COURSE DESCRIPTION

COURSE DETAILS

Title (of the course): **MODELADO Y DISEÑO AVANZADO DE SOFTWARE**
Code: 101410
Degree/Master: **GRADO DE INGENIERÍA INFORMÁTICA** Year:
Name of the module to which it belongs: OBLIGATORIO ESPECIALIDAD INGENIERÍA DEL SOFTWARE
Field: MODELADO Y DISEÑO AVANZADO DE SOFTWARE
Character: OBLIGATORIA Duration: SECOND TERM
ECTS Credits: 6.0 Classroom hours: 60
Face-to-face classroom percentage: 40.0% Study hours: 90
Online platform: http://www.uco.es/moodle

LECTURER INFORMATION

Name: ROMERO SALGUERO, JOSÉ RAÚL (Coordinator)
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PREREQUISITES AND RECOMMENDATIONS

Prerequisites established in the study plan

None

Recommendations

None specified

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INTENDED LEARNING OUTCOMES

CEB5	To understand the structure, organisation, functioning and connections of IT systems, the foundations of programming and their use in Engineering problem solving.
CEC1	To be able to design, develop, select and evaluate applications and IT systems, ensuring their reliability, quality and security in accordance with ethical principles and the current legal regulations.
CEC6	To understand and apply the basic algorithms of computer technology in order to design solutions to common problems, while analysing the suitability and complexity of the proposed algorithms.
CEC7:	To understand, design and make efficient use of the types and structure of data that are most appropriate for resolving a specific problem.
CEC10	To understand the characteristics, functions and structure of operating systems and use them to design and implement applications.
CEC11	To understand and apply the characteristics, functions and structure of distributed software, computer and internet networks and to use them to design and implement applications.
CEC14	To understand and apply the basic principles and techniques of parallel programming, concurrent programming, distributed programming and real time programming.
CEC16	To understand and apply the principles, methods and life cycles of software engineering.
CTEIS1	Ability to develop, maintain and evaluate software services and systems that meet all user requirements and behave reliably and efficiently, are affordable to develop and maintain and meet quality standards, applying theories, principles, methods and practices of software engineering.
CTEIS3	Ability to solve integration problems based on the strategies, standards and technologies available.
CTEIS4	Ability to identify and analyze problems and design, develop, implement, verify and document software solutions based on an adequate knowledge of current theories, models and techniques.
CTEIS5	Ability to identify, evaluate and manage potential associated risks that may arise.
CTEIS6	Ability to design appropriate solutions in one or more application domains using software engineering methods that integrate ethical, social, legal and economic aspects.

OBJECTIVES

Students will be introduced to the basic concepts related to the design and architectural modeling of complex systems. Also, specific proposals for the development of component-based software will be studied. Finally, the use of different notations as a mechanism for representing software architectures will be discussed, with an in-depth study of the use of the UML 2 notation. The application of specific methodologies for the creation of component-based software architecture specifications will be studied and applied in practice.
In the lab, exercises will be performed at both the design and programming levels, in which the theoretical contents will be put into practice.

CONTENT

1. Theory contents

1. Introduction to software architectures.
2. The component-based engineering paradigm.
3. UML Components Methodology.
4. Provisioning and assembly.
5. Architectural patterns.

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2. Practical contents

The practical content of the course is closely linked to the development of the theoretical content, with special emphasis on the content referring to the modeling and design of software based on components. One or more scenarios will be proposed, in which teams of students will have to solve one or more design projects, deepening in the use of UML 2 as a design specification and architectural description language. In addition, the implementation of these problems will be carried out, using the Java programming language and its associated technology stack for the implementation of the proposed problems.

The practical teams will be formed by a specific number of students (determined by the practical teaching staff) and, once these teams have been formed, they will remain unchanged for the rest of the academic year. The result of the practical project will be presented in several deliveries, following the deadlines planned by the teaching staff. These must be given as a technical report, including the associated code, where appropriate. Also, certain deliverables, according to planning, could be defended orally. Complementary deliverables, such as explanatory videos, may be proposed.

In general, the practicals will cover the following contents:

- Best practices in object-oriented code development.
- Use of good practices: design patterns.
- Design and implementation of a complete or partial software solution to a problem according to the Component-Based Software Engineering paradigm.
- Design and implementation of a software problem according to a given architectural style; services and deployment.

SUSTAINABLE DEVELOPMENT GOALS RELATED TO THE CONTENT

Unrelated

METHODOLOGY

General clarifications on the methodology (optional)

The course is developed through lectures alternating with the resolution of study cases and oral presentations of the resolution of the cases.

Methodological adaptations for part-time students and students with disabilities and special educational needs

Part-time students must complete the same activities as full-time students. It is recommended that these students contact the teaching staff at the beginning of the course.

Face-to-face activities

Activity	Large group	Medium group	Total
Assessment activities	4	-	4
Case study	6	-	6
Group presentation	8	-	8
Lab practice	-	24	24
Lectures	16	-	16
Tutorials	2	-	2

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Activity	Large group	Medium group	Total
Total hours:	***36***	***24***	***60***

Off-site activities

Activity	Total
Analysis	10
Exercises	18
Group work	10
Information search	8
Self-study	44
Total hours	***90***

WORK MATERIALS FOR STUDENTS

Exercises and activities
Lessons summary
Oral presentations
Placement booklet

Clarifications

In addition to the bibliography and class notes, students will have additional material available in the virtual learning environment, Moodle.

EVALUATION

Intended learning	Exams	Oral Presentation	Placement reports
CEB5	X	X	
CEC1	X	X	X
CEC10	X	X	X
CEC11	X	X	X
CEC14	X	X	
CEC16	X	X	
CEC6	X	X	
CEC7:	X	X	X

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Intended learning	Exams	Oral Presentation	Placement reports
CTEIS1	X	X	X
CTEIS3	X	X	
CTEIS4	X	X	X
CTEIS5	X	X	
CTEIS6	X	X	X
Total (100%)	***20%***	***40%***	***40%***
Minimum grade	***5***	***5***	***5***

(*)Minimum mark (out of 10) needed for the assessment tool to be weighted in the course final mark. In any case, final mark must be 5,0 or higher to pass the course.

Method of assessment of attendance:

To pass the practical content, it is necessary to attend at least 80% of the laboratory classes and 100% of the extraordinary activities proposed during the teaching of the theoretical sessions, if any.

General clarifications on instruments for evaluation:

PRACTICAL CONTENT

The aim is for the student to consolidate and develop the cognitive, procedural, and attitudinal competencies set out in this guide. The practical content of the subject will be assessed by weighing the grades of the reports and codes of the different proposed practicals, together with one or more defense interviews that the lecturer will conduct to check the real knowledge acquired. The videos prepared by the students as part of the oral presentation will also be considered. The grade will be published for the total of the practicals at the end of the term. The lecturer will indicate at the beginning of the course the specific weighting of the proposed practicals. Also, he/she may propose an optional individual practical, with a summative grade in the evaluation. In any case, the delivery of practicals will be consecutive, so it will not be possible to deliver a practice without having delivered the previous ones, always according to the deadlines announced for it. All the practical exercises must be handed in on time to be graded as Pass (grade equal to or higher than 5). Once the student has passed, the mark of the specific part will be kept for the July and September exams. To pass the practicals, it is necessary to pass the oral presentation of the problem design proposed in the theory part.

THEORETICAL CONTENT

During the first week of class, the student must communicate in Moodle whether he/she wants to be assessed for the theoretical content using option 1 or 2. This decision will be irrevocable and will only affect the first ordinary exam in June.

Options:

* Option 1: Traditional assessment. A final theory exam (40%) and a final problem exam (20%).

*Option 2: Continuous assessment. Mid-term exams (40%) and a series of oral presentations in the class of the analysis and design of a problem (20%).

In any of the options, the minimum grade to pass the theoretical part is a 5 (Pass). Once the student has passed, the grade of the specific part will be kept for the June/July (2nd ordinary exam) and September exams.

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Clarifications on the methodology for part-time students and students with disabilities and special educational needs:

Part-time students will be assessed under the same conditions as full-time students.

Clarifications on the evaluation of the first extraordinary call and extra-ordinary call for completion studies:

The extraordinary call in April is for students who meet the requirements of the extraordinary call for the end of studies (article 74 of the RRA). They will be examined according to the syllabus and criteria of the previous year. The extraordinary call (September/October) for students with second or higher enrolment will use the same criteria that appear in the previous year's guide.

Qualifying criteria for obtaining honors:

To be eligible, the student must pass all parts of the subject with a score higher than 9.

BIBLIOGRAPHY

1. Basic Bibliography

- J. Cheesman, J. Daniels. UML Components: A simple process for specifying component-based software. AddisonWesley, 2002.
- I. Sommerville. Ingeniería del software, 7ª ed. Addison Wesley, 2002
- J. Arlow, L. Neustadt. UML 2 (Serie Programación). Anaya Multimedia, 2006.

2. Further reading

- B. Eckel. Piensa en Java, 4ª ed. Prentice-Hall, 2007.
- R.C. Martin. Clean Code - A Handbook of Agile Software Craftman. Prentice Hall, 2008. ISBN: 978-0136083238
- R. Pressman. Ingeniería del Software: Un enfoque práctico, 6ª ed. McGraw-Hill, 2005.
- E. Gamma, R. Helm, R. Johnson, J. Vlissides. Design Patterns: Elements of Reusable Object-Oriented Software, 10th edition. Addison-Wesley Professional, 2010.
- Oracle: Javadoc Java 8 SE, https://docs.oracle.com/javase/8/docs/api/

COORDINATION CRITERIA

Joint activities: lectures, seminars, visits ...

The methodological strategies and the evaluation system contemplated in this Course Description will be adapted according to the needs presented by students with disabilities and special educational needs in the cases that are required.

CONTINGENCY PLAN: CASE SCENARIO A

Case scenario A will correspond to a diminished on-site academic activity due to social distancing measures affecting the permitted capacity of classrooms.

COURSE DESCRIPTION

METHODOLOGY

General clarifications on the methodology on case scenario A

A multimodal (hybrid) teaching system will be adopted, combining both on-site and remote classes via videoconference (synchronous) that will be held in the timetable approved by the corresponding Faculty or School. The time distribution of teaching activities (both on-site and remote) will be decided by the aforementioned Faculties and Schools bearing in mind the permitted capacity of classrooms and social distancing measures as established at that time.

The course is developed through lectures alternating with the resolution of study cases and oral presentations of the resolution of the cases.

EVALUATION

Intended learnig	Exams	Oral Presentation	Placement reports
CEB5	X	X	
CEC1	X	X	X
CEC10	X	X	X
CEC11	X	X	X
CEC14	X	X	
CEC16	X	X	
CEC6	X	X	
CEC7:	X	X	X
CTEIS1	X	X	X
CTEIS3	X	X	
CTEIS4	X	X	X
CTEIS5	X	X	
CTEIS6	X	X	X
Total (100%)	***40%***	***20%***	***40%***
Minimum grade	***4***	***4***	***4***

(*)Minimum mark (out of 10) needed for the assessment tool to be weighted in the course final mark. In any case, final mark must be 5,0 or higher to pass the course.

Method of assessment of attendance (Scenario A):

To pass the practical content, it is necessary to attend at least 80% of the laboratory classes and 100% of the extraordinary activities proposed during the teaching of the theoretical sessions, if any.

COURSE DESCRIPTION

General clarifications on instruments for evaluation (Scenario A):

PRACTICAL CONTENT

The aim is for the student to consolidate and develop the cognitive, procedural, and attitudinal competencies set out in this guide. The practical content of the subject will be assessed by weighing the grades of the reports and codes of the different proposed practicals, together with one or more defense interviews that the lecturer will conduct to check the real knowledge acquired. The videos prepared by the students as part of the oral presentation will also be considered. The grade will be published for the total of the practicals at the end of the term. The lecturer will indicate at the beginning of the course the specific weighting of the proposed practicals. Also, he/she may propose an optional individual practical, with a summative grade in the evaluation. In any case, the delivery of practicals will be consecutive, so it will not be possible to deliver a practice without having delivered the previous ones, always according to the deadlines announced for it. All the practical exercises must be handed in on time to be graded as Pass (grade equal to or higher than 5). Once the student has passed, the mark of the specific part will be kept for the July and September exams. To pass the practicals, it is necessary to pass the oral presentation of the problem design proposed in the theory part.

THEORETICAL CONTENT

During the first week of class, the student must communicate in Moodle whether he/she wants to be assessed for the theoretical content using option 1 or 2. This decision will be irrevocable and will only affect the first ordinary exam in June.

Options:

* Option 1: Traditional assessment. A final theory exam (60% of total) with a theoretical part (40%) and a final problem exam (20%).

*Option 2: Continuous assessment. Mid-term exams (40%) and a series of oral presentations in the class of the analysis and design of a problem (20%).

In any of the options, the minimum grade to pass the theoretical part is a 5 (Pass). Once the student has passed, the grade of the specific part will be kept for the June/July (2nd ordinary exam) and September exams.

Clarifications on the methodology for part-time students and students with disabilities and special educational needs (Scenario A):

Part-time students will be assessed under the same conditions as full-time students.

CONTINGENCY PLAN: CASE SCENARIO B

Case scenario B will bring about a suspension of all on-site academic activities as a consequence of health measures.

METHODOLOGY

General clarifications on the methodology on case scenario B

On-site teaching activities will be held via videoconference (synchronous) in the timetable approved by the corresponding Faculty or School. Alternative activities will be proposed for reduced groups in order to guarantee the acquisition of course competences.

The course is developed through lectures alternating with the resolution of study cases and oral presentations of the resolution of the cases.

COURSE DESCRIPTION

EVALUATION

Intended learnig	Exams	Oral Presentation	Placement reports
CEB5	X	X	
CEC1	X	X	X
CEC10	X	X	X
CEC11	X	X	X
CEC14	X	X	
CEC16	X	X	
CEC6	X	X	
CEC7:	X	X	X
CTEIS1	X	X	X
CTEIS3	X	X	
CTEIS4	X	X	X
CTEIS5	X	X	
CTEIS6	X	X	X
Total (100%)	***40%***	***20%***	***40%***
Minimum grade	***4***	***4***	***4***

(*)Minimum mark (out of 10) needed for the assessment tool to be weighted in the course final mark. In any case, final mark must be 5,0 or higher to pass the course.

Moodle Tools	Exposición oral	Exámenes	Informes/memorias de prácticas
Cuestionario		X	
Foro	X		
Tarea			X
Videoconferencia	X		

Method of assessment of attendance (Scenario B):

To pass the practical content, it is necessary to attend at least 80% of the laboratory classes and 100% of the extraordinary activities proposed during the teaching of the theoretical sessions, if any.

COURSE DESCRIPTION

General clarifications on instruments for evaluation (Scenario B):

PRACTICAL CONTENT

The aim is for the student to consolidate and develop the cognitive, procedural, and attitudinal competencies set out in this guide. The practical content of the subject will be assessed by weighing the grades of the reports and codes of the different proposed practicals, together with one or more defense interviews that the lecturer will conduct to check the real knowledge acquired. The videos prepared by the students as part of the oral presentation will also be considered. The grade will be published for the total of the practicals at the end of the term. The lecturer will indicate at the beginning of the course the specific weighting of the proposed practicals. Also, he/she may propose an optional individual practical, with a summative grade in the evaluation. In any case, the delivery of practicals will be consecutive, so it will not be possible to deliver a practice without having delivered the previous ones, always according to the deadlines announced for it. All the practical exercises must be handed in on time to be graded as Pass (grade equal to or higher than 5). Once the student has passed, the mark of the specific part will be kept for the July and September exams. To pass the practicals, it is necessary to pass the oral presentation of the problem design proposed in the theory part.

THEORETICAL CONTENT

During the first week of class, the student must communicate in Moodle whether he/she wants to be assessed for the theoretical content using option 1 or 2. This decision will be irrevocable and will only affect the first ordinary exam in June.

Options:

* Option 1: Traditional assessment. A final theory exam (60% in total) with a theoretical part (40%) and a final problem exam (20%).

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In any of the options, the minimum grade to pass the theoretical part is a 5 (Pass). Once the student has passed, the grade of the specific part will be kept for the June/July (2nd ordinary exam) and September exams.

Clarifications on the methodology for part-time students and students with disabilities and special educational needs (Scenario B):

Part-time students will be assessed under the same conditions as full-time students.