Dynamic Web Applications
Alex Leitch, aleitch1@umd.edu

INST377
FALL 2019

Catalog Description
This course will be an exploration of the methods, tools, and processes for developing dynamic, database-driven user interfaces and websites, which will cover an end-to-end process to build a web application. This includes acquiring, installing, and running web servers, database servers, and web applications.

Extended Course Description
This course will introduce methods and tools for developing application layers that include both front-end and back-end of a web-based system. This course will cover acquiring, installing and running database servers, web servers, modules, and web applications. This course will also cover methods, skills, and processes for developing and maintaining application layers that allow end-users to interact with underlying databases through dynamic web interfaces.

Learning Outcomes

Upon completion of the course, students will be able to:
1. Articulate the basic approaches and key development elements for building databases and dynamic user interfaces.
2. Acquire, install and maintain a web server as a stand-alone component or as part of a bundled software distribution.
3. Acquire, install and maintain applications that facilitate interactions between different layers of the application or site architecture.
4. Build dynamic web interfaces that allow a wide range of users to interact with underlying databases.
5. Articulate the relationships between server and client-side technologies including web servers, API layers, JavaScript, CSS, and HTML.
6. Identify security issues in dynamic web applications and develop approaches to address them.
7. Maintain code versions and update servers using Git version control.
8. Understand universal usability and how it applies to web applications
9. Explain how programming is situated in and reflects social issues (e.g. racism or sexism) and describe actions that individuals or organizations are taking to counteract inequities in software and programming/technical organizations.

Class Meets
Section 0101
Mondays, Wednesdays, & Fridays
11:00am – 11:50am
HBK #0302H

Section 0102
Tuesdays & Thursdays
12:30pm – 1:45pm
HBK #0302H

Section 0103
Tuesdays & Thursdays
9:30am – 10:45am
HBK #0302H

Office Hours
Wed., 1pm-3pm,
HBK 4111G
and by appointment

Teaching Assistants
Pooja Gada
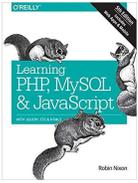pooja.gada@rhsmith.umd.edu
Joo Hee Choi
jchoi27@umd.edu

Prerequisites
INST 327

Antirequisite
INST 407

Course Communication

Required Resources

Course website: elms.umd.edu

Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5
Nixon, Robin
Fifth edition (2018).
ISBN # 1491978910
(*Fourth edition from 2014 is also acceptable, but watch page and chapter numbers may differ from syllabus*)

1. Sourcetree, Git Graph for VSCode, Tower, or similar Git graph visualization software

2. VSCode or similar plain-text editing software
    a. https://code.visualstudio.com/

We will be working through programming examples during class. Please bring your charged laptop to class. There are very few charge points in the classroom.

Other Resources
- One HTML Page Challenge: https://onehtmlpagechallenge.com/ || https://github.com/Metroxe/one-html-page-challenge
- CSS Zen Garden: http://www.csszengarden.com
- Oh Shit, Git: https://ohshitgit.com/
- Github guides: https://guides.github.com/
- Mozilla Developer's Network: https://developer.mozilla.org/en-US/docs/Web
- W3schools.com: https://www.w3schools.com/
- Wizard Zines: https://wizardzines.com/
- AMPPS: https://ampps.com/
- HTML5 Boilerplate: https://html5boilerplate.com/

Campus Policies

It is our shared responsibility to know and abide by the University of Maryland's policies that relate to all courses, which include topics like:

- Academic integrity
- Student and instructor conduct
- Accessibility and accommodations
- Attendance and excused absences

- Grades and appeals
- Copyright and intellectual property

Please visit www.ugst.umd.edu/courserelatedpolicies.html for the Office of Undergraduate Studies' full list of campus-wide policies and follow up with me if you have questions.

Course-Specific Policies

- Attend class and arrive on time
- Bring a charged laptop to class
- Participate in class - ask questions, answer professor questions
- Monitor Canvas daily; adjust settings as needed to ensure receipt of all notifications
- Follow course calendar activities:
  - Read chapters before the lecture
  - Complete quizzes as assigned
  - Review practice problems before in-class labs
  - Complete labs in class and submit via Canvas
  - Submit all individual and team assignments via Canvas on time
- All team members must participate in the team project

No phones (or other messaging services) in use during class.
I understand and have considered arguments for permitting digital communications in the classroom. However, in my experience (and based on the research evidence) the reality is that they present an irresistible distraction and detract from the cooperative learning environment. Researchers have found that these distractions do in fact interfere with learning and active participation. For that reason, the use of phones will not be permitted during class meetings (except when required for ADS accommodations). Your laptop is required to participate in class, however, you will be asked to close it during lecture and during class presentations.

I expect you to make the responsible and respectful decision to refrain from using your cellphone in class. If you have critical communication to attend to, please excuse yourself and return when you are ready. For more information about the science behind the policy watch: youtu.be/WwPaw3Fx5Hk

Names/Pronouns and Self Identifications
The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering equitable classroom environments. I invite you, if you wish, to tell us how you want to be referred to both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). The pronouns someone indicates are not necessarily indicative of their gender identity. Visit trans.umd.edu to learn more. Additionally, how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity, is your choice whether to disclose (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all your fellow Terps.

Office Hours, Topic Clinics, Group Project Support
For extra clarification of a lecture topic, lab exercise, quiz, or assistance with a homework assignment, please come to office hours. NOTE: A schedule will be posted with timeslots for team project support. Support appointments will be scheduled via Google sheets and timeslots must be reserved in advance. At least two team members must attend support appointments.

Course Activities and Assessments

Lectures

You are expected to complete the assigned reading prior to class time. Lectures will be interactive; please arrive in class on time and prepared to participate. You may have your laptops open during lecture for class activities such as note-taking, referencing an e-copy of the book, or running class exercises.

Quizzes

There will be twelve quizzes throughout term to test your comprehension of reading assignments and lecture. Quizzes are individual work designed to cover material from class. All quizzes are due by the date indicated on ELMS, and some quizzes may have a completion time limit.

In-Class and Take-Home Work

There will be participatory in-class work in this course, which you will be expected to complete outside of class, and submit via ELMS from a public Github repository. Please submit your work by the due date listed on the assignment - as covered in our grading policy, work that is more than ten days late will receive a zero. If an assignment due date is a religious holiday for you, please let the instructor know as soon as the assignment is announced so that an alternate due date can be set for you.

You should come to class well-prepared to work on problems and design techniques. Although you may consult with your classmates, TAs, and instructor, you must work individually while you build, type, test, and debug your answers.

Homework Assignments

There will be five assignments over the semester, each of which will include 2 to 4 questions.
1. Points: Each assignment is worth 50 points.
2. Types of Assignments: Most assignments are coding or server configuration tasks. You will have 1 to 2 weeks to work on and complete each assignment. The assignments are individual work. This means that although you may consult with your classmates and the instructor to develop general approaches to solving the challenges, you are expected to work individually while you build, type, test and debug the code.
3. Notifications: Assignment questions will be made available on Canvas.
4. Submissions: Completed assignments will be submitted via Github.
5. Help Scores: If an assignment is marked as "help scores available", it means you can help or being helped by any classmates to finish the assignment. In this case, students who helped another student get extra credits when both students agree that there were help activities between the two students. Helping one student will add 5 points per help activity to his or her original points (i.e., 5 * the number of students you helped). This means, ideally, a student can earn more than the full points for a help-score-available assignment. Note that helping a classmate DOES NOT mean that a helper student does an assignment on behalf of another. It means literally helping the classmate to understand the process/code fully. If a student who was helped by another does not have basic understanding of an assignment, the help score will not be applied.
6. If "help scores available" is not specified, students should work on the assignment by himself/herself. Any help more than a general, high-level discussion could be regarded as plagiarism or cheating.

Group Project

Students will work in 4-to 6-student teams and build a non-trivial web-enabled application over the semester. The final project will involve identifying an end-user need for interacting with a database, determining the requirements for the application that will facilitate the interaction, developing a deadline-oriented plan for building the application, and coding and documenting the application. Groups will be asked to find and articulate their own project topics, but they

may seek the instructor's input whilst identifying possible topics and choosing the topic to be used. Students can show preferences for group mates, but the instructor may finalize project groups based on diversity in skill sets and career goals. The instructor will provide more details on the project in the class. The following are brief descriptions of the different parts of the group project.

- **Mid-term Presentation**: A mid-term presentation will be administered
  - to test students' understanding of course materials and
  - to check the progress on the group project
  - The mid-term presentation may include explaining particular concepts/technologies that will be used in the final deliverable, interface/DB design, and the rationale of the project.
- **Final Presentation:** Each group is expected to
  - Introduce and justify the project
  - Demo the final website that runs on a production server (Google Cloud)
  - Explain technologies and architectures used
  - Describe development processes and strategies
  - Discuss limitations and future work
- **Deliverables**: Along with the final presentations, each group needs to submit:
  - The URL of the final system
  - Scripts and database dump files through Github
  - Technical documentation and user manuals
  - A final report for the project

Mid-Term Exam
A mid-term exam will be administered to test students' understanding of web-enabled database concepts, web interface technology concepts, development processes, as well as their script coding skills. More details will be announced a few weeks before the exam.

Final Exam
A final exam will be administered to test students' understanding of web-enabled database concepts, web interface technology concepts, development processes, as well as their script coding skills. More details will be announced a few weeks before the exam.

Grading
- Grades are not given, but earned.
- Your grade is determined by your performance on the learning assessments in the course and is assigned individually (not curved).
- If earning a particular grade is important to you, please speak with me at the beginning of the semester so that I can offer some helpful suggestions for achieving your goal.
- All assessment scores will be posted on the course ELMS page.
- If you would like to review any of your grades (including the exams), or have questions about how something was scored, please email me to schedule a time for us to meet in my office.
- I am happy to discuss any of your grades with you, and if I have made a mistake I will immediately correct it.
- Any formal grade disputes must be submitted in writing and within one week of receiving the grade.
- Final letter grades are assigned based on the percentage of total assessment points earned.

Learning Assessments	Total	Weight

Assignments	250	25%
Midterm Exam	100	10%
Midterm Presentation	150	15%
Final Presentation	150	15%
Final Reports and Code	200	20%
Final Exam	100	10%
Participation	50	5%

Late Submission Policy

Timely submission of the completed assignments is essential. Each one-day late submission subtracts 1/3 letter grade, so submitting an assignment a single day late will take an A+ to an A, five days late will result in an A+ becoming a B-. After 11 days, the best grade, regardless of quality, will be failing. Late submissions will also receive less feedback from me. If an assignment due date is a religious holiday for you or you have any serious issues that prevent you from meeting the due date, please let the instructor know as soon as the assignment is announced, so an alternate due date can be set. This notification should be made within 24 hours after the assignment is announced. Otherwise, there will be no adjustment in the due date.

Get Some Help!

Taking personal responsibility for your own learning means acknowledging when your performance does not match your goals and doing something about it. I hope you will come talk to me so that I can help you find the right approach to success in this course, and I encourage you to visit tutoring.umd.edu to learn more about the wide range of campus resources available to you. In particular, everyone can use some help sharpen their communication skills (and improving their grade) by visiting ter.ps/writing and schedule an appointment with the campus Writing Center. You should also know there are a wide range of resources to support you with whatever you might need (see go.umd.edu/assistance), and if you just need someone to talk to, visit counseling.umd.edu or one of the many other resources on campus.

Most services free because you have already paid for it, and **everyone needs help**... all you have to do is ask for it.

Basic Needs Security

If you have difficulty affording groceries or accessing sufficient food to eat every day, or lack a safe and stable place to live and believe this may affect your performance in this course, please visit go.umd.edu/basic-needs for information about resources the campus offers you and let me know if I can help in any way.

Syllabus Change Policy

This syllabus is a guide for the course and is subject to change with advance notice.

CourseEvalUM

Course evaluations are a part of the process by which the University of Maryland seeks to improve teaching and learning. The University Senate approved the implementation of a standard, online, University-wide course evaluation instrument. Each course evaluation contains a set of universal questions, and some are supplemented by questions from specific colleges. Across the University, course evaluations are being administered through a web-based system dubbed CourseEvalUM. Students who leave no "Pending" evaluations in their Evaluation Dashboard each semester can view the aggregate results of a sub-set of universal items online.

Across the University, course evaluations are being administered through a web-based system dubbed CourseEvalUM. All information submitted to the Evaluation System is confidential. Instructors and academic administrators can only view summarized evaluation results after final grades have been submitted. Instructors and academic administrators cannot identify which submissions belong to which students. This standardized set of evaluation results provides the University with useful information on teaching and student learning across the campus.

For additional info see Student Fast Facts at:
https://www.irpa.umd.edu/Assessment/CourseEval/stdt_faq.shtml

Tentative Course Schedule

Dynamic Web Applications INST377

This is a tentative schedule, and subject to change as necessary – monitor the course ELMS page for current deadlines. In the unlikely event of a prolonged university closing, or an extended absence from the university, adjustments to the course schedule, deadlines, and assignments will be made based on the duration of the closing and the specific dates missed.

	Date	Topics	Readings	Assignments
1	Aug 26-31 Intro	➤ Introduction & Overview ➤ Local dev environment, What is a Web Stack?	➤ Nixon, Ch. 1 & 2 ➤ ampps.com	➤ Install a web server and the database of your choice - probably AMPPS ➤ Sign up for Github
2	Sep 3-6 Git/HTML1	SHORT WEEK - LABOUR DAY No class Monday. ➤ Source control & Git ➤ Git Workflows ➤ HTML and the Document Object Model	➤ Introduction to the Document Object Model at MDN ➤ Oh Shit, Git - ohshitgit.com ➤ W3Schools HTML Tutorial ➤ One HTML Page Challenge	➤ Clone a copy of the boilerplate for the OneHtmlPageChallenge ➤ Complete the W3Schools HTML Tutorial
3	Sep 9-13 CSS Selectors Setting Up A Server	➤ CSS Selectors ➤ Server Setup	➤ Nixon, Ch. 18 ➤ Nixon Ch. 13 ➤ CSS Zen Garden ➤ W3Schools CSS Tutorial	➤ Add a CSS animation and two media breaks to your HTML page ➤ Add a basic JS widget to your HTML page
4	**Sep 16-20** Javascript 1	➤ Variables, Data Types, Operators	➤ Nixon Ch. 13 ➤ W3Schools Javascript Tutorial	➤ **DUE: HTML/CSS Assignment 1**
5	Sep 23-27 Javascript 2	➤ Functions/Conditionals ➤ Objects & Arrays	➤ Nixon, Ch. 14 ➤ Nixon, Ch. 15 ➤ Nixon, Ch. 17	
6	Sep 30-Oct 4 Database Integration 1	➤ Adding A Database to Your Server ➤ Introduction to Group Project ➤ Revisit MySQL	➤ Nixon Ch. 7 ➤ Nixon, Ch. 8 ➤ Nixon, Ch. 9	➤ **DUE: HTML/CSS/JS Assignment 2** ➤ **Pick Your Groups For A Larger Project** ➤ **Team Contracts Due**
7	Oct 7-11 Databases And PHP	➤ Getting Data To Your Application/Working With PHP	➤ Nixon, Ch. 3 ➤ Nixon, Ch. 4	

8	Oct 14-18 Definitions And Conversations	➢ What Is A CRUD App? ➢ Working With Verbs To Get Your App Talking To Itself ➢ Forms/GET and POST ➢ Security on the Internet - Cookies, Sessions, and Auth	➢ Nixon Ch. 17 ➢ Nixon Ch. 12 ➢ Nixon Ch. 11	
9	Oct 21-25 Single-Page Web Apps 1	➢ Javascript Applications On The Client Side ➢ Single-Page Web Apps ➢ JSON & Asynchronous Operations	➢ Nixon Ch. 21 ➢ Nixon Ch. 27	
10	Oct 28-Nov 1 Midterms	➢ Midterm Presentations	➢ Midterm Presentations	➢ **Midterm Assignment Presentations**
11	Nov 4-8 Javascript Front-End Frameworks	➢ Installing A Front-End Development Suite ➢ jQuery vs Front End Frameworks	➢ React Documentation	
12	Nov 11-15	➢ Split-Development Applications ➢ Advanced Topics		
13	Nov 18-22	➢ Advanced Topics Presentations		
14	Nov 25-26	SHORT WEEK - THANKSGIVING		
15	Dec 2-6	➢ Final Presentations	➢ Final Presentations	➢ **Final Presentations**
16	Dec 9	LAST DAY OF CLASS EXAM REVIEW		➢ **Exam Review**