Welcome to Illinois TECH
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ROOM 258

ITMD 441/541

Web Application Foundations

Week 1

FALL 2023 – AUGUST 21, 2023

Week's Agenda

- Course Introduction & Syllabus Review
- Web History and Introduction to the Triad of Core Technologies
- Assignments

Course Introduction

What the class is

- This course is intended to teach the foundational technologies used in web development in order to make sure you are prepared for other courses in the program.
- We will be primarily talking about the 3 core technologies, HTML5, CSS3, and JavaScript.
- While there is some expectations that you will be familiar with basic HTML & CSS, we will review some of the basics but spend more time discussing some of the more modern and newer techniques.
- We will also learn the basics of the JavaScript language and how to apply it in the context of a web page and/or browser.
- We will discuss web protocols and architecture but will not focus on back-end or server-side programming. We will be focusing on the front-end technologies.

What the class isn't

- Not a back-end development class. We are focusing on the foundational front-end technologies that are used regardless of what back-end language or technology you may be using.
- Not a database class. We will discuss the use of databases but will not be writing any SQL.
- Not a graphic design class. We will focus on the usability of a user interface made with HTML and CSS but not necessarily artistic decisions. User experience will be considered, and any UI should be functional and flow well.

Class Topics Include

- JavaScript, Cascading Style Sheets (CSS), HTML
- Standard Compliant markup and code
- HTML5 & CSS3: features, markup, and APIs
- JavaScript language syntax
- JavaScript version differences
- History of Internet applications and web technologies
- HTTP / HTTPS Protocol
- Client/Server architecture
- Responsive design principles
- Creating working code prototypes from interface mockups
- DOM manipulation
- AJAX techniques for asynchronously loading content
- Object Oriented Programming (OOP)
- JavaScript Object Notation (JSON)
- JS Scope & Namespace
- ES6 Modules
- Security threats posed to internet applications
- Introduction to command line tools and version control (Git)
- Frameworks
- Using online API documentation

Web Certifications

- These are two web certifications we loosely basing course topics around
- We won't cover them all but hope to cover many
- https://www.ciwcertified.com/ciw-certifications/web-and-mobile-design-series/advanced-html5-and-css3-specialist
- https://www.ciwcertified.com/ciw-certifications/web-development-series/javascript-specialist

Review Syllabus

- Let's review the syllabus

Hardware Requirements

- You will need access to a computer of some kind to develop on.
  - Need to be able to install software. You will also need to install NodeJS and Git SGM at some point.
  - Any OS: Windows, Mac, Linux
  - There are computer labs on campus. Check OTS Lab software list on their website.
- Your computer will need a developer friendly web browser
  - Install Chrome, Edge, Safari, and/or Firefox
- Your computer will need a plain text editor
  - One made for programming use. Must edit in plain text UTF-8 format.
  - VS Code, Sublime Text, Atom, Notepad++, and many others
  - Do not use WordPad, MS Office, or any RTF editor (no bold, italics, etc.)
- A development web server would be helpful. There is a basic node package (http-server), PHP has one built in, VMs, docker containers, or use a tool like XAMPP, MAMP to provide a complete isolated web stack.
- Per ITM department policy students are required to have a notebook computer for the program. See the requirements in the undergraduate or graduate student information.

Tips for Success

- Largely what will determine what you get out of this course is by doing your own additional reading, research, and practice.
- I will show examples and talk about some of the theory but will not be able to cover every topic in detail. You will need to branch out on your own and do some extra research and readings.
- If you have a question, you are probably not the only one.
  1. Google the exact problem, probably find stack overflow
  2. Check the discussion board if there is one
  3. Send TA an email or visit office hours (If we have a TA)
  4. Send me an email
- **Do not wait until the last minute to start any assignments, start early!**

Questions?

Web History and Introduction to the Triad of Core Technologies

A Brief History of the Web

A Brief History of the Web

- 1963 – Ted Nelson coined term hypertext. Text linked content
- 1969 – ARPANET
  - First Real Packet Switched Network
  - Under Contract from ARPA by BBN of Cambridge, MA and under Bob Kahn
  - Connected mostly a handful of Universities First link UCLA and Stanford
- 1972 – Email adapted for ARPANET
  - Ray Tomlinson of BBN, choose @ to separate name and host
- 1973-74 – TCP
  - Bob Kahn at DARPA and Vint Cerf at Stanford develop TCP
  - 1978 TCP finalized into TCP/IP

A Brief History of the Web

- 1980 - Tim Berners-Lee at CERN creates ENQUIRE
  - personal database of people and software models
  - simple Hypertext program
- 1983 – ARPANET switches over to TCP/IP from NCP
- 1984 – DNS system
  - made addresses on the Internet more human-friendly
- 1987 – About 30,000 hosts on Internet

A Brief History of the Web

- 1989 – Tim Berners-Lee of CERN develops a new technique for distributing information on the Internet.
  - Information Management: A Proposal
  - Based on Hypertext
  - Called it the World Wide Web
  - http://www.w3.org/History/1989/proposal-msw.html
- 1990 - World Wide Web concepts defined, protocols and technologies
  - HTML, HTTP, and URLs
- Aug 6, 1991 - First web page created for project on info.cern.ch
  - http://www.w3.org/History/19921103-hypertext/hypertext/WWW/TheProject.html

A Brief History of the Web

- 1993 - Mosaic – first major graphical web browser to make the Internet accessible to non-techies
  - Developed by Marc Andreeson and team at the National Center for Supercomputing Applications (NCSA), University of Illinois
  - Later forms Netscape
- 1994-95
  - CompuServe, America Online, and Prodigy start providing dial-up Internet access.
  - Netscape develops Navigator Browser and SSL
  - Sir Tim Berners-Lee founds the World Wide Web Consortium (Oct 94)

A Brief History of the Web

- 1995 continued
  - Ebay, Amazon, Vatican, Geocities all go online
  - Sun releases Java programming language
  - JavaScript created by Brendan Eich (originally called LiveScript) is released as part of Netscape Navigator
- 1996 – HoTMaIL, First webmail
- 1997 – Weblog term coined
- NASA pathfinder sets traffic record with over 200 million views between July 4-8, 1997

A Brief History of the Web

- 1998 – Google goes live
- 1999 – Napster
- 2001 – Wikipedia
- 2004 – Facebook
- 2005 – Youtube
- 2006 – Twitter
- Nov 2006 – 100 Million Websites
- 2007 – iPhone brings era of mobile web
- Sept 2014 – 1 Billion Websites

A Brief History of the Web

- https://www.w3.org/2004/Talks/w3c10-HowItAllStarted/?n=0
- https://en.wikipedia.org/wiki/History_of_the_World_Wide_Web
- https://www.w3.org/2012/08/history-of-the-web/origins.htm
- https://www.w3.org/History.html
- https://web30.web.cern.ch/web-history.html
- https://thehistoryoftheweb.com/timeline/
- https://home.cern/science/computing/birth-web/short-history-web
- https://webfoundation.org/about/vision/history-of-the-web/

Introduction to the core web technology triad

HTML

- HyperText Markup Language
- Created by Tim Berners-Lee while working at CERN
- Wrote the original internet-based hypertext system proposal memo in 1989.
  - https://www.w3.org/History/1989/proposal.html
- First description of HTML was a document called "HTML Tags" in 1991.
  - https://www.w3.org/History/19921103-hypertext/hypertext/WWW/MarkUp/Tags.html
- Strongly influenced by CERN SGML (standard generalized markup language) based system in use at CERN
- HTML elements become the building blocks of HTML pages.
- He created HTML and HTTP protocol
- Set of nested "tags" that look like xml and is a markup language, not a programming language
- This provides a way to make structured documents with structural semantics like headlines, paragraphs, links, lists, and other items. Tags either directly insert content in the page or wrap around content to provide additional information.
- **HTML** is the **STRUCTURAL** layer of a web page

HTML

- Major Version History
- HTML Tags – Informal CERN document with 18 tags, October 1991
- HTML 1.1 – First draft with a version number, November 1992
- HTML 2.0 – Published as IETF RFC 1866, November 1995
- HTML 3.2 – Published as W3C recommendation, January 1997
- HTML 4.0 – Published as W3C recommendation, December 1997 and reissued in April 1998 with minor edits
- HTML 4.1 – Published as W3C recommendation, December 1999
- HTML 5 – Published as W3C recommendation, October 2014
- XHTML 1.0 – Published as W3C recommendation, January 2000 and revised in April 2002
- XHTML 1.1 – Published as W3C recommendation, May 2001 and based on XHTML 1.0 Strict
- XHTML 2.0 – Was a working draft but abandoned in 2009 in favor of HTML5

HTML

HTML History Resources

- https://en.wikipedia.org/wiki/HTML
- https://www.w3.org/People/Raggett/book4/ch02.html

CSS

- Cascading Style Sheets
- A style sheet language used to describe how the markup should look and be presented to the user in the browser.
- First proposed in October 1994 by Håkon Wium Lie, Norwegian, while working with Tim Berners-Lee and Robert Cailliau at CERN.
- Arena web browser became the first to implement CSS
- He joined W3C in 1995 to work on CSS Specifications with Bert Bos
- Wium Lie became an activist for web standards, including challenging Microsoft to support web standards.
- Robert Cailliau wanted to separate the structure (HTML) from the presentation (CSS) to allow for more flexible presentation of the same content
- Original browsers/editors had the "style sheets" hard coded into the programs so consistency between different browsers was difficult.
- Proposals were being presented in 1994-1995 and by 1996 CSS level 1 was published as a recommendation.

CSS

- Used to apply visual styles to a web page and its structure
- **CSS** is the **PRESENTATION** layer of a web
- CSS 1 – Published as a recommendation December 1996
- CSS 2 – Published as a recommendation May 1998
- CSS 2.1 – Published as a recommendation June 2011
  - Single large specification, fixed errors in CSS 2
  - Went back and forth from working draft to candidate recommendation for many years
- CSS 3 – Current standard being developed
  - Full specification is split up into modules
  - Comprised of many small modules in working drafts
  - Started being worked on when CSS 2 was published
  - Earliest CSS 3 drafts were June 1999, working draft was started in 2001
  - https://www.w3.org/TR/2001/WD-css3-roadmap-20010523/
- https://www.w3.org/Style/CSS/specs.en.html

CSS

CSS History Resources

- https://en.wikipedia.org/wiki/Cascading_Style_Sheets
- https://www.w3.org/Style/CSS20/history.html
- https://css-tricks.com/look-back-history-css/

- Stop Here on Day 1
- Day 2 will begin with an overview of the Syllabus in detail

JavaScript

- JavaScript – ECMA compliant Object-Oriented language
- http://en.wikipedia.org/wiki/JavaScript
- **JavaScript** or **JS** is the **BEHAVIOR** layer of your web page
- JavaScript is a programming language
- It is capable of the following
  - Animating page elements, modifying the DOM, updating content with AJAX
  - Manipulating HTML tags and CSS rules
  - Interactive elements like games and video
  - Validate forms
  - Implementing browser APIs like location and local storage
  - And much more...

JavaScript

- Originally developed by Brendan Eich at Netscape
- Prototyped in a 10-day period in May 1995
- Developed with code name Mocha, then officially called LiveScript in beta Netscape Navigator 2 in Sept 1995.
- Renamed JavaScript before final release of Netscape Navigator 2 (B3). Marketing ploy by Netscape to cash in on the popularity of the new language Java which was also included in Netscape 2. Was initially planned on being a lightweight glue language to connect Java to the browser. Released in Joint press release in Dec 1995.
- November 1996 – Netscape submitted JavaScript to Ecma International to be considered a standard.
- June 1997 – Ecma International published the ECMA-262 Specification in version 1.
- 2008-2009 there was an agreement to combine all the vendors work and move forward with the language. The result was ECMAScript 5 standard. ECMAScript 5.1 standard was published in June 2011. This was a widely supported standardized version of the language.
  - https://en.wikipedia.org/wiki/JavaScript
- ECMAScript 6 published June 2015, ECMAScript 7 published June 2016, ES13 published June 2022
  - https://en.wikipedia.org/wiki/ECMAScript

JavaScript

- We are always working towards new versions of JavaScript
- ECMAScript 6th Edition – 2015 Language Specification was a major update
- Adds new syntax and features
- All current browsers offer direct support at this point but there may be some newer features not supported
- Can compile ES6+ to ES5 with many available tools
- We will discuss some differences later in class
- Most recent version is 13th Edition, June 2022
- https://www.ecma-international.org/publications-and-standards/standards/ecma-262/

JavaScript

Additional Resources

- http://en.wikipedia.org/wiki/JavaScript
- https://en.wikipedia.org/wiki/ECMAScript
- https://www.ecma-international.org/publications-and-standards/standards/ecma-262/
- https://auth0.com/blog/a-brief-history-of-javascript/
- https://medium.com/@_benaston/lesson-1a-the-history-of-javascript-8c1ce3bffb17

Additional Resources

- Mozilla Developer Network (MDN)
  - Web API references, tutorials, and guides
  - https://developer.mozilla.org/en-US/
- Web.dev
  - Google sponsored web development documentation
  - Courses, tutorials, guides, measurement tools
  - https://web.dev/
- Reading assignments will likely come from these sources in addition to others.

Assignments

Reading/Assignments

- Make sure you have a programmer focused text editor installed and working on your computer.
- Make sure you have Chrome, Edge, Safari, and/or Firefox installed and have tried using the developer tools to inspect a web page.
- Read through some of the links provided regarding the history of the web and triad of core technologies.
- Watch for an online blackboard-based quiz covering week 1.