Carleton University
Department of Systems and Computer Engineering
SYSC 4504: Fundamentals of Web Development, Fall 2019
Course Outline

Instructor:

- **Thomas Kunz, CB 5202, tkunz@sce.carleton.ca**
- **Office Hours: Tuesdays 2-3 pm, CB 5202**

TA Information

- **Zahra Jahedi, ZahraJahedi@cmail.carleton.ca**
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Calendar Information

SYSC 4504: Fundamentals of Web Development
WWW architecture, web servers and browsers, core protocols. Web pages, their structure, interpretation and internal representation. Client-side and server-side programming. Data representation. Interfacing with databases and other server-side services. Cookies, state management, and privacy issues. Security. Web services.

Prerequisites
SYSC 2004. Additional recommended background: SYSC 4602 or SYSC 3303.

SYSC 2004 teaches the basics of object-oriented programming. In this course, we will use two distinct OO languages (JavaScript and PHP), and the lectures will assume that students understand the basic OO concepts (classes, objects, methods). SYSC 2004 and its prerequisites will also have ensured that students mastered a certain level of maturity in writing non-trivial programs, something that will be required in this course as well, starting with Lab 3 and Assignment 2.

SYSC 4602 or SYSC 3303 introduce students to data networks, and in particular the Internet protocol stack. They also introduce the concept of a client-server application, with the two parties running concurrently and communicating via an application-specific protocol. The course builds on this knowledge, as web-based applications involve clients (web browsers) and servers communicating over a data network, using a specific application-layer protocol (HTTP). We will not discuss the network protocol aspects in detail, and these courses are therefore only recommended. However, we will cover the basics of HTTP and will occasionally link specific topics, such as state management in web applications or authentication in web applications, to the corresponding underlying HTTP features.

Students who have not satisfied the prerequisites for this course must either withdraw from the course or obtain a prerequisite waiver by visiting the Engineering Undergraduate Academic Support Office.

Course Objectives
Distributed Systems are ubiquitous and of unprecedented importance. Examples of the Web and Internet-based applications illustrate the development and the deployment of these architectures. In distributed systems, resources and users can be located geographically anywhere. The objective of the course is to discuss the fundamental concepts and the software solutions, in the design of a distributed system, in particular the use of WWW-related technologies. During lab sessions, students will apply the concepts presented in class in the form of WWW exercises (markup, styling, etc.) and programming exercises. Programming will be in JavaScript (client-side) and PHP (server-side), and will involve querying an SQL database.

Learning Outcomes
1. Understand the overall architecture of a web-based application
2. Know the basic skills required to design a static webpage (HTML, CSS)
3. Be able to design forms/user input and validate the input (both on the client/browser side as well as on the server side)
4. Can explain the differences and pros/cons of client-side programming versus server-side programming in web-based applications
5. Manipulate web pages on the client side via JavaScript and DOM
6. Process user input on both client-side and server-side
7. Write server-side code as part of a web-based application in PHP
8. Integrate/Interact with a relational database using SQL
9. Manage state in web-based applications
10. Use and design simple web-based services using either XML or JSON
11. Understand the basic security challenges, limitations of provided solutions in HTML/HTTP, and common approaches to defending against typical security attacks such as SQL Injection or XSS (Cross Site Scripting).

Graduate Attributes (GA's)
The Canadian Engineering Accreditation Board requires graduates of engineering programs to possess 12 attributes at the time of graduation. Activities related to the learning outcomes listed above are measured throughout the course and are part of the department's continual improvement process. Graduate attribute measurements will not be taken into consideration in determining a student's grade in the course. For more information, please visit: https://engineerscanada.ca/.

Graduate Attribute	Learning Outcome (s)
2.1 Problem definition	1, 4, 9, 11
2.2 Approach to the problem	2, 3, 5-10
4.2 Detailed design specifications and requirements	4, 11
4.4 Design solution(s)	5, 8, 10
4.5 Design implementation / task(s) definition	3, 7, 8, 9, 10

Mandatory Textbook: Randy Connolly and Ricardo Hoar, Fundamentals of Web Development, 2nd Edition, Pearson 2018, ISBN-10: 0134481267, ISBN-13: 978-0134481265

Other References:
I will use cuLearn for managing course interactions, grades, as well as assignment and lab submissions. There is also a course webpage where I will post announcements, assignments, as well as other course material. The webpage is at http://kunz-pc.sce.carleton.ca/sysc4504/, and access to parts of the course material is password-controlled.

Evaluation and Grading Scheme
Students will be evaluated by means of assignments, a midterm exam, and a final exam. The midterm exam will be Wednesday, October 30, either from 8:30 am to 10 am (if I can get additional rooms at that time) or alternatively from 6 to 7:30 pm. Students who are unable to write the exam because of illness or other circumstances beyond their control must provide evidence. In the case of illness, this requires a medical certificate dated no later than one working day after the exam. The certificate must specify the date of the onset of the illness, the (expected) date of recovery, and the extent to which the student was/is incapacitated during the time of the examination. If this information is provided to the instructor no later than five working days after the exam, a deferred midterm exam will be scheduled. The final exam will be scheduled during the university exam period in December.
There will be a number of assignments and labs. Doing those is the best way to learn the course material, so students are encouraged not to "write them off" just because of its relative low weight in the overall grading scheme. Labs are due at the end of the scheduled lab, assignment due dates will be clearly stated on the assignment handouts. Late assignments will not normally be accepted, and will receive a mark of 0; however, students who cannot submit an assignment by the due date for valid medical or compassionate reasons should contact the instructor immediately and prior to the due date to arrange for appropriate accommodations (e.g., an extension of the due date). Arrangements must be made in a timely manner, otherwise the assignment will be considered late and not accepted.
Students are encouraged to discuss design issues when working on assignments; however, you are expected to write your own programs. There is a fine line between cooperating with your colleagues (discussing problems and ideas) and copying program code (plagiarism). Not only is plagiarism an instructional offense (see the current Undergraduate Calendar, Academic Regulations of the University, Section 14), but doing the assigned work by yourself is by far the best way to prepare for the exams. To facilitate discussion of assignment-related issues, cuLearn maintains a discussion topic for each assignment, which will be monitored by the TA(s) and myself.
For each of the 6 labs during the term (labs are in odd weeks only), there will be a lab sheet with exercises to work through. Then, there will be a lab assignment that you will need to hand in (through cuLearn) for the lab credit. I will post the lab worksheets on cuLearn before the labs, to allow you to study them as a preparation for the lab (but not the assignment part). The lab assignments will cover the following topics:

Lab 1	Week 1	HTML
Lab 2	Week 3	CSS
Lab 3	Week 5	JavaScript
Lab 4	Week 7	PHP
Lab 5	Week 9	SQL
Lab 6	Week 11	Managing State

A final exam will be held during the University's December examination period. Where circumstances warrant, apply to the Registrar's Office for deferral of the final exam. However, in case of deferral, the following rule will apply:

> Students who miss the final exam may be granted permission to write a deferred examination (see the Undergraduate Calendar for regulations on deferred exams). These students have additional months to study and a less crowded examination schedule compared to their colleagues who write the final exam in December. As such, it is only fair to expect substantially better performance from these students on the deferred examination than on the December final exam.

Both exams will be open textbook. Only proper copies of the official course textbook will be accepted, no alternative textbooks, photocopies, ebooks, etc.

Breakdown of course requirements (labs, assignments, quizzes, exams, etc.)

To pass the course, a student must pass the final examination (D- or better). For these students, the marks will be calculated as follows (with a final score of below 50 resulting in course failure):

	Assignment 1	***Assignment 2***	***Assignment 3***	***Labs (6 in total)***	***Midterm***	***Final***
Weight	5%	5%	5%	2% each	23%	50%
Available	Sept. 24	Oct. 16	Nov. 6			
Due	Oct. 15, noon	Nov. 5, noon	Dec. 3, noon		Oct. 30	December

The final examination is for evaluation purposes only and will not be returned to students. You will be able to make arrangements with the instructor or with the department office to see your marked final examination after the final grades have been made available.

Week-by-Week breakdown

1. Introduction
2. How the Web Works
3. Introduction to HTML
4. Introduction to CCS
5. HTML Tables and Forms
6. JavaScript 1: Language Fundamentals
7. JavaScript 2: Using JavaScript
8. JavaScript Frameworks
9. Introduction to Server-Side Development with PHP
10. PHP Arrays and Superglobals
11. Working with Databases
12. Error Handling and Validation
13. Managing State
14. Security
15. XML Processing and Web Services (optional, depending on time)

These topics correspond to specific chapters in the course textbook. I expect that you read the course textbook in preparation for the lectures.

General Regulations

Attendance: Students are expected to attend all lectures and lab periods. The University requires students to have a conflict-free timetable. For more information, see the current *Undergraduate Calendar, Academic Regulations of the University, Section 2.1.3, Course Selection and Registration and Section 2.1.7, Deregistration.*

Health and Safety: Every student should have a copy of our Health and Safety Manual. A PDF copy of this manual is available online: http://sce.carleton.ca/courses/health-and-safety.pdf

Deferred Term Work : Students who claim illness, injury or other extraordinary circumstances beyond their control as a reason for missed term work are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor and in all cases this must occur no later than three (3.0) working days after the term work was due. The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule. For more information, see the current *Undergraduate Calendar, Academic Regulations of the University, Section 4.4, Deferred Term Work.*

Appeal of Grades : The processes for dealing with questions or concerns regarding grades assigned during the term and final grades is described in the *Undergraduate Calendar, Academic Regulations of the University, Section 3.3.4, Informal Appeal of Grade and Section 3.3.5 Formal Appeal of Grade.*

Academic Integrity: Students should be aware of their obligations with regards to academic integrity. Please review the information about academic integrity at: https://carleton.ca/registrar/academic-integrity/. This site also contains a link to the complete Academic Integrity Policy that was approved by the University's Senate.

Plagiarism: Plagiarism (copying and handing in for credit someone else's work) is a serious instructional offense that will not be tolerated.

Academic Accommodation: You may need special arrangements to meet your academic obligations during the term. You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at http://www.carleton.ca/equity/ For an accommodation request, the processes are as follows:

- **Pregnancy or Religious obligation**: Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf
- **Academic Accommodations for Students with Disabilities**: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic

accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your ***Letter of Accommodation*** at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (*if applicable*). **Requests made within two weeks will be reviewed on a case-by-case basis.** After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website (www.carleton.ca/pmc) for the deadline to request accommodations for the formally-scheduled exam (*if applicable*).

- **Survivors of Sexual Violence:** As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: https://carleton.ca/sexual-violence-support/.
- **Accommodation for Student Activities:** Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf