

**1. General information****Course:** WEB AND SERVICES ENGINEERING**Code:** 42367**Type:** ELECTIVE**ECTS credits:** 6**Degree:** 406 - UNDERGRADUATE DEGREE IN COMPUTER SCIENCE AND ENGINEERING (AB)**Academic year:** 2022-23**Center:** 604 - SCHOOL OF COMPUTER SCIENCE AND ENGINEERING (AB)**Group(s):** 17**Year:** 4**Duration:** First semester**Main language:** English**Second language:****Use of additional languages:****English Friendly:** Y**Web site:****Bilingual:** N**Lecturer:** GABRIEL CEBRIÁN MÁRQUEZ - Group(s): 17

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|--|-----------------------|--------------|-------------------------|--|
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2. Pre-Requisites

The *Web Engineering and Services* course requires knowledge related to the Rational Unified Process (RUP) and the Unified Modeling Language (UML). This knowledge can be acquired during the *Software Engineering I* course that is part of the Module I of the Computing Science degree curricula.

Although not required, any knowledge acquired during the *Software Design* and the *Software Engineering Processes* courses that are part of the *Software Engineering* specialization will be very welcome. Additionally, although not strictly necessary, students should have some prior knowledge of the HTML, CSS and JSON markup languages, as well as the JavaScript programming language. These skills can be acquired during the *Web System Technologies* course that is part of the *Information Technology* specialization.

3. Justification in the curriculum, relation to other subjects and to the profession

The Web is one of the most popular communication and content distribution platform in the world, enabling users and applications the exchange of information through the Internet. Web systems can be defined as a set of distributed web applications supported by a client-server architecture, developed with standard Web languages and technologies such as HTML, XML, CSS, JavaScript, etc.

Modern web systems cover both Business-to-Client (B2C) as well as Business-to-Business (B2B) applications. While most B2C applications are usually implemented as graphical user interfaces rendered in web browsers using languages such as HTML, CSS and JS, B2B applications are usually implemented as web Application Programming Interfaces (APIs) acting as Web services using languages such as XML and JSON. Let's take as an example the case of a web system that provides support to an online shop. While the web application that allows clients to buy products is an example of a B2C web application, the web application that automatically requests products from the shopping provider when the product stock is under a threshold value is an example of a B2B web application.

From the B2C applications' perspective, web services enable applications to move the web page rendering from the server side to the client side of the application, improving the web application performance and flexibility. From the B2B applications' perspective, web services enable users to share software applications and even platforms and infrastructures.

As we have mentioned, web services serve as a communication platform requiring protocols to exchange information. In order to work properly and improve software reuse and maintenance, these protocols follow standards that are the basis of Service Oriented Architectures (SOAs) and cloud computing.

Due to the evolution of web technologies and services during the last decade, the discipline of Web Engineering has adapted and optimized development processes and methodologies to cope with the particularities of web applications. This course focuses on the development of web systems using web technologies and services following well-established Web Engineering processes and methodologies.

4. Degree competences achieved in this course**Course competences**

| Code | Description |
|--------|--|
| INS01 | Analysis, synthesis, and assessment skills. |
| IS03 | Ability to solve problems of integration according to strategy functions, standards, and available technologies. |
| SI01 | Ability to integrate information and communication technology solutions and entrepreneurial process so as to fulfil the needs for information in organisation, allowing them to meet their goals in an effective and efficient manner, providing them with competitive benefits. |
| SI02 | Ability to determine the needs of information and communication systems in an organisation, following security aspects and complying with current laws and regulations. |
| UCLM01 | Command of a second language at a B1 level within the Common European Framework of Reference for Languages |

5. Objectives or Learning Outcomes**Course learning outcomes**

Description

Improvement of communication skills of the student in English language

Planning, modelling, development, assessment, and management of Web-based systems.

Knowledge of the legal environment of the auditing of information systems, as well as the main areas of information systems auditing, and have skills in the use of tools for auditing.

6. Units / Contents

Unit 1: Web Engineering

Unit 1.1 Web application development process and modeling techniques

Unit 1.2 Web project management and scheduling

Unit 1.3 Web application quality management and auditing

Unit 1.4 Content management systems. Web application domains

Unit 2: Web development

Unit 2.1 Server-side frameworks and applications

Unit 2.2 Client-side frameworks and applications

Unit 3: Web service Engineering

Unit 3.1 The service-oriented paradigm

Unit 3.2 Service-oriented organizations

Unit 3.3 Service-oriented architectures

Unit 3.4 Advanced aspects on services

Unit 4: Web service development

Unit 4.1 Web service languages and protocols

Unit 4.2 Web service tools and technologies

7. Activities, Units/Modules and Methodology

| Training Activity | Methodology | Related Competences (only degrees before RD 822/2021) | ECTS | Hours | As | Com | Description |
|---|---|---|---|------------|----|-----|--|
| Class Attendance (theory) [ON-SITE] | Lectures | INS01 SI01 UCLM01 | 0.42 | 10.5 | N | - | [MAG] Theory |
| Problem solving and/or case studies [ON-SITE] | Workshops and Seminars | INS01 SI01 UCLM01 | 0.6 | 15 | N | - | [PRO] Problem solving and seminars |
| Laboratory practice or sessions [ON-SITE] | Practical or hands-on activities | IS03 SI02 UCLM01 | 0.9 | 22.5 | Y | Y | [LAB] Practice |
| Individual tutoring sessions [ON-SITE] | Other Methodologies | INS01 IS03 SI01 SI02 | 0.18 | 4.5 | N | - | [TUT] Tutoring sessions |
| Formative Assessment [ON-SITE] | Assessment tests | INS01 IS03 SI01 SI02 UCLM01 | 0.18 | 4.5 | Y | Y | [EVA] Theory tests and evaluation of practice deliverables |
| Formative Assessment [ON-SITE] | Individual presentation of projects and reports | INS01 SI01 UCLM01 | 0.12 | 3 | Y | N | [EVA] Presentation of course project |
| Writing of reports or projects [OFF-SITE] | Reading and Analysis of Reviews and Articles | IS03 SI02 UCLM01 | 0.9 | 22.5 | Y | N | [RES] Writing of course project |
| Study and Exam Preparation [OFF-SITE] | Combination of methods | INS01 SI01 UCLM01 | 1.5 | 37.5 | N | - | [EST] Study and theory tests preparation |
| Practicum and practical activities report writing or preparation [OFF-SITE] | Practical or hands-on activities | IS03 SI02 UCLM01 | 1.2 | 30 | Y | Y | [LAB] Practice |
| Total: | | | 6 | 150 | | | |
| Total credits of in-class work: 2.4 | | | Total class time hours: 60 | | | | |
| Total credits of out of class work: 3.6 | | | Total hours of out of class work: 90 | | | | |

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

| Evaluation System | Continuous assessment | Non-continuous evaluation* | Description |
|-------------------------------|-----------------------|----------------------------|---|
| Laboratory sessions | 45.00% | 45.00% | [LAB] Practice deliverables. The practical project of the course is divided into 5 deliverables with different weights. The mark of this item will be calculated using a weighted mean of the deliverables. The minimum mark for this item is 3,5 points out of 10. |
| Theoretical papers assessment | 15.00% | 15.00% | [INF] Course project report. |
| Oral presentations assessment | 10.00% | 10.00% | [PRES] Oral presentation of the course project. |
| Progress Tests | 30.00% | 30.00% | [ESC] Multiple-choice tests. After each lecture, the student will have to complete a multiple-choice questionnaire. The mark of this item will be calculated using an arithmetic mean of all the marks obtained in these questionnaires. Non-answered questionnaires will have the mark of 0 points. The minimum mark for this item is 3,5 points out of 10. In the case that the student does not obtain a mark |

| | | | |
|---------------|----------------|----------------|--|
| | | | greater than or equal to the minimum mark, the student will be able to take a theoretical exam at the end of the semester. The minimum mark for this exam is 3,5 points out of 10. |
| Total: | 100.00% | 100.00% | |

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

The evaluation is divided into 4 parts, namely [ESC], [LAB], [INF] and [PRES], as shown in the table above. The [ESC] and [LAB] items are mandatory and have the minimum marks specified in the table. If the mark obtained in any of these two parts is not greater than or equal to the corresponding minimum mark, the maximum mark of the call will be no greater than 4,5 points out of 10.

By default, the student will be assessed under the continuous assessment criteria. Should the student want to switch to the non-continuous assessment criteria, the student must fill the form in <https://www.esiiaab.uclm.es/alumnos/evaluacion.php> before the end of the teaching period as long as no more than 50% of the assessable items have been taken.

Non-continuous evaluation:

The evaluation is divided into the same parts, weights and minimum marks as in the continuous assessment criteria. Nonetheless, the evaluation will change in the following aspects.

[ESC] Theory exam. The student will take a theoretical exam comprising all the contents of the course.

[LAB] Practical project of the course. The student will submit the practical project of the course in its entirety along with a comprehensive report. The student will also have to take a face-to-face interview about the project.

The [INF] and [PRES] parts remain the same, but their submission dates may be different from the continuous assessment method.

Specifications for the resit/retake exam:

The evaluation criteria are the same as in the non-continuous assessment method of the ordinary call.

Specifications for the second resit / retake exam:

The evaluation criteria are the same as in the non-continuous assessment method of the ordinary call and the extraordinary call.

| 9. Assignments, course calendar and important dates | |
|--|-------|
| Not related to the syllabus/contents | |
| Hours | hours |
| Formative Assessment [PRESENCIAL][Individual presentation of projects and reports] | 3 |
| General comments about the planning: The subject is taught in three weekly sessions of 1.5 hours. This planning is ORIENTATIVE, and may vary throughout the course depending on the teaching needs, holidays and any other unforeseen cause. The weekly planning of the subject can be found in detail and updated in Campus Virtual. | |
| Unit 1 (de 4): Web Engineering | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures] | 7 |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities] | 4.5 |
| Individual tutoring sessions [PRESENCIAL][Other Methodologies] | 1 |
| Formative Assessment [PRESENCIAL][Assessment tests] | 3 |
| Writing of reports or projects [AUTÓNOMA][Reading and Analysis of Reviews and Articles] | 7.5 |
| Study and Exam Preparation [AUTÓNOMA][Combination of methods] | 15 |
| Unit 2 (de 4): Web development | |
| Activities | Hours |
| Problem solving and/or case studies [PRESENCIAL][Workshops and Seminars] | 10 |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities] | 7 |
| Individual tutoring sessions [PRESENCIAL][Other Methodologies] | 1 |
| Study and Exam Preparation [AUTÓNOMA][Combination of methods] | 10 |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Practical or hands-on activities] | 15 |
| Unit 3 (de 4): Web service Engineering | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures] | 3.5 |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities] | 7 |
| Individual tutoring sessions [PRESENCIAL][Other Methodologies] | 1 |
| Formative Assessment [PRESENCIAL][Assessment tests] | 1.5 |
| Writing of reports or projects [AUTÓNOMA][Reading and Analysis of Reviews and Articles] | 15 |
| Study and Exam Preparation [AUTÓNOMA][Combination of methods] | 9 |
| Unit 4 (de 4): Web service development | |
| Activities | Hours |
| Problem solving and/or case studies [PRESENCIAL][Workshops and Seminars] | 5 |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities] | 4 |
| Individual tutoring sessions [PRESENCIAL][Other Methodologies] | 1.5 |
| Study and Exam Preparation [AUTÓNOMA][Combination of methods] | 3.5 |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Practical or hands-on activities] | 15 |
| Global activity | |
| Activities | hours |
| Formative Assessment [PRESENCIAL][Individual presentation of projects and reports] | 3 |
| Writing of reports or projects [AUTÓNOMA][Reading and Analysis of Reviews and Articles] | 22.5 |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities] | 22.5 |

| | |
|---|------|
| Individual tutoring sessions [PRESENCIAL][Other Methodologies] | 4.5 |
| Problem solving and/or case studies [PRESENCIAL][Workshops and Seminars] | 15 |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Practical or hands-on activities] | 30 |
| Study and Exam Preparation [AUTÓNOMA][Combination of methods] | 37.5 |
| Class Attendance (theory) [PRESENCIAL][Lectures] | 10.5 |
| Formative Assessment [PRESENCIAL][Assessment tests] | 4.5 |
| Total horas: 150 | |

| 10. Bibliography and Sources | | | | | | |
|--|---|------------------|------|----------------|------|-------------|
| Author(s) | Title/Link | Publishing house | Citv | ISBN | Year | Description |
| Roger Pressman, Bruce Maxim | Web Engineering: A Practitioner's Approach (8th edition) | McGraw-Hill | | 978-0078022128 | 2014 | |
| Leonard Richardson, Sam Ruby | RESTful Web Services | O'Reily | | 978-0596529260 | 2007 | |
| Gerti Kappel, Birgit Proll, Siegfried Reich, Werner Retschitzegger | Web Engineering: The Discipline of Systematic Development of Web Applications | Wiley | | 978-0470015544 | 2006 | |