COSC 419: Topics in Computer Science
Introduction to Full-Stack Web Development

Instructor: Matthew Fritter
Class Schedule: Tuesday 18:30 - 21:20, E-401
Lab Schedule: Wednesday 18:30 - 20:20, E-401
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Course Description

This course is an introduction to full-stack web development, with an emphasis on building web software stacks and developing secure, maintainable interactive web applications. This includes back-end development using PHP frameworks, content management systems, and databases; front-end development using HTML5, CSS, JS, and AJAX; and systems administration tasks using SSH, Bash, Git, and Chron. Students completing this course will be comfortable with web development at all levels of the web software stack, and capable of provisioning and maintaining a web server.

Course Objectives

The course will consist of lectures with interactive examples, and a lab segment in which students will practically implement knowledge from the lectures to build and manage a web server and accompanying web application.

Topics covered include:

- Connecting to remote web servers via SSH, and using SSH to install and configure web software stacks, and using Git for web application deployment.
- Installation, use, and management of common back-end components, including databases such as MariaDB and SQLite, the Laravel PHP framework, and the Apache web server.
- Development of front-end responsive web pages using CSS, HTML5, and JS, including common libraries such as JQuery and Bootstrap.
- Handling of data between client and server, including use of databases, GET and POST requests, ansynchronous requests, and development of simple APIs
- Common security exploits that target web servers and applications, and methods of mitigating these exploits at both the server and client side
- Automation of backups and updates using the Chron utility and Bash scripting

Evaluation

Quizzes (5% each)	20%
Labs	50%
Final Exam	30%

- Short quizzes will be held periodically in-class throughout the semester, testing knowledge of previously covered concepts. The dates of these quizzes and the contents that are covered will be announced one week prior to the quiz date. Missed quizzes will result in a mark of zero for the quiz unless proof of hardship is given (ex. medical note, family emergency).
- Labs are due prior to the beginning of the following week's lab unless otherwise noted. Late submissions are accepted up to 24 hours past the deadline, with a 10% deduction. After 24 hours, no mark will be given without proof of hardship.
- The final exam will be cumulative, and cover all concepts introduced throughout the course, in addition to practical knowledge from the lab segments.

Course Schedule

Date	**Lecture Topic(s)**	**Lab**
W1: Sept 3-7	No Lecture	No Lab.
W2: Sept 10-14	Introduction; Concepts of Full-Stack development; Installation and configuration of web stack components; Using Git for deployment	L1: Server Setup & Git
W3: Sept 17-21	Configuration of Apache; DNS and SSL; Installation of PHP 7; Intro to PHP	L2: Apache Config, DNS, SSL
W4: Sept 24-28	Front-end development using HTML5, CSS, and JS; Responsive design; JQuery and Bootstrap libraries	L3: Responsive web pages
W5: Sept 1-5	Introduction to Laravel PHP Framework; Installation of Laravel; Basic Request Routing	L4: Laravel Install and basic routing
W6: Oct 8-12	Laravel Controllers; Advanced GET routing; Middleware	L5: Laravel controllers, routing, and middleware
W7: Oct 15-19	No Lecture/Guest Lecture (TBD)	L5: Continued
W8: Oct 22-26	Integrating databases with Laravel; Handling POST requests and User Data	L6: Laravel POST routing and database integration
W9: Oct 29 - Nov 2	Performing asynchronous calls to the server using AJAX; Development of basic APIs	L7: APIs and AJAX calls
W10: Nov 5-9	Installation and use of the Wordpress CMS	L8: Wordpress
W11: Nov 12-16	Common security exploits in web servers; Server hardening; Exploit mitigation	L9: Web server security
W12: Nov 19-23	Automating server maintenance tasks; Remote data backup; Failure recovery	L10: Automation and backup
W14: Nov 26-30	Web Statistics; Emerging web technologies; Web server and service providers	L11: Web Statistics
W15: Dec 3-7	Closing topics and errata; Final exam Review.	No Lab.

Plagiarism & Academic Dishonesty

Students are encouraged to work together on lab work, however each student must submit their own lab containing their own code. Plagiarism and academic dishonesty threaten the reputation of academic institutes and diminishes the learning experience. Plagiarism **will** be checked for. Use of libraries such as JQuery and Bootstrap is acceptable, and re-use of small code snippets (within reason) from websites such as StackExchange, MDN, and W3Schools is acceptable provided that attribution is given. If you have any concerns over whether code is acceptable for re-use, please contact the instructor before you submit the assignment. Any cases of plagiarism found after assignment submission will be forwarded to the department head.

Required Texts

This course has no required textbooks. However, it is recommended that students bring a computer or tablet to class to follow along with the notes and take part in examples and demonstrations.