

Web Development with JavaScript & DOM

Spring, 2017

STUDY GUIDE



JÖNKÖPING UNIVERSITY

School of Engineering

Introduction

This course will teach the student different programming languages and browser interfaces for building web pages, such as HTML, CSS, JavaScript and DOM, and how to combine these to build modern and dynamic web pages. Traditionally, web pages have only been used on the web to distribute information, but today, they are also used to build [cross platform desktop applications](#), [smartphone applications](#) and games. Many programmers find JavaScript such a nice programming language that they even implement their [web applications](#) (running on the server) in it.

In this course, we will not implement web applications running on servers. Instead, focus will be on writing the files web applications send to the clients (web browsers). These files will instruct the web browser how to render the web page and what the browser should do when the user interacts with the web page. With the gained knowledge, the student will also be able to write extensions/plugins/add-ons for web browsers. We will also cover HTTP and how one can send HTTP requests to servers from web pages.

Figure 1 below shows the pre-requisites for the course (this course expects the students to have knowledge corresponding to what is taught in the other courses).

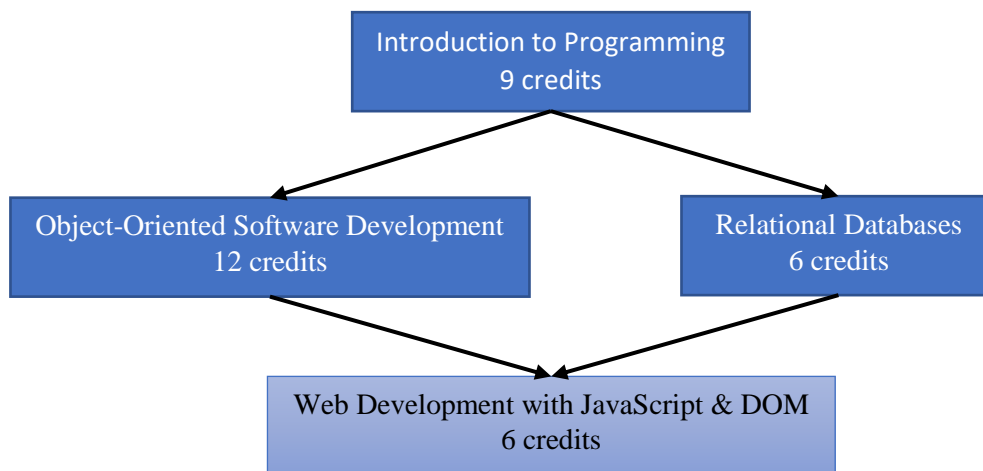


Figure 1, Pre-requisites for the course.

In addition to the recommended course books, the students will be offered lectures and lab sessions in their quest to master the subject. Examination consists of project work (creating a web page per a specification) and a Ping Pong exam.

Teachers

The teachers involved in the course, along with their responsibilities and contact information, are listed in Table 1 below.

Table 1, The teachers in the course, along with their responsibilities and contact information.

Teacher	Responsibilities	Contact information
Peter Larsson-Green	Coordinator Examiner Lecturer	Peter.Larsson-Green@ju.se 036 - 10 17 35
Anders Carstensen	Laboratory Supervisor	Anders.Carstensen@ju.se 036 - 10 15 86
Magnus Schoultz	Laboratory Supervisor	Magnus.Schoultz@ju.se 036 - 10 15 79

Intended learning outcomes

The intended learning outcomes describes what the student should have learned upon completion of the course. These are grouped into three different categories: *knowledge and understanding*, *skills and abilities* and *judgement and approach*. The intended learning outcomes in the course are listed in Table 2 below.

Table 2, The intended learning outcomes in the course.

Category	Intended learning outcome
Knowledge and understanding	<ul style="list-style-type: none">• Display knowledge of the standards in HTML, XHTML, HTML5 and CSS.• Demonstrate comprehension of the structure and functionalities in JavaScript and the Document Object Model.• Demonstrate comprehension of how asynchronous JavaScript and XML (AJAX) enables the development of advanced web applications.• Demonstrate comprehension of the limits in web applications built with AJAX (e.g. regarding search engine optimization and availability).
Skills and abilities	<ul style="list-style-type: none">• Demonstrate the ability to create HTML pages containing images, tables, links, lists, etc. and applying CSS to change the pages' graphical layout.• Demonstrate the ability to construct HTML forms and to process the content from such forms with JavaScript and regular expressions.• Demonstrate the ability to detect client side shortcomings (browser version, resolution, etc.) and to adopt the page content thereafter.• Demonstrate the ability to implement asynchronous data access with AJAX.• Demonstrate the ability to build web applications using common JavaScript libraries (e.g. JQuery, Prototype, Dojo) and frameworks for HTML/CSS layouts (e.g. Blueprint, 960 GS, etc.).• Demonstrate the ability to implement web applications complying with WCAG (Web Content Accessibility Guidelines).
Judgement and approach	<ul style="list-style-type: none">• Demonstrate the ability to compare and evaluate web applications with respect to functionality, availability and compatibility.

Examination

The course contains two different tests to verify that the student has achieved the intended learning outcomes: a Ping Pong exam and a project work. These are summarized in Table 3 below.

Table 3, Summary of the examination tests.

Examination test	Number of credits	Grades
Ping Pong exam	2	3, 4, 5 and Fail
Project work	4	3, 4, 5 and Fail

To pass the course, the student needs to pass both tests. The final grade will be derived from the grades obtained on the individual tests per Table 4 below.

Table 4, The final grade is derived from the individual grades on the examination tests.

Ping Pong exam grade	Project work grade	Final grade
3	3	3
4	3	3
5	3	4
3	4	3
4	4	4
5	4	5
3	5	4
4	5	4
5	5	5

The tests examine the achievement of the intended learning outcomes per Table 5 below.

Table 5, How the intended learning outcomes are covered by the examination tests.

Intended learning outcome	Ping Pong exam	Project work
Display knowledge of the standards in HTML, XHTML, HTML5 and CSS.	✓	✓
Demonstrate comprehension of the structure and functionalities in JavaScript and the Document Object Model.	✓	✓
Demonstrate comprehension of how asynchronous JavaScript and XML (AJAX) enables the development of advanced web applications.	✓	✓
Demonstrate comprehension of the limits in web applications built with AJAX (e.g. regarding search engine optimization and availability).	✓	
Demonstrate the ability to create HTML pages containing images, tables, links, lists, etc. and applying CSS to change the pages' graphical layout.		✓
Demonstrate the ability to construct HTML forms and to process the content from such forms with JavaScript and regular expressions.	✓	✓
Demonstrate the ability to detect client side shortcomings (browser version, resolution, etc.) and to adopt the page content thereafter.	✓	
Demonstrate the ability to implement asynchronous data access with AJAX.	✓	✓
Demonstrate the ability to build web applications using common JavaScript libraries (e.g. JQuery, Prototype, Dojo) and frameworks for HTML/CSS layouts (e.g. Blueprint, 960 GS, etc.).		✓
Demonstrate the ability to implement web applications complying with WCAG (Web Content Accessibility Guidelines).	✓	✓

Demonstrate the ability to compare and evaluate web applications with respect to functionality, availability and compatibility.	✓	
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Examination test 1: Ping Pong exam

The Ping Pong exam consists of questions worth 30 points in total. Table 6 below displays the mapping from scores to grades.

Table 6, Mapping from scores to grades for the Ping Pong exam.

Minimum score	Grade
0 points	Fail
12 points (40% of max score)	3
18 points (60% of max score)	4
24 points (80% of max score)	5

When writing the Ping Pong exam, no additional aids are allowed, and the computer may only be used to answer the questions on the Ping Pong exam. If the student finds any question in the exam unclear, clarifications from the examiner can be requested during the exam.

The Ping Pong exam takes place 30th May. To attend to it, the student first needs to register for it at <https://lpw.hj.se> between 1st April and 20th May.

Re-exams are offered at the re-examination periods in August and January. At re-examination, registration at <https://lpw.hj.se> in advance is also required.

Examination test 2: Project work

The project work involves implementing a webpage with the functionality specified in the file [project-work-instructions.pdf](#) on Ping Pong. It will to a large extent be graded per the guidelines in the file [project-work-grading-guidelines.pdf](#) on Ping Pong.

The deadline for submitting the project work for grading is 31st May. The project work is submitted by uploading the webpage to a server provided by us and submitting the assignment [Project work](#) on Ping Pong. At submission on Ping Pong, the student needs to upload a ZIP file containing all files required to test the webpage, and attach the URI to the webpage on our server as a comment. Emailing the project work to us does not count as submission; Ping Pong is our archive system, and we can only grade work uploaded there.

Re-exams are offered at the re-examination periods in August and January. At re-examination, the project work will only be graded Fail/3.

Teaching

The following specifications cover most of what the student need to learn to achieve the intended learning outcomes:

- HTML5 (partly including BOM): <https://www.w3.org/TR/html5/>
- CSS: <https://www.w3.org/Style/CSS/specs>
- ECMAScript 2016: <http://www.ecma-international.org/publications/standards/Ecma-262.htm>
- DOM: <https://www.w3.org/DOM/DOMTR>
- HTTP: <https://www.w3.org/Protocols/rfc2616/rfc2616.txt>
- The XHR object: <https://xhr.spec.whatwg.org/>
- JSON: <https://tools.ietf.org/html/rfc7159>
- XML: <https://www.w3.org/TR/REC-xml/>
- Web Content Accessibility Guidelines: <https://www.w3.org/TR/WCAG20/>

For those finding it hard to learn by reading specifications, we recommend the following reading:

- The book series *You Don't Know JS* by Kyle Simpson, <https://github.com/getify/You-Dont-Know-JS>
- W3Schools' HTML, CSS and JavaScript/DOM guides, <http://www.w3schools.com>
- *HTTP Made Really Easy* by James Marshall, <https://www.jmarshall.com/easy/http>
- W3's summary of the Web Content Accessibility Guidelines, <https://www.w3.org/WAI/WCAG20/glance/Overview>
- *Introducing JSON*, <http://www.json.org/>

Additional reading will be suggested during the course.

In addition to the resources listed above, lectures and laboratory sessions are offered to help the student with their studies. A typical weekly schedule is shown in Figure 2 below.

	Monday	Tuesday	Wednesday	Thursday	Friday
08:00			08:00 TGMM3H16- WJK14V17-L3 CaAn E2404 Lab Session		08:00 TGMM3H16- WJK14V17-L3 CaAn E2432 Lab Session
09:00					
10:00	10:00 TGMM3H16- WJK14V17- larpet E1028			10:00 TGMM3H16- WJK14V17- larpet E1028	
11:00					
12:00					
13:00	13:00 TGMM3H16- WJK14V17-L2 CaAn E2432 Lab Session	13:00 TGMM3H16- WJK14V17-L1 ScMa E2404 Lab Session		13:00 TGMM3H16- WJK14V17-L2 CaAn E2432 Lab Session	13:00 TGMM3H16- WJK14V17-L1 ScMa E2404 Lab Session
14:00					
15:00					
16:00					
17:00					

Figure 2, Weekly schedule. Red boxes are lectures, the other boxes are lab sessions for different lab groups.

Lectures

The lectures will cover the content in the specifications and teach the student how to combine the different languages/APIs to build dynamic websites. Table 7 below lists the lectures planned for the course.

Table 7, Planned lectures.

#	Lecture	Lecturer	Week	Weekday
1	Introduction & HTTP	Peter Larsson-Green	17	Monday
2	HTML	Peter Larsson-Green	17	Thursday
3	CSS and HTML & CSS frameworks	Peter Larsson-Green	18	Thursday
4	JavaScript basics	Peter Larsson-Green	19	Monday
5	Document Object Model	Peter Larsson-Green	19	Thursday
6	AJAX & JavaScript libraries	Peter Larsson-Green	20	Monday
7	Advanced JavaScript	Peter Larsson-Green	20	Thursday
8	Repetition	Peter Larsson-Green	21	Monday

The students are encouraged to ask questions, both in Swedish and English, at the lectures.

Laboratory sessions

The student can participate at two laboratory sessions each week by joining one of the [laboratory session groups on Ping Pong](#) (occasionally there is just one session per week). If there is room for it, the student is welcome to attend to the other laboratory sessions as well, but it is only OK to join one laboratory session group on Ping Pong.

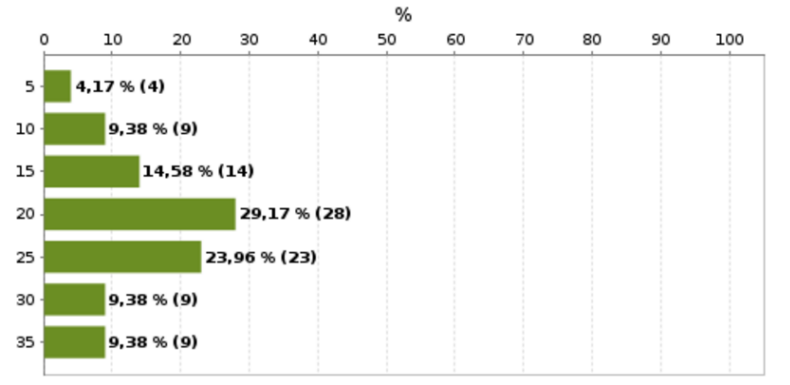
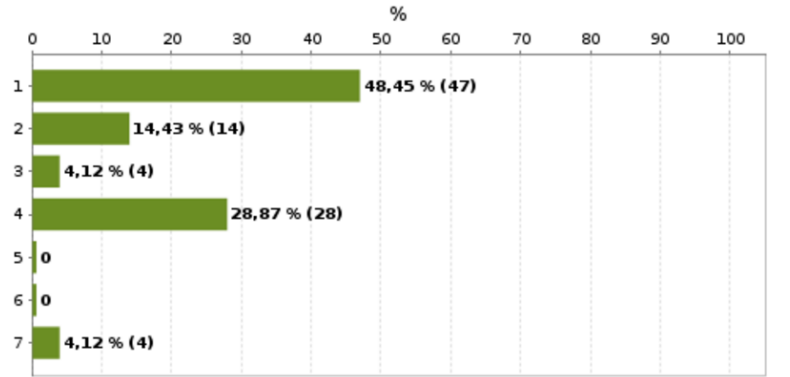
The laboratory sessions are the primary way for the students to get help with their project work by discussing their solutions/problems/questions with a teacher.

Feedback

The students are encouraged to give the teachers feedback about the course at lectures/laboratory sessions or via email. That feedback will help us improve the course for this year's students.

The students are encouraged to fill in the Individual Course Evaluation form published on Ping Pong at the end of the course. That feedback will help us improve the course for next year's students. Table 8 below shows some of the changes made to the course this year thanks to the previous year's students' feedback.

Table 8, Feedback from previous year's students and changes to this year.

Feedback from previous year	Response/Change to this year
<p>How many hours/week have you spent on the course?</p>  <p>Figure 3, Hours/week spent on the course.</p>	<p>Change: Clearly tell the students this is a full-time course; 40 hours/week is expected.</p>
<p>How much have you used the course literature (1=nothing, 7= much)?</p>  <p>Figure 4, How much the course literature has been used.</p>	<p>Change: Change course literature.</p>
<p>"Bättre förklaringar mer grundläggande förklaringar hur man ska göra osv inte bara en översikt om allt."</p>	<p>Response: Learning how to apply what is taught at the lecture is part of the project work. Ask the teacher at the laboratory session for guidance. The project work instructions do</p>

	this year also contain some additional guidance.
"Göra det lättare att plugga till tentan."	Response: How?
"Mer detaljerad information kring server-api" "lite mer info om just hur man pratar med databasen"	Response: The server API contained all details; ask the laboratory assistance for guidance. Sample usage was added in the middle of the course the previous year.
"Att inte göra den så svår, de är omöjligt att lära sig allt vi har gått igenom på så kort tid, alldeles för mkt kunskap för nybörjare."	Response: If you lack the pre-requisites, this course will probably be very hard.
"Kommunikationen helt klart. Väldigt jobbigt att föreläsaren inte är den person som skall bedöma projektet vi arbetar med. Kommer ständigt upp frågor på föreläsningarna som blir halvt besvarade. Vid vissa tillfällen säger föreläsaren att denna inte vill lägga sig i projektet, och inte alls vet. Detta var väldigt irriterande, borde ändras om i kursen till framtiden. Kursen verkar allmänt inte vara planerad, dyker upp nya saker hela tiden som man måste göra i projektet, och nya krav för ett godkänt betyg så man måste ändra om koden osv. Borde vara klart och tydligt från början, och förbättra kommunikationen mellan lärarna så de säger samma saker och inte ändrar sig eller måste höra med den andra läraren ständigt som det varit under kursens gång." "Att ständigt ändra krav på kursen gjorde det väldigt oklart över vad som skulle göras"	Change: Lecturer = Examiner. Clarifications made to the grading guidelines document. More references to the grading guidelines document has been added.
"Föreläsningar kan ha bättre koppligar till verkliga hemsidor istället för att bara vara en vägg av kod."	Response: Real websites are usually too complex to cover at one lecture. Instead, you are taught the basics components all real websites consist of, so you can analyze them on your own.
Projekt är superbra men hade gärna haft några labbar för att jobba upp lite struktur i arbetet. Som sagt föreläsningarna kan bli lite långdragna när man går igenom olika tips man kan använda när man fortfarande inte hittat användningsområdet för dem.	Response: All web sites do not contain all possible functionality → hard to create a project covering them all. The written exam is complementary.
"Vi har fortfarande inte fått besked om det skulle bli en pingpong tenta eller sals tenta."	Change: Call the written exam for Ping Pong exam throughout the entire course.