Database and Web Applications (33:136:440)

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The course introduces students to web and database application development. The main goal is to familiarize students with modern best-practices, on three main areas: how data is represented and exchanged over the web (both user-facing as well as API endpoints), how application front-ends are developed, and how databases are used for persistent storage in application back-ends. Topics are organized along these three main areas, and include HTML and CSS, semi-structured data concepts (DOM, XML, JSON, etc), the model-view controller (MVC) paradigm, Javascript and browser-based technologies, and web application frameworks and object-relational mapping (ORM). Students are expected to complete one individual homework assignment on each of those areas. The class is heavily hands-on, with in-lecture development of example applications that build up to each homework assignment. In addition, students are expected to propose and implement a project in groups, using any subset of the technologies covered in the class (suggested project ideas will be provided, but students can also propose their own). The project will be evaluated both on terms of a short in-class presentation motivating the project (Pecha-Kucha format), as well as a final presentation (ideally with a simple demo).

List of topics*

- Part 1: Data representations on the web
  - HTML and CSS
  - Web browsers and web development (Chrome, Firefox)
  - Semi-structured data and the DOM
  - XML, XPath, XSLT
  - JSON
- Part 2: Front-end technologies
  - Javascript basics
  - Dynamic webpages: XMLHttpRequest and AJAX
  - jQuery
  - Model-View-Controller (MVC) paradigm
  - Angular.js
- Part 3: Back-end technologies
  - Web frameworks and HTTP overview
  - Object-relational mapping (ORM)
  - UNIX command-line basics
  - Python basics
  - SqlAlchemy and Flask
- Group projects
  - Project proposal presentations (Pecha-Kucha format)
  - Final presentations and/or demos

* The set of topics covered in this course is different from, but complementary to, Business Data Management (33:136:470).

Textbook

No required textbook – class is primarily based on lecture notes/sides, and online resources (tutorials and videos). The class is also very hands-on; lectures revolve around the development of simple applications (leading to the homework assignments) and students are strongly encouraged to follow along.

Grading policies

30% Homework assignments
30% Class project
20% Midterm
20% Final