

**Course Outline**

<b>Course Name:</b>	Principles of Web Development COMP 307 – Fall 2016		
<b>Instruction:</b>	Joseph Vybihal Office: ENGMC 323 Website: MyCourses	Email: <a href="mailto:jvybihal@cs.mcgill.ca">jvybihal@cs.mcgill.ca</a> Office hours: TBD or by appointment	
<b>Credits:</b>	2 credits		
<b>Motivation:</b>	Developing the front and back end of web sites, together with comprehending the various paradigms, theories and current technologies involved in web development is an important and relevant skill to have for students graduating from computer science and planning to work as programmers.		
<b>Course Objectives:</b>	Students wanting to work as web site developers will need to understand the concepts behind server-side execution, client-side execution, security, language paradigms, distributed processing, interpreters, deployment methods, web frameworks, the architecture of the Internet, and some of the latest techniques and technologies. This would include common practises and common programming languages.		
	<b>Primary learning outcome:</b> To get a clear understanding of the major principles & algorithms that underlie web development and receive practical hands-on experience through a project.		
	<b>Secondary learning outcomes:</b> After taking this course, the student should be able to: (1) identify the core technologies in web development and how they are architect-ed, (2) explain the paradigms and principles on which the core functions are built on, (3) be able to discuss major performance issues (data storage and run-time load), and (4) discuss the web technologies and techniques required for a particular target application.		
<b>Course Description:</b>	The course discusses the major principles, algorithms, languages and technologies that underlie web development. Students receive practical hands-on experience through a project.		
<b>Primary Text:</b>	Internet & World Wide Web: How to Program; Pearson; ISBN 978-0-13-215100-9		
<b>Additional Text:</b>	Software Systems; Kendall hunt; ISBN 978-0-7575-9514-1		
<b>Evaluation:</b>	Project	30%	Teams of 3 (last month)
	Mini Assignments	20%	7 submissions (first two months)
	Presentation	10%	
	Final Exam	40%	
	McGill CS Tech Web Site? Glory	(0, 1 or 2 entries at most are published to site)	
<b>Course Prerequisite:</b>	COMP-206		
	COMP-307 assumes previous <u>introductory</u> experience programming in HTML, CGI, Bash, Python, C, and installing a simple web site at a publicly hosted directory under a Unix-type server.		
<b>Course Co-Requisite:</b>	COMP-303		

## Tentative Course Schedule

WEEK	LECTURE	DESCRIPTION	WORK
1	1	Introduction to COMP 307 & History of the Internet <ul style="list-style-type: none"> <li>• Survey &amp; introductory material with insights</li> <li>• Instructor directed self-study</li> <li>• Readings are important</li> </ul>	Course outline Prerequisites Readings: 206 notes Readings: Chapter 1
<b>The Web Landscape</b>			
	2	Networks and Packets	Wireshark demo Network topology Mini 1 – Wireshark
2	3	Client Server Technology <ul style="list-style-type: none"> <li>• Client-side (front end) Browser-based vs Stand-alone</li> <li>• Server-side (back end) Network vs Internet server</li> <li>• About sessions and the run-time environment</li> </ul>	Apache, XAMP, LAMP Readings: chapter 17.1 to 17.3 (only)
	4	Security Issues <ul style="list-style-type: none"> <li>• Man-in-the middle attacks</li> <li>• Encryption: simple, blocked, hash, public/private</li> <li>• Sessions – passwords, index.html and Apache settings</li> </ul>	<a href="http://www.cryptool.org">www.cryptool.org</a> Wikipedia: Cryptography Apache – redirection, locked folders, permission lists, IP address filtering GnuPT & WinPT Mini 2 – Cryptography
3	5	Security Issues <ul style="list-style-type: none"> <li>• The security stack</li> <li>• Routers and firewalls</li> <li>• Protocols as security</li> <li>• The Public Key Infrastructure</li> </ul>	Wikipedia: PKI Router features
<b>Frontend Development (Client-side programming)</b>			
	6	The Front-End Landscape: Browser, Stand-alone, Flash, etc. Browser-based Development: HTML5 & CSS	Notepad++, Browser inspect features Readings: chapter 2-5 Mini 3 – HTML & CSS
4	7	Browser-based Development: JavaScript fundamentals	Imbedding JavaScript Readings: chapters 6-11
	8	Browser-based Development: JavaScript DOM & Events	UI enhancements Readings: chapters 12-13 Mini 4 – JavaScript
5	9	Browser-based Development: HTML5 Canvas & JavaScript	Graphics Readings: chapter 14
	10	Standalone-based Development: socket programming	Sockets Readings: chapter 29 Mini 5 – Sockets
<b>Inter-process Communication</b>			
6	11	About REST, PUSH, and PULL About the Internet packet & REST & CGI & Strings Why message passing using strings?	<form> tag & data passing in C
	12	About formatting Internet packet strings using XML and JSON. XML as a database-like or configuration-file-like technology. JSON as an object-state or data-structure technology. About cookies.	Readings: chapter 15,16.6 Mini 6 – Web & Data
7	13	Asynchronous programming Programming with AJAX	AJAX

			Readings: chapter 16 & the project description
<b>Backend Development (Server-side programming)</b>			
	14	Web servers, databases (MySQL, PostgreSQL, MongoDB), and CSV. Directory structures and file permissions. Security through the server file system & Internet server configuration.	Apache, XAMP, LAMP Reading: chapter 17-18 Mini 7 – Web Server
8	15	REST: Python, C, and Perl. (How to program in Perl) Processing without remembering the user (abilities, scope). Processing while remembering the user (abilities, scope).	Perl PROJECT START
	16	REST: PHP (how to program with PHP)	PHP Readings: chapter 18
9	17	REST: Web Design: Model-view-controller & Web Frameworks Web Design: Transaction-based computing Slim and Bootstrap	SLIM & Bootstrap Ruby-on-Rails
	18	PUSH and PULL: Web Design: Automatic computing model Notification servers	Notification systems Observer design pattern
<b>New Technologies</b>			
10	19	Angular JS (how to program)	
	20	React (how to program)	
<b>Student Presentations</b>			
11	21	Student presentations	Overview of your website New tech description Your website deployment Your website architecture Your website security Demo of your website Q & A
	22	Student presentations	
12	23	Student presentations	
	24	Student presentations	
13	25	Student presentations & Project Submission + Demo	
	26	Student presentations & Project Submission + Demo	

## About Assignments

Assignments are original works created by the student alone. You are permitted to have conversations with other students concerning the contents of the assignments and how to do them, but your work must be original. If two or more assignments are found to be identical (or portions of assignments) then all parties will receive zero. This includes the student who permitted their assignment to be copied. This includes written solutions and software source code.

All software solutions must compile with zero errors and must run to be graded. It does not need to run correctly for grading but it must run. If your program compiles with errors or does not run at all then you will receive zero points. The grader will not fix your code or look at the source code to give you partial grades.

**Project Description:** Student develops a complex web project

- Project selection
  - A list of projects will be proposed by the instructor from which students can select
  - Students can propose their own projects for approval by the instructor.
- These project must employ 5 to 6 technologies (to be defined)
- The project would consume the last month of the semester
- You must work in groups of 3 or 4
- Lecture 17 is important in relation to the project

**Right to submit in English or French written work that is to be graded**

In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.

**Classroom Rules:** All electronic devices (cell phones and beepers) must be turned off or left on silent mode during class time.

**Assignments Pickup:** All assignments are submitted to and picked-up from My Courses.

**Computing Resources:** Trottier 3<sup>rd</sup> floor.

**Examinations and Grading:**

Students are responsible for all materials for the tests and exams, whether or not it is covered in class. Exams will be a combination of all types of questions based on all sources, and students may be required to integrate theoretical concepts from the text to substantiate their arguments.

No make-up tests or make-up assignments are allowed in this course.

If you are not satisfied with the grading of an assignment or mid-term test, you may request a review within 7 days of return. Indicate in writing or during a meeting with the instructor where and why you feel the marks are unjustified and give it back to your instructor for re-grading. Note that the entire assignment or mid-term test will be re-graded and your grade can go up or down (or stay the same) accordingly.

*Calculators*

Only non-programmable, no-tape, noiseless calculators are permitted. Calculators capable of storing text are not permitted in tests and examinations.

*Dictionaries*

Dictionaries are not permitted, but translation dictionaries are.

*Handheld Devices*

Handheld devices capable of storing text and having calculator functionality (e.g. Palm, etc.) are not permitted.

**Additional Information:**

The course slides are not meant as a complete set of notes or a substitute for a textbook, but simply constitute the focus of the lecture. Important gaps are left in the slides that are filled in during class, thus lecture attendance should be considered essential.

The material covered in the classroom will be used to supplement textbook readings.

**Academic Integrity:** *Code of Student Conduct*

McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see [www.mcgill.ca/integrity](http://www.mcgill.ca/integrity) for more information).

L'université McGill attache une haute importance à l'honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l'on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l'étudiant et des

procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le site [www.mcgill.ca/integrity](http://www.mcgill.ca/integrity)).

**Final Exam Policy:***Regulations*

Students should not make other commitments during the final exam period. Vacation plans do not constitute valid grounds for the deferral or the rescheduling of examinations. See the Centre Calendar for the regulations governing Examinations:

<http://www.mcgill.ca/student-records/exams/regulations/>

Students are required to present their I.D. Card (with photo) for entrance to their examination.

*Conflicts*

If you are unable to write your final examination due to scheduling conflicts, you must submit a Final Exam Conflict Form with supporting documentation at least **one month** before the start of the final examination period. Late submissions will not be accepted. For details, see

<http://www.mcgill.ca/student-records/exams/conflicts/>

*Exam Timetable*

Examination schedules are posted at the Centre and on the following page approximately 6-8 weeks before the examination period commences

<http://www.mcgill.ca/student-records/exams/>

The Centre cannot provide examination dates over the telephone.

**Email Policy:**

E-mail is one of the official means of communication between McGill University and its students. As with all official University communications, it is the student's responsibility to ensure that time-critical e-mail is accessed, read, and acted upon in a timely fashion. If a student chooses to forward University e-mail to another e-mail mailbox, it is that student's responsibility to ensure that the alternate account is viable.

Please note that to protect the privacy of the students, the University will only reply to the students on their McGill e-mail account.

**Students Rights and Responsibilities:**

Regulations and policies governing students at McGill University can be downloaded from the website:

<http://www.mcgill.ca/deanofstudents/rights/>

**Students Services and Resources:**

Various services and resources, such as email access, walksafe, library access, etc., are available to students:

<http://www.mcgill.ca/student-records>

**Minerva for Students:** <http://www.mcgill.ca/minerva-students/>

**Note:** In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.