Universida_{de}Vigo

Subject Guide 2023 / 2024

IDENTIFYIN	G DATA				
Architectur	al design of large software	systems			
Subject	Architectural design of large software systems				
Code	O06G151V01407				
Study programme	Grado en Ingeniería Informática				
Descriptors	ECTS Credits		Choose	Year	Quadmester
	6		Optional	4th	1st
Teaching language	#EnglishFriendly Spanish Galician				
Department					
Coordinator	Ribadas Pena, Francisco José González Peña, Daniel				
Lecturers	González Peña, Daniel Ribadas Pena, Francisco José				
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Web	http://moovi.uvigo.gal				
General description	This subject covers all softwar systems design. In this kind of degree of complexity in the di needed to focus complex softw discussed with an industrial pr	e engineering lifeciclye f systems, techniques a stribution of tasks and ware systems developn roduction perspective (e but it is focused and usual softward in its general aim nent from a comp software factories	on complex, hig e engineering to s. Diverse and r onent-oriented 5).	h-dimension, software ols require a greater lecessary aptitudes point of view are

English Friendly subject: International students may request from the teachers: a) materials and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.

Training and Learning Results Code A2 Students will be able to apply their knowledge and skills in their professional practice or vocation and they will show they have the required expertise through the construction and discussion of arguments and the resolution of problems within the relevant area of study. Students will be able to gather and interpret relevant data (normally within their field of study) that will allow them to A3 have a reflection-based considered opinion on important issues of social, scientific and ethical nature. A4 Students will be able to present information, ideas, problems and solutions both to specialist and non-specialist audiences. A5 Students will acquire the learning skills that are required to pursue further studies with a high degree of independence. B1 Ability to conceive, write, organize, plan, develop and sign projects in the field of computing engineering whose aim is, according to the acquired knowledge and training, the design, development and exploitation of computing systems, services and applications. **B**5 Ability to conceive, develop and maintain computing systems, services and applications through use of software engineering methods as tools to ensure quality, according to the knowledge and training acquired. Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to **B9** communicate the knowledge contents, skills and abilities of the Computer Science Engineer profession. C13 Knowledge, design and efficient use of the most appropriate data structures and types for the resolution of a problem. C19 Knowledge and application of the necessary tools for storing, processing and accessing information Systems, including web-based ones. C22 Knowledge and application of the principles, methodologies and life cycles of software engineering. C25 Ability to develop, maintain and assess software systems and services that satisfy all the demands of users and work reliably and efficiently, are easy to develop and maintain, and meet the quality standards, applying the theories, principles, methods and practices of Software Engineering. C27 Ability to solve problems of integration according to available strategies, standards and technologies.

- C28 Ability to identify and analyze problems and design, develop, implement, verify and document software solutions on the basis of sound knowledge of the theories, models and techniques available nowadays.
- C30 Ability to design appropriate solutions in one or more domains of application by using methods of software engineering that include ethical, social, legal and economic issues.
- C32 Ability to select, design, implement, integrate, assess, build, manage, exploit and maintain hardware, software and network technologies, within the appropriate costs and quality requirements.
- D4 Analysis, synthesis and evaluation capacity
- D5 Organizational and planning skills
- D6 Ability to abstract: ability to create and use models that reflect real situations
- D7 Ability to search, relate and structure information from various sources and to integrate ideas and knowledge.
- D8 Ability to work in situations of lack of information and / or under pressure
- D9 Ability to quickly integrate and work efficiently in unidisciplinary teams and to collaborate in a multidisciplinary environment
- D10 Interpersonal relationship skills.
- D11 Critical thinking
- D14 Have motivation for quality and continuous improvement

Expected results from this subject						
Expected results from this subject			Training and Learning			
			Results	;		
LA1: To know and to analyze the complexity of large software systems, effectively tackling each of a their development phases	A2 A3 A4 A5	B1 B5 B9	C13 C19 C22 C25 C27 C28 C30 C32	D4 D5 D6 D7 D8 D9 D10 D11 D14		
LO2: Distribute the work of each human team in charge of development among the different parts of the system	A2 A4	B1 B5 B9	C22 C30	D9		
LO3: Being able to divide and structure any large software system into small pieces of software that can be treated independently	A2	B1 B5	C13 C22 C25 C27 C32	D4 D5 D6 D14		
LO4: Validate and verify the integration of different components and software architectures in order to create large software systems	A2 A4	B1 B5	C22 C25 C27 C28 C32	D4 D11 D14		
LO5: Guide the software development process according to an industrial point of view	A2	B1 B5 B9	C13 C19 C22 C25 C27 C28 C30 C32	D4 D5 D6 D10 D14		
LO6: Know the specific software engineering techniques to deal with large software systems and large working teams	A2 A3 A4 A5	B1 B5	C22 C25 C28 C30	D4 D5 D7 D8 D11 D14		

Contents			
Торіс			
Complex software systems analysis and design	Requisites gathering in complex software systems. High level of detail architecture design.		
	Component-oriented software analysis and design (COTS).		
	Distributed software elements analysis and design.		

Development technologies for complex software Use of integration middlewares between components and subsystems. systems

	Specific software factories frameworks and methodologies.
Complex software testing	Validation, testing and deployment of complex software systems.

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	13	34	47
Laboratory practical	24	36	60
Seminars	10	0	10
Presentation	0.5	9.5	10
Objective questions exam	3	0	3
Project	2	18	20
*The information in the planning table is	for guidance only and does n	ot take into account the het	erogeneity of the students.

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Personalized assistance

Tests Description

Project Teacher will assist the student at the laboratory during assesable project development, by answering individual questions

Assessment						
	Description	Qualificatio	n Tra	ining I) and Lo Results	earning
Laboratory practica	alRegular attendance to the laboratory and participation (question answering, etc.) EXPECTED RESULTS IN THE SUBJECT BEING EVALUATED: LO1, LO2, LO3, LO4, LO5, LO6	5	A4 A5	B9	C13 C30	D8 D9 D14
Presentation	Preparation and presentation in small groups of a topic, his oral presentation and practical examples. Clarity, quality and time adjustment of the presentation will be taken into account. EXPECTED RESULTS IN THE SUBJECT BEING EVALUATED: LO1, LO5, LO6	15	A3 A4	B1 B5 B9	C22 C25 C27 C28 C30	D4 D5 D6 D7 D8 D9 D10 D11 D14
Objective question exam	s Individual multiple-choice tests which include theoretical and practical contents of the subject EXPECTED RESULTS IN THE SUBJECT BEING EVALUATED: LO1, LO3, LO5, LO6	35	A3 A5	B5 B9	C13 C19 C22 C25 C28 C32	D6

Project	Project development integrating subject contents.	45	A2	B5	C19	D5
	EXPECTED RESULTS IN THE SUBJECT BEING EVALUATED: LO1, LO2, LO3, LO4, LO5, LO6		A5 A5	D9	C22 C25 C27 C28 C32	D6 D7 D11

Other comments on the Evaluation

CONTINUOUS ASSESSMENT SYSTEM

Assistance and participation in laboratory

Description: regular attendance and participation in the laboratory sessions (asking doubts about the work, etc.).

Applied methodology: laboratory practical.

% Qualification: 5%.

% **Minimum**: There is no required minimum.

Evaluated training and learning results: A4, A5, B9, C13, C30, D8, D9, D14.

Expected results in the subject being evaluated: LO1, LO2, LO3, LO4, LO5, LO6.

Oral presentation

Description: preparation and presentation in small groups of a topic, its oral exposition and application approach. The clarity of the exposure, the quality of the presentation and the adjustment to the maximum pre-established time will be taken into account.

Applied methodology: presentation.

% Qualification: 15%.

Minimum %: a grade equal to or greater than 3.5 points must be obtained.

Evaluated training and learning results: A3, A4, B1, B5, B9, C22, C25, C27, C28, C30, D4, D5, D6, D7, D8, D9, D10, D11, D14.

Expected results in the subject being evaluated: LO1, LO5, LO6.

Written exam 1

Description: written individual multiple choice test on the theoretical contents of the first part.

Applied methodology: objective questions exam.

% Qualification: 17.5%.

Minimum %: a grade equal to or greater than 3.5 points must be obtained.

Evaluated training and learning results: A3, A5, B5, B9, C13, C19, C22, C25, C28, C32, D6.

Expected results in the subject being evaluated: LO1, LO3, LO5, LO6.

Written exam 2

Description: written individual multiple choice test on the theoretical contents of the second part.

Applied methodology: objective questions exam.

% Qualification: 17.5%.

Minimum %: a grade equal to or greater than 3.5 points must be obtained.

Evaluated training and learning results: A3, A5, B5, B9, C13, C19, C22, C25, C28, C32, D6.

Expected results in the subject being evaluated: LO1, LO3, LO5, LO6.

Projects deliverable 1

Description: first delivery of the projects that integrate contents seen in the matter.

Applied methodology: project.

% Qualification: 22.5%.

Minimum %: a grade equal to or greater than 3.5 points must be obtained.

Evaluated training and learning results: A2, A3, A5, B5, B9, C19, C22, C25, C27, C28, C32, D5, D6, D7, D11.

Expected results in the subject being evaluated: LO1, LO2, LO3, LO4, LO5, LO6.

Projects deliverable 2

Description: second delivery of projects that integrate contents seen in the matter.

Applied methodology: project.

% Qualification: 22.5%.

Minimum %: a grade equal to or greater than 3.5 points must be obtained.

Evaluated training and learning results: A2, A3, A5, B5, B9, C19, C22, C25, C27, C28, C32, D5, D6, D7, D11.

Expected results in the subject being evaluated: LO1, LO2, LO3, LO4, LO5, LO6.

If a student does not take any of the tests, a grade of 0 will be assigned to it.

GLOBAL ASESSMENT SYSTEM

Procedure for choosing the global assessment modality: once the period of one month from the beginning of the semester has passed, a period of 10 working days will be enabled for the enrolled students to formally express their intention to be assessed under the global assessment system.

Written exam

Description: written individual multiple choice test on the theoretical contents.

Applied methodology: objective questions exam.

% Qualification: 40%.

Minimum %: a grade equal to or greater than 5 points must be obtained.

Evaluated training and learning results: A3, A5, B5, B9, C13, C19, C22, C25, C28, C32, D6.

Expected results in the subject being evaluated: LO1, LO3, LO5, LO6.

Projects deliverable 1

Description: first delivery of the projects that integrate contents seen in the matter.

Applied methodology: project.

% Qualification: 30%.

Minimum %: a grade equal to or greater than 5 points must be obtained.

Evaluated training and learning results: A2, A3, A5, B5, B9, C19, C22, C25, C27, C28, C32, D5, D6, D7, D11.

Expected results in the subject being evaluated: LO1, LO2, LO3, LO4, LO5, LO6.

Projects deliverable 2

Description: second delivery of projects that integrate contents seen in the matter.

Applied methodology: project.

% Qualification: 30%.

Minimum %: a grade equal to or greater than 5 points must be obtained.

Evaluated training and learning results: A2, A3, A5, B5, B9, C19, C22, C25, C27, C28, C32, D5, D6, D7, D11.

Expected results in the subject being evaluated: LO1, LO2, LO3, LO4, LO5, LO6.

EVALUATION CRITERIA FOR EXTRAORDINARY CALL AND FINAL DEGREE

The continuous and global evaluation systems described above will be used.

RECORD QUALIFICATION PROCESS

Regardless of the evaluation system and the call, the average mark, the minimum score to pass the subject is 5. On the other hand, if the minimum score is not exceeded in any part of the evaluation, but the overall score is greater than 4 (out of 10), the grade in the minutes will be 4.

EVALUATION DATES

The dates of the tests corresponding to the continuous assessment system will be published in the calendar of activities, available on the ESEI website https://esei.uvigo.es/docencia/horarios/.

The official exam dates of the different calls, officially approved by the Xunta de Centro of the ESEI, are published on the ESEI website https://esei.uvigo.es/docencia/horarios/.

USE OF MOBILE DEVICES

All students are reminded of the prohibition of the use of mobile devices in exercises and practices, in compliance with article 13.2.d) of the University Student Statute, regarding the duties of university students, which establishes the duty to "Refrain from using or cooperating in fraudulent procedures in the assessment activities, in the delivered assignments or in official documents of the university."

TUTORING SCHEDULE AND PERSONAL TUTORING REQUEST

The tutoring schedule, and the way to request a personal tutoring, is published in the personal page of the teaching staff,

Sources of information

Basic Bibliography

Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, **Design Patterns: Elements of Reusable Object-Oriented Software**, 978-0201633610, 1, Addison-Wesley, 1995

Elisabeth Freeman (Author), Eric Freeman, Bert Bates, Kathy Sierra, Elisabeth Robson, **Head First Design Patterns**, 978-0596007126, 1, O'Reilly, 2004

Robert C. Martin, Clean Architecture: A Craftsman's Guide to Software Structure and Design: A Craftsman's Guide to Software Structure and Design, 978-0134494166, 1, Addison-Wesley, 2017

OODesign.com. Object Oriented Design,

Antonio Goncanves, Beginning Java EE 7, 978-1430246268, 1, Apress, 2013

Craig Walls, Spring in Action, 978-1617294945, 5, Manning, 2018

Complementary Bibliography

GoPivotal, Inc., Spring Framework,

Recommendations