exciting opportunities and serious challenges that need to be addressed. Not surprisingly, the Internet has been driving innovation not only in computing but in many other areas. The net effect is that the absolute majority of jobs in information technology are concerned with some aspect of Internet software development, whose knowledge provides a critical competitive advantage on the IT job market.

The goal of this course is to provide students with the knowledge and skills required to become effective Internet developers. To that end, the course introduces students to the major Internet development concepts through significant hands-on experience with several mainstream Internet development technologies.

Students can follow one of the two tracks to complete this course: (1) standard and (2) research.

The *standard* track includes:

1. 3 programming projects
2. a research project (exploring in detail an Internet technology or an issue),
3. midterm exam
4. final exam

In the standard track, all projects will be completed in teams, while the exams will be taken individually.

The *research* track requires completing the first programming project and then accomplishing a substantial term project. The term project includes:

1. choosing a research topic (with consultation with the instructor)
2. performing research to obtain new knowledge
3. presenting the findings in class
4. preparing a publishable manuscript (to be submitted to a peer-reviewed venue)

The term project is team-based.

All graduate students must follow the research track. Undergraduate students may choose either track to complete the course.

### Course Objectives:

Having successfully completed the course, the student will be able to:

- Explain the main Internet programming concepts such as client-server, proxying, mobility, etc.
- Explain at a network protocol level how resources (e.g., documents) are requested and transferred over the Web.
- Implement Web-based systems using Internet development tools such as sockets, remote procedure calls, and XML.
- Implement basic Web servers and clients.
- Learn new Internet technologies using the concepts covered in the course.

### Syllabus:

1. Introduction	5
2. Client-Server architecture	20
Networking Primer	
HTTP	
Static/dynamic content	
Error handling	
Session management	
3. Performance issues and fault tolerance	20
Concurrency	
Web Proxying/Caching	
Replication, Distribution, Mobility	
4. Programming Systems/Abstractions	20
Sockets	
Remote Procedure Calls	
Web services	
Component Models	
5. Security	10
6. Document Representations	10
MIME	
XML processing	
Semantic Web	
7. Emerging technologies	15

**Teaching approach:**

Internet software development involves a great deal of programming, which can only be learned by doing. This course, therefore, has a significant programming component. However, in learning a computer science discipline, it is essential that one differentiate between concepts and technologies. While concepts remain the same (or at least evolve very slowly), technologies tend to proliferate, particularly in the case of the Internet. For a handful of Internet programming concepts, one can find numerous technologies based on them. A thorough understanding of concepts enables one not only to learn new technologies quickly, but also to see through marketing hype. The specific Internet technologies covered in this course are selected primarily on the basis of how well they demonstrate the underlying concepts.

**Prerequisites:**

- CS 3204: Operating Systems
- Proficiency in the Java programming language (students with insufficient background in Java but strong programming skills should be able to learn Java by completing Web-based self-study courses)
- Ability to design, code, test, and document a computer system that is several hundred lines of code in size.

**Textbooks:**

No textbook is required for this course. All the reading assignments will come from web pointers and handouts. Internet development is a topic that combines aspects of distributed systems, networking and software engineering. Hence it is difficult to find a single textbook that combines the appropriate aspects of each of these areas of computer science, especially in a way that reflects recent developments. Fortunately, there are many appropriate resources available on the Web.

The following optional texts will be of interest as supplementary texts:

Jim Kurose and Keith Ross, *COMPUTER NETWORKING: A TOP-DOWN APPROACH FEATURING THE INTERNET*, Pearson: Addison Wesley, 2004,

Elliotte Rusty Harold, *JAVA NETWORK PROGRAMMING*, Sebastopol CA: O'Reilly Media, Inc., 2005.

**Grading:**

Semester grades will be determined after all work has been completed and graded. Point ranges for letter grades may be based on a number of factors, including absolute and relative performance.

For the standard track, the grade breakdown is as follows:

Programming Projects (3)	60%
Research Project	10%
Midterm	10%
Final	15%
Class Participation	5%

For the research track, the grade will be assigned based on the final manuscript, including the significance of the research results obtained and the quality of the presentation. All manuscripts are expected to be submitted for publication in conference proceedings or journals.

### **Collaboration Policy and Honor Code:**

The class website has links to the following policies that apply to this class: University Policy of Class Attendance, the Honor Code, and the ACM and IEEE Code of Ethics.

### **Students with Disabilities:**

If you need adaptations or accommodations because of a disability (learning disability, attention deficit disorder, psychological, or physical), if you have emergency medical information to share with the instructor, or if you need special arrangements in case the building must be evacuated, please meet with the instructor as soon as possible.