340456 - PMUD-I7P23 - Cross-Platform and Distributed Programming

Coordinating unit: 340 - EPSEVG - Vilanova i la Geltrú School of Engineering
Teaching unit: 723 - CS - Department of Computer Science
Academic year: 2019
Degree: BACHELOR'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2010). (Teaching unit Optional)
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2018). (Teaching unit Optional)
ECTS credits: 6
Teaching languages: Catalan

Teaching staff
Coordinator: Esteve Cusine, Jordi
Others: Esteve Cusine, Jordi

Opening hours
Timetable: See the current timetable in the EPSEVG people list:
https://web3.epsevg.upc.edu/coneix-lepsevg/directori-epsevg

Prior skills
Basic knowledge of programming (variables, functions, alternative instructions with if, repetitive instructions with while or for).

Requirements
Have been passed the FOPR course (computer students) or INFO course (students from other degrees).
Have a laptop.

Degree competences to which the subject contributes

Specific:
I_CEFC11. CEFC11. Knowledge and application characteristics, functions and structure of Distributed Systems, Computer Networks and the Internet design and implement applications based on them.
I_CEFC17. CEFC17. Ability to design and evaluate computer interfaces that guarantee accessibility and usability of informatic systems, services and applications.
I_CEIS3. CEIS3. Ability to solve problems of integration in terms of strategies, standards and available technologies.
I_CETI3. CETI3. Ability to set up methodologies focused on user and development organization, valuation and application management and systems based on information technologies which secure ergonomic accessibility and use of
I_CETI6. CETI6. Ability to design systems, applications and services based on network technologies, including internet, website, e-commerce, multimedia, interactive services and mobile computing.

Transversal:
04 COE N2. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 2. Using strategies for preparing and giving oral presentations. Writing texts and documents whose content is coherent, well structured and free of spelling and grammatical errors.
04 COE N3. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.

06 URI. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

Teaching methodology

Presentation in the classroom, in participatory lessons, of concepts associated with the subjects.
Performing individually practices in attendance and non-attendance way.

Mainly workshop, always developed in front of the student's computer laptop. The student is responsible for his own learning.

Learning objectives of the subject

1. Learn the basic principles of Internet (IP, URL, protocols, client/server).
2. Understanding the implications behind the fact of developing a cross-platform application.
3. Learning to program web multiplatform and responsive applications with HTML5, CSS3 and JavaScript using libraries.
4. Understanding how distributed applications work on internet, what are Web Services, and knowing in detail the REST services and the RESTful APIs.
5. Learning how to program web servers that offer a web application or a RESTful APIs.
6. Learning how to program web clients that interact with a RESTful API.
7. Obtain the resources to be up to date in this quickly changing world.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 30h 20.00%</th>
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<tbody>
<tr>
<td></td>
<td>Hours medium group: 0h 0.00%</td>
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<tr>
<td></td>
<td>Hours small group: 30h 20.00%</td>
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<td></td>
<td>Guided activities: 0h 0.00%</td>
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<tr>
<td></td>
<td>Self study: 90h 60.00%</td>
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## Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Learning time</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Introduction to the Internet and multiplatform programming</strong></td>
<td>4h</td>
<td>Theoretical concepts of Internet (URL, protocols, client/server) and multiplatform programming based on Internet standards (HTML5, CSS3, Java-Script).</td>
</tr>
<tr>
<td><strong>Practice 1. HTML5</strong></td>
<td>10h</td>
<td>Development of basic web pages with HTML5. Discovering the new features offered by HTML5.</td>
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<tr>
<td><strong>Practice 2: CSS3</strong></td>
<td>4h</td>
<td>Giving style to web pages with CSS3. Discovering the new features offered by CSS3.</td>
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<tr>
<td><strong>Practice 3: Java-Script</strong></td>
<td>16h</td>
<td>Discovery of Java-Script programming language and its features. How Java-Script can modify the DOM (Document Object Model) of an HTML document. Practice for developing an interactive static website programmed in Java-Script.</td>
</tr>
<tr>
<td><strong>Practice 4: jQuery library</strong></td>
<td>8h</td>
<td>Features and advantages of jQuery library. Development of a small project with HTML5, CSS3 and Java-Script using jQuery.</td>
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### Practice 5: Bootstrap library

**Description:**
Development of a small project about an adaptive and responsive website with Bootstrap.

**Learning time:** 8h  
Laboratory classes: 4h  
Self study: 4h

### Distributed Programming

**Description:**
Theoretical aspects of Distributed Programming: Types of software architectures, how distributed applications work on the Internet, Web Services (in particular REST services and RESTful APIs).

**Learning time:** 4h  
Theory classes: 2h  
Self study: 2h

### Practice 6. Servidor web with NodeJS

**Description:**
Programming web servers with NodeJS. Package management with npm (Node Package Manager).

**Learning time:** 4h  
Laboratory classes: 2h  
Self study: 2h

### Practice 7. Framework Express for NodeJS

**Description:**
Web servers programming with an MVC architecture (Model-View-Controller) using the Express framework for NodeJS. Concepts of templates, routes and middlewares.

**Learning time:** 16h  
Laboratory classes: 8h  
Self study: 8h

### Practice 8. Web server with RESTful API

**Description:**
Programming of web servers that offer a RESTful API with NodeJS and Express.

**Learning time:** 8h  
Laboratory classes: 4h  
Self study: 4h
Practice 9. Web client connected to a RESTful API

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<thead>
<tr>
<th>Description:</th>
<th>Learning time: 8h</th>
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<tr>
<td>Programming a web client with that connects to the RESTful API made in the previous practice.</td>
<td>Laboratory classes: 4h</td>
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<td>Self study: 4h</td>
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Final project

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<tr>
<th>Description:</th>
<th>Learning time: 30h</th>
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<tr>
<td>Develop a web service with a RESTful API that allows you to manage a specific need. Develop a web application that uses this service.</td>
<td>Laboratory classes: 0h</td>
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<td>Self study: 30h</td>
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Research work

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<th>Learning time: 30h</th>
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<tr>
<td>Research work around multiplatform and distributed programming (for example on some client or server web technology we have not seen in class). There will be a public presentation in class (20-30 min. exposure + 10 min. questions).</td>
<td>Theory classes: 6h</td>
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<td>Self study: 24h</td>
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Qualification system

60% Work done in classroom and evaluation of the applications submitted (30% work during the course, 30% final work).
30% Preparation and public presentation of a technical work analyzing the state of the question.
10% Participation and motivation (if any additional activity is necessary for this last 10%, it may be in the form of a control or mini-test).

Because 100% of the subject is evaluated with practical work, there is not a final control or a review control in the form of a written test.

Bibliography