



(*)Escola Superior de Enxeñaría Informática

Presentation

In 1991, the University School of Technical Engineering in Computer Management of the University of Vigo was created in the Campus of Ourense together with the degree of Technical Engineering in Computer Management, in order to respond to the needs of graduates in Computer Science demanded by the Galician society. In 1999, after the concession to this Centre of the second cycle of the degree in Computer Engineering, it changed its name to Escuela Superior de Enxeñaría Informática (ESEI).

Currently, the Centre offers the following degrees:

- **Degree in Computer Engineering:** A degree adapted to the EEES that incorporates two different professional profiles that are highly attractive in the Galician socio-economic environment:
 - Software Engineering
 - Information Technologies
- **Degree in Artificial Intelligence:** provides the broad, in-depth and multidisciplinary training required by professionals in this field and which is essential to successfully build the intelligent services and applications that are having such an important impact on our lives at all levels.

This is an inter-university degree in the Galician University System, of four courses (240 ECTS), in which the subjects of the first two courses are common to the three universities (A Coruña, Santiago and Vigo). In the third and fourth years, the University of Vigo develops the orientation in Intelligent Information Systems (SII).

- **University Master's Degree in Computer Engineering:** a degree linked to the profession of Computer Engineering, with 90 ECTS and one and a half years adapted to the EHEA. Its objective is to provide the graduate student with in-depth training in management and administration in the area of information technology, as well as solid knowledge in specific technologies associated with different professional profiles in this field. Graduates acquire technical, communication and leadership skills that enable them to start up their own business or to join management positions in the ICT area in companies and organisations.
- **Master's Degree in Artificial Intelligence:** an inter-university degree, offered by the Universities of A Coruña, Santiago de Compostela and Vigo, which is a complete programme for the training of professionals and entrepreneurs in this branch of knowledge.

All the information about the Centre and its degrees is available on the website esei.uvigo.es.

Organization chart

management team

Director
: Arno Formella

- He is responsible for the running of the School, implementing the agreements of the collegiate bodies, executing the budget and representing the Centre both within the University and before institutions and society in general.
- Email: [formella\(at\)uvigo.es](mailto:formella(at)uvigo.es)
- Telephone: +34 988 387 002

Deputy Director of Planning

: Francisco Javier Rodríguez Martínez

- He is responsible for the planning, definition, implementation, evaluation and monitoring of the procedures and processes of the ESEI.
- Email: franjrm(at)uvigo.es
- Telephone: +34 988 387 022

Deputy Director of Academic Organisation

: Rosalía Laza Fidalgo

- She is responsible for the organisation of teaching at the School: timetables, exam calendars, teaching control, control of tutorials...
- Email: rlaza(at)uvigo.es
- Telephone: +34 988 387 013

Deputy Director of Quality

: Eva Lorenzo Iglesias

- She is in charge of ensuring compliance with the Internal Quality Assurance System.
- Email: eva(at)uvigo.es
- Telephone: +34 988 387 019

Secretary of the Centre

: María Encarnación González Rufino

- She is in charge of taking the minutes of the School's collegiate bodies, as well as certifying the agreements taken in them.
- Email: secretaria.esei(at)uvigo.es
- Telephone: +34 988 387 016

Within the management team, the secretary of the school, María Encarnación González Rufino, is the

Equality Liaison Officer

, and is responsible for the dynamisation and implementation of equality policies. This person is the liaison with the

Equality Unit

of the University of Vigo to contribute to the application and monitoring of the measures proposed in the I Plan for Equality between women and men of the University of Vigo, with a view to achieving a more balanced participation of women and men in our University.

In addition to the management team, there are several professors in charge of coordinating the degree courses:

Coordinator of the Degree in Computer Engineering

: Eva Lorenzo Iglesias

Email: eva(at)uvigo.es

Phone: +34 988 387 019

Coordinator of the Degree in Artificial Intelligence

: Lourdes Borrajo Diz

Email: lborrajo(at)uvigo.es

Phone: +34 988 387 028

Coordinator of the Master's Degree in Computer Engineering

: Alma Gómez Rodríguez

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Coordinator of the Master's Degree in Artificial Intelligence

: Francisco Javier Rodríguez Martínez

Email: franjrm(at)uvigo.es

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Location

Escola Superior de Enxeñería Informática.

Campus de Ourense - Universidad de Vigo

Edificio Politécnico. As Lagoas s/n

32004 - Ourense (Spain)

Teléfonos: +34 988 387000, +34 988 387002

Fax: +34 988 387001

Web: esei.uvigo.es

Regulations and legislation

Available on the Centre's website (esei.uvigo.es)

Center services

teaching equipment

14 computer laboratories with 24 individual workstations and different operating systems

1 Electronics Technology laboratory

1 Computer Architecture laboratory

1 end-of-degree project laboratory

6 theory classrooms

6 seminars for group tutorials

added values

Classes in English in various subjects

Guidance teacher in the first year.

E-mail for students.

Storage directory for students, accessible from the Internet.

E-learning platform.

Wireless Internet access from all over campus.

Campus library with 120,000 volumes.

Alumni Delegation.

Premises for student associations.

University residence.

Hall of Degrees and Assembly Hall.

Cafeteria.

Grado en Ingeniería Informática

Subjects

Year 4th

Code	Name	Quadmester	Total Cr.
O06G151V01401	Computer systems security	1st	6
O06G151V01402	Project-based learning	1st	6
O06G151V01403	ICT Ethical and legal foundations	2nd	6
O06G151V01404	Development and software quality	1st	6
O06G151V01405	Business systems	1st	6
O06G151V01406	Application development and integration	1st	6
O06G151V01407	Architectural design of large software systems	1st	6
O06G151V01408	Advanced software engineering methods	1st	6
O06G151V01409	Service-oriented web architectures	2nd	6
O06G151V01410	Cloud computing and software	2nd	6
O06G151V01411	Software processes	2nd	6
O06G151V01412	Applications with scripting languages	2nd	6
O06G151V01413	Agile application development	2nd	6
O06G151V01414	Web services and technologies	1st	6
O06G151V01415	Digital content creation	1st	6
O06G151V01416	Mobile devices	1st	6
O06G151V01417	Applications developing for the Internet	1st	6
O06G151V01418	Industrial IT	1st	6
O06G151V01419	Information handling advanced techniques	2nd	6
O06G151V01420	ICT strategic management	2nd	6
O06G151V01421	Process modelling and simulation	2nd	6
O06G151V01422	Codes Theory	2nd	6
O06G151V01423	Corporate networks	2nd	6
O06G151V01981	Internships 1	1st	6
O06G151V01982	Internships 2	1st	12
O06G151V01991	Final Year Dissertation	2nd	12

IDENTIFYING DATA**Computer systems security**

Subject	Computer systems security			
Code	O06G151V01401			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	4th	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Ribadas Pena, Francisco José			
Lecturers	Ribadas Pena, Francisco José			
E-mail	ribadas@uvigo.es			
Web	http://moovi.uvigo.gal			

General description The course "Computer Systems Security" is located at the fourth course of the "Grado en Ingeniería Informática". It is a compulsory course that pretends to integrate, complement and expand contents related with the computer security already studied in previous matters related with operating systems and computer networks. Since computer security is a wide and diverse field, the main aim of this subject is to provide an introduction to this branch of the computer science and give an overview of the most notable aspects the computer security, so that it could serve to the student as a starting point in case that they decide to run their professional paths in this field.

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.
A3	Students will be able to gather and interpret relevant data (normally within their field of study) that will allow them to have a reflection-based considered opinion on important issues of social, scientific and ethical nature.
B3	Ability to design, develop, assess and ensure accessibility, ergonomics, usability and safety of computing systems, services and applications, as well as the information managed by them.
B4	Ability to define, assess and select hardware and software platforms for the development and execution of computing systems, services and applications, according to the acquired knowledge and training.
B7	Ability to learn, understand and apply the necessary legislation during professional practice as a Computer Science Engineer and to use the relevant binding specifications, regulations and norms.
B9	Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to communicate the knowledge contents, skills and abilities of the Computer Science Engineer profession.
B11	Ability to analyze and assess the social and environmental impact of technical solutions, being aware of the ethical and professional responsibilities involved in the professional practice of a Computer Science Engineer.
B12	Knowledge and application of basic elements of economics and human resource management, organization and planning of projects, as well as legislation, regulation and standardization in the field of computer projects, according to the knowledge acquired.
C7	Ability to design, develop, choose and assess computer applications and systems to guarantee their reliability, safety and quality, according to ethical principles and existing legislation and regulations.
C29	Ability to identify, assess and deal with associated risks that could potentially arise.
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.
C34	Ability to select, design, implement, integrate and manage networks and communications infrastructures in organizations.
C37	Ability to understand, apply and manage the security and safety of computing systems.
D4	Analysis, synthesis and evaluation capacity
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
D11	Critical thinking
D12	Leadership
D13	Entrepreneurial spirit and professional ambition
D14	Have motivation for quality and continuous improvement

Expected results from this subject

Expected results from this subject	Training and Learning Results			
RA2: Know the security architecture of modern operating systems and know configure them and manage them in a safe way	A2	B3 B4 B7 B9 B12	C7 C29 C32 C37	D7 D9 D11 D14
RA3: Manage a computer network in a safe way	A3	B3 B4 B7 B9 B11 B12	C7 C29 C32 C34 C37	D7 D8 D9 D14
RA4: Know the most common types of computer attacks and the alternatives to protect against them	A2 A3	B3 B7 B9 B11 B12	C7 C29 C34 C37	D7 D8 D12 D13 D14
RA5: Know how manage a security incident	A2 A3	B3 B7 B9 B11 B12	C7 C29 C32 C34 C37	D4 D7 D8 D11 D12 D13 D14

Contents

Topic

BLOCK I. Information security	.
1. Context of the security in computer systems	1.1 Concepts and terminology 1.2 Levels of the security: physics, logical, organisational 1.3 Norms and recommendations
2. Cryptography	2.1 Foundations and evolution 2.2 Symmetric encryption 2.3 Asymmetric encryption 2.4 Criptographic infraestructure: certificates, digital signatures, PKI
3. Secure application development	3.1 Software vulnerabilities and threats 3.2 Exploitation of vulnerabilities 3.3 Safe programming
BLOCK II. Operating systems security	.
4. Safe administration of O.S.	4.1 Authentication mechanisms 4.2 Monitoring tools 4.3 Typical vulnerabilities 4.4 Security incident response
BLOCK III. Network security	.
5. Secure network protocols	5.1 Vulnerabilities in TCP/IP networks 5.2 Security at network layer: IPSec 5.3 Security at transport layer: SSL/TLS 5.4 Security at application layer: SSH
6. Perimeter protection	6.1 Firewalls: types and topologies 6.2 Intrusion detection systems 6.3 Virtual private networks 6.4 Network security analysis
PRACTICAL ASSIGMENTS	- Use of encryption APIs - Security analysis in networks, systems and services - Design and deployment of perimeter protection solutions - Web application security analysis and countermeasures deployment

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	20	20	40
Laboratory practical	26	52	78
Mentored work	0	15	15
Presentation	1	3	4

Objective questions exam	2	10	12
Essay	1	0	1

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
	Description
Lecturing	Presentation by the teacher and discussion of the theoretical contents in the course's didactic guide. It includes activities such as study of practical cases and examples, presentation of studies and / or research, review and evaluation of security tools.
Laboratory practical	Practical works to realize in the laboratory. It will consist of a collection of guided exercises (individual or in couples) related with secure systems administration of operative systems and computer networks. CONTINUOUS ASSESSMENT Character: mandatory Attendance: not mandatory GLOBAL ASSESSMENT Character: not mandatory
Mentored work	Small research work, individual or in couples, related with aspects of the computer security not covered by the main topics of this subject. Research themes can be proposed by students. The result of the work will reflect in a written report and a short public presentation. CONTINUOUS ASSESSMENT Character: mandatory Attendance: not mandatory GLOBAL ASSESSMENT Character: not mandatory
Presentation	Public presentation and discussion of the more relevant aspects of students research works. CONTINUOUS ASSESSMENT Character: not mandatory Attendance: not mandatory

Personalized assistance

Methodologies	Description
Mentored work	Autonomous work (or in couples) with teacher tutoring and development guides
Laboratory practical	Autonomous work (or in couples) with teacher tutoring and development guides

Assessment

	Description	Qualification	Training and Learning Results			
Laboratory practical	Evaluation of the programming project with cryptographic APIs.	45	A2	B3	C7	D7
	Evaluation of guided exercises about network and operative systems security.			B4	C29	D8
	- LEARNING OUTCOMES: RA1, RA2, RA3, RA4, RA5			B7	C32	D9
Presentation	Evaluation of the presentation of research work. It will evaluate synthesis and communication skills, as well as the encouragement of the discussion around questions from teacher and other students.	5	A3	B7	C7	D4
				B11	C29	D7
	- LEARNING OUTCOMES: RA2, RA3, RA4, RA5			B12	C37	D13
Objective questions exam	Written multiple selection test, also with short answer questions, regarding contents from theoretical sessions and practical exercises.	40	A3	B3	C7	D4
				B7	C29	D7
	- LEARNING OUTCOMES: RA1, RA2, RA3, RA4, RA5				C32	D8
Essay	Evaluation of the written report with the results of the research work.	10	A3	B7	C7	D4
				B11	C29	D7
	- LEARNING OUTCOMES: RA2, RA3, RA4, RA5			B12	C37	D9
						D11

Other comments on the Evaluation

(1) CONTINUOUS ASSEMENT SYSTEM TEST 1: Java Encryption API Project

Description: Evaluation of the code and memory of the development project employing the JCA encryption API.

Applied methodology: Laboratory practical

% Qualification: 10%

Minimum %: grade equal to or greater than 4 points (out of 10)

Evaluated learning results: B3, C7, C32

Expected results: RA1

TEST 2: Guided practices

Description: Evaluation of the deliverables and questions corresponding to the security practices in networks and OS.

Applied methodology: Laboratory practical

% Qualification: 35%

Minimum %: grade equal to or greater than 4 points (out of 10)

Evaluated learning results: A2,B3,B4,B7,C7,C29,C32,C34,D7,D8,D9,D11,D12,D14

Expected results: RA2, RA3, RA4, RA5

TEST 3: Tutored work/essay

Description: Evaluation of the report/essay from the tutored research work.

Applied methodology: Essay

% Qualification: 10%

Minimum %: no minimum

Evaluated learning results: A3,B7,B11,B12,C7,C29,C37,D4,D7,D9,D11

Expected results: RA2, RA3, RA4, RA5

TEST 4: Presentation

Description: Evaluation of the presentation of the supervised research work.

Applied methodology: Presentation

% Qualification: 5%

Minimum %: no minimum

Evaluated learning results: A3,B7,B11,B12,C7,C29,C37,D4,D7,D13

Expected results: RA2, RA3, RA4, RA5

TEST 5: Final exam

Description: Multiple-choice exam on the theoretical contents of the subject.

Applied methodology: Objective questions exam

% Qualification: 40%

Minimum %: grade equal to or greater than 4 points (out of 10)

Evaluated learning results: A3,B3,B7,C7,C29,C32,C34,C37,D4,D7,D8

Expected results: RA1, RA2, RA3, RA4, RA5

ADDITIONAL CLARIFICATIONS

- To pass the subject it is necessary to reach the minimums indicated in the previous tests and to add in the final weighted grade a minimum of 5 points out of 10.
- In the case of finding unethical behavior (copying, plagiarism) in any of the deliveries made (total or partial), the total contribution of the corresponding evaluation element on the final grade will be annulled.

(2) GLOBAL ASSEMENT SYSTEM Procedure for selecting the global assessment modality:

- The continuous assessment modality is assumed by default.
- Students who opt for the global evaluation must communicate it via Moovi, using the mechanisms that are enabled and within the stipulated period, once the period of one month from the beginning of the term has passed.

TEST 1: Java Encryption API Project

Description: Evaluation of the code and memory of the development project employing the JCA encryption API.

Applied methodology: Laboratory practical

% Qualification: 10%

Minimum %: grade equal to or greater than 5 points (out of 10)

Evaluated learning results: B3, C7, C32

Expected results: RA1

TEST 2: Guided practices

Description: Evaluation of the deliverables and questions corresponding to the security practices in networks and OS.

Applied methodology: Laboratory practical

% Qualification: 35%

Minimum %: grade equal to or greater than 5 points (out of 10)

Evaluated learning results: A2,B3,B4,B7,C7,C29,C32,C34,D7,D8,D9,D11,D12,D14

Expected results: RA2, RA3, RA4, RA5

TEST 3: Final exam

Description: Multiple-choice exam on the theoretical contents of the subject.

Applied methodology: Objective questions exam

% Qualification: 55%

Minimum %: grade equal to or greater than 5 points (out of 10)

Evaluated learning results: A3,B3,B7,C7,C29,C32,C34,C37,D4,D7,D8

Expected results: RA1, RA2, RA3, RA4, RA5

ADDITIONAL CLARIFICATIONS

- To pass the subject it is necessary to reach the minimums indicated in the previous tests and to add in

the final weighted grade a minimum of 5 points out of 10.

- In the case of finding unethical behavior (copying, plagiarism) in any of the deliveries made (total or partial), the total contribution of the corresponding evaluation element on the final grade will be annulled.

(3) ASSESSMENT CRITERIA FOR EXTRAORDINARY AND FINAL CALLS- The continuous and global evaluation systems described above will be used.

- In these calls, students must only take the tests in which they have not obtained the minimum grade indicated.

(4) GRADING PROCESS In the case of students who pass part of the evaluated elements, but do not reach the minimum required to pass the whole subject, the grade to be included in the respective minutes will be calculated as the minimum between the weighted average of the parts passed and 4.9.

(5) EVALUATION DATES

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/>.

(6) 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."

(7) 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, accessible through <https://esei.uvigo.es/docencia/profesorado/>.

Sources of information

Basic Bibliography

W. Stallings, **Cryptography and Network Security: Principles and Practice**, 978-1292158587, 7th edition, Prentice Hall, 2017

W. Stallings, L. Brown, **Computer Security: Principles and Practice**, 978-0134794105, 4rd edition, Prentice Hall, 2018

J. L. García Rambla, **Ataques en redes de datos IPv4 e IPv6**, 978-8409240630, 2da edición, OXWORD, 2014

Complementary Bibliography

Carlos Álvarez Martín y Pablo González Pérez, **Hardening de servidores GNU / Linux**, 978-84-09-24061-6, 4ª edición, OXWORD, 2020

Darril Gibson, **Microsoft Windows Security Essentials**, 978-1118016848, 1st Edition, John Wiley & Sons, 2011

Recommendations

Other comments

Basic knowledge on OS administration, GNU/Linux and TCP/IP networks is assumed.

Programming assignment will require knowledge of Java language.

Network security exercises will employ virtual machines on VirtualBox (www.virtualbox.org). Basic knowledge of this tool is mandatory.

IDENTIFYING DATA**Aprendizaxe baseado en proxectos**

Subject	Aprendizaxe baseado en proxectos			
Code	006G151V01402			
Study programme	Grao en Enxeñaría Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	4	1c
Teaching language	Castelán Galego			
Department	Informática			
Coordinator	Rodríguez Martínez, Gerardo José			
Lecturers	Rodríguez Martínez, Gerardo José			
E-mail	gerodriguez@uvigo.es			
Web	http://moovi.uvigo.gal			
General description	Adquisición de habilidades e competencias mediante a análise, elaboración e presentación de memorias de proxectos de Software en grupo.			

Resultados de Formación e Aprendizaxe

Code	
A2	Que os estudantes saiban aplicar os seus coñecementos ó seu traballo ou vocación dunha forma profesional e posúan as competencias que adoitan demostrarse por medio da elaboración e defensa de argumentos e a resolución de problemas dentro da súa área de estudo.
A5	Que os estudantes desenvolvan aquelas habilidades de aprendizaxe necesarias para emprender estudos posteriores cun alto grao de autonomía.
B1	Capacidade para concebir, redactar, organizar, planificar, desenvolver e asinar proxectos no ámbito da enxeñaría en informática que teñan por obxecto, de acordo cos coñecementos adquiridos, a concepción, o desenvolvemento ou a explotación de sistemas, servizos e aplicacións informáticas.
B3	Capacidade para deseñar, desenvolver, avaliar e asegurar a accesibilidade, ergonomía, usabilidade e seguridade dos sistemas, servizos e aplicacións informáticas, así como da información que xestionan.
B4	Capacidade para definir, avaliar e seleccionar plataformas hardware e software para o desenvolvemento e a execución de sistemas, servizos e aplicacións informáticas, de acordo cos coñecementos adquiridos.
B5	Capacidade para concebir, desenvolver e manter sistemas, servizos e aplicacións informáticas empregando os métodos da enxeñaría de software como instrumento para o aseguramento de súa calidade, de acordo cos coñecementos adquiridos.
B8	Coñecemento das materias básicas e tecnoloxías, que capaciten para a aprendizaxe e desenvolvemento de novos métodos e tecnoloxías, así como as que lles doten dunha gran versatilidade para adaptarse a novas situacións.
B9	Capacidade para resolver problemas con iniciativa, toma de decisións, autonomía e creatividade. Capacidade para saber comunicar e transmitir os coñecementos, habilidades e destrezas da profesión de Enxeñeiro Técnico en Informática.
C7	Capacidade para deseñar, desenvolver, seleccionar e avaliar aplicacións e sistemas informáticos, asegurando a súa fiabilidade, seguridade e calidade, conforme aos principios éticos e á lexislación e normativa vixente
C9	Capacidade para comprender a importancia da negociación, os hábitos de traballo efectivos, o liderado e as habilidades de comunicación en todos os contornos de desenvolvemento de software
C14	Capacidade para analizar, deseñar, construír e manter aplicacións de forma robusta, segura e eficiente, elixindo o paradigma e as linguaxes de programación máis axeitadas
C17	Coñecemento e aplicación das características, funcionalidades e estrutura dos Sistemas Distribuídos, as Redes de Computadores e Internet e deseñar e implementar aplicacións baseadas nelas
C26	Capacidade para valorar as necesidades do cliente e especificar os requisitos software para satisfacer estas necesidades, reconciliando obxectivos en conflito mediante a procura de compromisos aceptables dentro das limitacións derivadas do custo, do tempo, da existencia de sistemas xa desenvolvidos e das propias organizacións
C28	Capacidade de identificar e analizar problemas e deseñar, desenvolver, implementar, verificar e documentar solucións software sobre a base dun coñecemento axeitado das teorías, modelos e técnicas actuais
C31	Capacidade para comprender a contorna dunha organización e as súas necesidades no ámbito das tecnoloxías da información e as comunicacións
C32	Capacidade para seleccionar, deseñar, despregar, integrar, avaliar, construír, xestionar, explotar e manter as tecnoloxías de hardware, software e redes, dentro dos parámetros de custo e calidade adecuados
C33	Capacidade para empregar metodoloxías centradas no usuario e a organización para o desenvolvemento, avaliación e xestión de aplicacións e sistemas baseados en tecnoloxías da información que aseguren a accesibilidade, ergonomía e usabilidade dos sistemas
D4	Capacidade de análise, síntese e avaliación
D5	Capacidade de organización e planificación
D6	Capacidade de abstracción: capacidade de crear e utilizar modelos que reflexen situacións reais

D7	Capacidade de buscar, relacionar e estruturar información provinte de diversas fontes e de integrar ideas e coñecementos.
D8	Capacidade de traballar en situacións de falla de información e/ou baixo presión
D9	Capacidade de integrarse rapidamente e traballar eficientemente en equipos unidisciplinares e de colaborar nun entorno multidisciplinar
D10	Capacidade de relación interpersonal.
D11	Razoamento crítico
D12	Liderado
D13	Espírito emprendedor e ambición profesional
D14	Ter motivación pola calidade e a mellora continua

Resultados previstos na materia

Expected results from this subject	Training and Learning Results			
RA1: Procura, ordenación e *estructuración de información sobre calquera tema	B1 B3 B4 B5 B8		D5 D7	
RA2: Traballo en equipo asumindo distintos roles: participar, liderar, animar, etc.	A5	B9	C9	D9 D10 D12 D13
RA3: Identificación e acotamiento de problemas, propoñendo alternativas de solución, razoando científica e técnicamente a solución adoptada.	A2	B1 B3 B4 B5 B8 B9	C7 C14 C17 C26 C28 C31 C32 C33	D6 D8 D11 D14
RA4: Elaboración de memorias de pequenos proxectos de diferente índole.		B1 B5	C26 C28	D4 D5 D7 D14

Contidos

Topic	
1. Introducción	1.1. Aprendizaxe cooperativa 1.2. Aprendizaxe baseada en proxectos 1.3. Metodoloxías de desenvolvemento en equipo 1.4. Ferramentas para o traballo colaborativo 1.5. Ferramentas para a aprendizaxe 1.6. Elaboración de memorias e informes 1.7. Presentación de proxectos
2. Casos de estudo	2.1. Análise e Elaboración de memorias de sistemas informáticos 2.2. Presentación de memorias

Planificación

	Class hours	Hours outside the classroom	Total hours
Lección maxistral	10.5	0	10.5
Seminario	7.5	15	22.5
Prácticas de laboratorio	29	78.5	107.5
Proxecto	2	3	5
Presentación	1	1	2
Estudo de casos	2.5	0	2.5

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Metodoloxía docente

	Description
Lección maxistral	Presentación na aula, en clases participativas, de teorías e conceptos asociados á aprendizaxe baseada en proxectos, e ás competencias transversais a desenvolver.

Seminario	Traballo individual e en equipo, con coordinación e distribución de tarefas, debates na aula, exercicios, e resolución de problemas e casos técnicos. Redacción de informes, presentación pública e defensa de conclusións extraídas.
Prácticas de laboratorio	Traballo en equipo, con coordinación e distribución de tarefas, no desenvolvemento de proxectos de sistemas informáticos. AVALIACION CONTINUA: Carácter: Obrigatorio Asistencia: Obrigatoria (mínimo 50%) AVALIACION GLOBAL: Carácter: Non Obrigatorio

Atención personalizada

Methodologies	Description
Seminario	Atenderanse as dúbidas particulares de cada grupo relacionadas coas actividades programadas
Prácticas de laboratorio	Atenderanse as dúbidas particulares de cada grupo relacionadas coas actividades programadas

Avaliación

	Description	Qualification	Training and Learning Results			
Proxecto	Realización de actividades que permiten a cooperación de varias materias e enfrontan aos alumnos/as, traballando en equipo, a problemas abertos. Permiten adestrar, entre outras, as capacidades de aprendizaxe en cooperación, de liderado, de organización, de comunicación e de fortalecemento das relacións persoais. Resultados de aprendizaxe avaliados: RA2, RA3, RA4, RA5	80	A2 A5	B1 B3 B4 B5 B8 B9	C7 C9 C14 C17 C26 C28	D4 D6 D8 D9 D10 D11 D12 D13 D14
Presentación	Exposición por parte do alumnado ante o/a docente e/ou un grupo de estudantes dun tema sobre contidos da materia ou dos resultados dun traballo, exercicio, proxecto... Pódese levar a cabo de maneira individual ou en grupo. Resultados de aprendizaxe avaliados: RA1, RA2, RA4	10	A5	B1 B5 B8 B9	C9 C26 C28	D5 D6 D7 D8 D9 D10 D11 D12 D13 D14
Estudo de casos	Proba na que un alumno/a debe analizar un feito, problema ou suceso real coa finalidade de coñecelo, interpretalo, resolvelo, xerar hipótese, contrastar datos, reflexionar, completar coñecementos, diagnosticarlo e adestrarse en procedementos alternativos de solución. Resultados de aprendizaxe avaliados: RA1, RA2, RA4	10	A5	B1 B5 B8 B9	C9 C26 C28	D5 D6 D7 D8 D9 D10 D11 D12 D13 D14

Other comments on the Evaluation

SISTEMA DE EVALUACIÓN CONTINUA

TRABALLO TEÓRICO

Descrición: Entrega dun traballo de análise sobre ferramentas utilizadas en xestión de proxectos.

Metodoloxía(s) aplicada(s): Aprendizaxe baseado en proxectos.

% Calificación: 20 %

% Mínimo: mínimo de 5 (sobre 10)

Competencias evaluadas: A2, A5,
B1,B3,B4,B5,B8,B9,C7,C9,C14,C17,C26,C28,C31,C32,C33,D4,D6,D8,D9,D10,D11,D12,D13,D14

Resultados de aprendizaxe evaluados: RA1, RA2,RA3,RA4

ELABORACIÓN E ANÁLISE DE MEMORIAS TÉCNICAS (Parte 1)

Descripción: Entrega e/o presentación de forma colectiva dal análise e cumplimentación de memorias técnicas

Metodoloxía(s) aplicada(s): Aprendizaxe baseado en proxectos.

% Calificación: 40 %

% Mínimo: mínimo de 5 (sobre 10)

Competencias evaluadas: A2, A5,
B1,B3,B4,B5,B8,B9,C7,C9,C14,C17,C26,C28,C31,C32,C33,D4,D6,D8,D9,D10,D11,D12,D13,D14

Resultados de aprendizaxe evaluados:

RA1, RA2,RA3,RA4

ELABORACIÓN E ANÁLISE DE MEMORIAS TÉCNICAS (Parte 2)

Descripción: Entrega e/o presentación de forma colectiva dal análise e cumplimentación de memorias técnicas

Metodoloxía(s) aplicada(s): Aprendizaxe baseado en proxectos.

% Calificación: 40 %

% Mínimo: mínimo de 5 (sobre 10)

Competencias evaluadas: A2, A5,
B1,B3,B4,B5,B8,B9,C7,C9,C14,C17,C26,C28,C31,C32,C33,D4,D6,D8,D9,D10,D11,D12,D13,D14

Resultados de aprendizaxe evaluados: RA1, RA2,RA3,RA4

A nota final se calculará en función das notas obtidas en cada unha das partes ponderadas en función da porcentaxe de cada unha das tres partes.

· Todos os estudantes que se presenten a cualquiera das probas se entende que se acollen ó procedemento de avaliación continua descrito anteriormente.

SISTEMA DE EVALUACIÓN GLOBAL

Procedimientoo para a elección da modalidade de avaliación global: Se considera que o estudiantado opta por o sistema de avaliación global si non se presenta á Proba 1 do sistema de avaliación continua

ELABORACIÓN E ANÁLISE DE MEMORIAS TÉCNICAS

Descripción: Entrega e/o presentación de forma colectiva dal análise e cumplimentación de memorias técnicas

Metodoloxía(s) aplicada(s): Aprendizaxe baseado en proxectos.

% Calificación: 100 %

% Mínimo: mínimo de 5 (sobre 10)

Competencias evaluadas: A2, A5,
B1,B3,B4,B5,B8,B9,C7,C9,C14,C17,C26,C28,C31,C32,C33,D4,D6,D8,D9,D10,D11,D12,D13,D14

Resultados de aprendizaxe evaluados: RA1, RA2,RA3,RA4

CRITERIOS DE EVALUACIÓN PARA CONVOCATORIA EXTRAORDINARIA E FIN DE CARREIRA

Emplearase o sistema de avaliación global exposto anteriormente.

PROCESO DE CALIFICACIÓN DE ACTAS

Independentemente do sistema de avaliación e a convocatoria, en caso de non superar algunha parte (teoría o prácticas) da avaliación, pero a puntuación global fose superior a 5 (sobre 10), a calificación en actas será 4.

DATAS DE EVALUACIÓN

As datas das probas correspondentes ó sistema de avaliación continua publicaranse no calendario de actividades, dispoñible na páxina web de la ESEI <https://esei.uvigo.es/docencia/horarios/>.

CONSULTA/SOLICITUDE DE TUTORÍAS

As tutorías poden consultarse a través da páxina persoal do profesorado, accesible a través de <https://esei.uvigo.es/docencia/profesorado/>

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Martel, Antonio., **Gestión práctica de proyectos con Scrum : desarrollo de software ágil para el Scrum Master**, 9781517192365, 1, Leipzig : Amazon, 2016

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Johnson, D. W., **El aprendizaje cooperativo en el aula**, 950122144X, 1, Paidós, 1999

Boss, S. and Krauss, J., **Reinventing Project-Based Learning: Your Field Guide to Real-World Projects in the Digital Age**, 9781564842381, 1, International Society for Technology in Education, 2007

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Dawson, C. W., **El proyecto fin de carrera en Ingeniería Informática**, 84-205-3560-5, 1, Prentice Hall, 2002

Downey, Allen B., **Think Python**, 9781491939369, 2, Sebastopol, CA : O'Reilly Media, cop., 2016

Recomendacións

Other comments

Recoméndase superar a maioría dos créditos obrigatorios (polo menos 150 ECTS) e estar matriculado de todos os créditos que falten para completar a obrigatorioidade, dado que nesta asignatura interrelaciónanse conceptos tratados no resto de asignaturas.

IDENTIFYING DATA				
Fundamentos éticos e xurídicos das TIC				
Subject	Fundamentos éticos e xurídicos das TIC			
Code	006G151V01403			
Study programme	Grao en Enxeñaría Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	4	2c
Teaching language	Castelán			
Department				
Coordinator	Garriga Domínguez, Ana			
Lecturers	Feijóo Miranda, José Garriga Domínguez, Ana			
E-mail	agarriga@uvigo.es			
Web	http://https://moovi.uvigo.gal/			
General description	Estudaranse as principais implicacións éticas do desenvolvemento do TIC nos dereitos fundamentais das persoas, especialmente na súa liberdade. Así mesmo estudaranse as normas xurídicas e deontolóxicas que regulan a sociedade da información nos seus diferentes aspectos. O idioma no que se impartirán as clases, así como o dos materiais empregados será o castelán.			

Resultados de Formación e Aprendizaxe				
Code				
A1	Que os estudantes demostren posuír e comprender coñecementos nunha área de estudo que parte da base da educación secundaria xeral e adoita atoparse a un nivel que, malia se apoiar en libros de texto avanzados, inclúe tamén algúns aspectos que implican coñecementos procedentes da vangarda do seu campo de estudo.			
A3	Que os estudantes teñan a capacidade de reunir e interpretar datos relevantes (normalmente dentro da súa área de estudo) para emitir xuízos que inclúan unha reflexión sobre temas relevantes de índole social, científica ou ética.			
B7	Capacidade para coñecer, comprender e aplicar a lexislación necesaria durante o desenvolvemento da profesión de Enxeñeiro Técnico en Informática e manexar especificacións, regulamentos e normas de obrigado cumprimento.			
B11	Capacidade para analizar e valorar o impacto social e medioambiental das solucións técnicas, comprendendo a responsabilidade ética e profesional da actividade de Enxeñeiro Técnico en Informática.			
B12	Coñecemento e aplicación de elementos básicos de economía e de xestión de recursos humanos, organización e planificación de proxectos, así como a lexislación, regulación e normalización no ámbito dos proxectos informáticos, de acordo cos coñecementos adquiridos.			
C7	Capacidade para deseñar, desenvolver, seleccionar e avaliar aplicacións e sistemas informáticos, asegurando a súa fiabilidade, seguridade e calidade, conforme aos principios éticos e á lexislación e normativa vixente			
C8	Capacidade para planificar, concibir, despreñar e dirixir proxectos, servizos e sistemas informáticos en tódolos ámbitos, liderando a súa posta en marcha e mellora continua e valorando o seu impacto económico e social			
C10	Capacidade para elaborar o pliego de condicións técnicas dunha instalación informática que cumpra os estándares e normativas vixentes			
C24	Coñecemento da normativa e a regulación da informática nos ámbitos nacional, europeo e internacional			
C30	Capacidade para deseñar solucións apropiadas nun ou máis dominios de aplicación utilizando métodos da enxeñería do software que integren aspectos éticos, sociais, legais e económicos			
D1	Capacidade para comprender o significado e aplicación da perspectiva de xénero nos distintos ámbitos de coñecemento e na práctica profesional co obxectivo de alcanzar unha sociedade máis xusta e igualitaria.			
D4	Capacidade de análise, síntese e avaliación			
D7	Capacidade de buscar, relacionar e estruturar información provinte de diversas fontes e de integrar ideas e coñecementos.			
D10	Capacidade de relación interpersonal.			
D11	Razoamento crítico			

Resultados previstos na materia				
Expected results from this subject	Training and Learning Results			
Nova	A1	B7	C7	D1
	A3	B11	C8	D4
		B12	C10	D7
			C24	D10
			C30	D11

Contidos	
Topic	
I.-NOCIÓN XURÍDICAS BÁSICAS	Concepto e fontes do Dereito español. Os dereitos fundamentais.

II.-O IMPACTO DO TIC NOS DEREITOS HUMANOS.	O desenvolvemento da informática e o seu impacto social. O dereito á intimidade e á protección de datos persoais. Desenvolvemento tecnolóxico e problemas actuais dos dereitos humanos.
III.-O RÉXIME XURÍDICO DA PROTECCIÓN DE DATOS PERSOAIS	A normativa de regulación de protección de datos persoais na Unión Europea. A normativa de protección de datos persoais no Ordenamento español.
IV.-A REGULACIÓN LEGAL DA SOCIEDADE DA INFORMACIÓN	Internet e protección de datos persoais. Privacidade e comunicacións electrónicas. O réxime xurídico dos servizos da sociedade da información.
V.-A PROTECCIÓN DOS PROGRAMAS DE COMPUTADOR.	Concepto de propiedade intelectual. A propiedade intelectual dos programas de computador. Autoría e dereitos de explotación dos programas de computador.
VI.- DEONTOLOGÍA PROFESIONAL DA ENXEÑARÍA INFORMÁTICA.	A deontoloxía profesional. As normas éticas e de práctica profesional dos enxeñeiros informáticos.

Planificación

	Class hours	Hours outside the classroom	Total hours
Traballo tutelado	6	15	21
Resolución de problemas	20	15	35
Lección maxistral	32	60	92
Exame de preguntas obxectivas	0.4	0	0.4
Exame de preguntas obxectivas	0.4	0	0.4
Presentación	0.2	0	0.2

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Metodoloxía docente

	Description
Traballo tutelado	Traballo tuteado, que se realizará en grupos de tres persoas e que deberá ser exposto en clase sobre un tema relacionado coa materia.
Resolución de problemas	Analizaranse e se resolverán os casos que se presenten aplicando a lexislación vixente
Lección maxistral	Exposición oral complementada co uso de medios audiovisuais dirixida aos estudantes, coa finalidade de transmitir coñecementos e facilitar a aprendizaxe.

Atención personalizada

Methodologies	Description
Lección maxistral	Atenderase ao alumnado durante as clases e no horario de tutorías
Traballo tutelado	Atenderase ao alumnado durante as clases e no horario de tutorías
Resolución de problemas	Atenderase ao alumnado durante as clases e no horario de tutorías

Avaliación

	Description	Qualification	Training and Learning Results			
Exame de preguntas obxectivas	Exame de 20 preguntas tipo test e unha pregunta longa que avaliarán os contidos teóricos correspondentes a sesión maxistral. Terase en conta a caligrafía, presentación e faltas de ortografía.	40	A1	B7	C7	D10
				B11	C8	D11
				B12	C10	
					C24	
	Avaliaranse os seguintes resultados de aprendizaxe: Rap.1, Rap.2, Rap.3, Rap.4, Rap.6, Rap.7, Rap.9				C30	
Exame de preguntas obxectivas	Realizaranse 4 probas na aula durante o curso, que avaliarán os coñecementos adquiridos mediante a resolución de problemas e a aplicación práctica dos coñecementos adquiridos nas prácticas de laboratorio. Para superar a materia será necesario obter a cualificación de, polo menos 4 sobre 10, en todos os cuestionarios e de 5 sobre 10 na cualificación media final desta parte da materia.	40	A3	B7	C7	D1
				B12	C8	D4
					C10	D7
					C30	D10
						D11
	Avaliaranse os seguintes resultados de aprendizaxe: Rap.2, Rap.5, Rap.6, Rap.7, Rap.8.					
Presentación	Valorarase tanto o traballo como a súa exposición.	20	A3	B11	C7	D1
					C10	D4
					C24	D7
						D10
						D11
	Avaliaranse os seguintes resultados de aprendizaxe: Rap. 1, Rap. 3 y Rap 6.					

Other comments on the Evaluation

AVALIACIÓN CONTINUA:

Todos os estudantes que se presenten a calquera destas probas enténdese que se acollen ao sistema de avaliación continua.

En caso de non alcanzar a nota esixida nalgunha das partes e que a cualificación media dese un resultado de 5 sobre 10 ou superior, serán cualificados coa nota de 4.9.

PROBA 1 AVALIACIÓN DE COÑECIMENTOS TEÓRICOS (40% da cualificación final): Exame escrito: 20 preguntas tipo test e unha pregunta longa que avaliarán os contidos teóricos correspondentes a sesión maxistral. Terase en conta a presentación, a caligrafía e a ortografía. A pregunta longa terá un valor de 2 puntos sobre 10, e pártela tipo test de 8 sobre 10. Será necesario obter unha cualificación de polo menos 5 sobre 10 nesta proba para superar a materia.

Competencias avaliadas: A1, B7, B11, B12, C7, C8, C10, C24, C30, D10, D11.

Avaliaranse os seguintes resultados de aprendizaxe: Rap.1, Rap.2, Rap.3, Rap.4, Rap.6, Rap.7, Rap.9

PROBA 2 RESOLUCIÓN DE PROBLEMAS E APLICACIÓN PRÁCTICA DOS COÑECIMENTOS TEÓRICOS (40% da cualificación final): Realizaranse 4 cuestionarios na aula durante o curso, que avaliarán os coñecementos adquiridos mediante a resolución de problemas e a aplicación práctica dos coñecementos adquiridos nas prácticas de laboratorio. Para superar a materia será necesario obter a cualificación de, polo menos 4 sobre 10, en todos os cuestionarios e de 5 sobre 10 na cualificación media final desta parte da materia. Os alumnos que non obteñan esa cualificación mínima realizarán un exame final escrito sobre un caso práctico.

Competencias avaliadas: A3, B7, B12, C7, C8, C10, C30, D1, D4, D7, D10, D11. Avaliaranse os seguintes resultados de aprendizaxe: Rap.2, Rap.5, Rap.6, Rap.7, Rap.8.

PROBA 3 PRESENTACIÓN DO TRABALLO TUTELADO (20% da cualificación final): Valorarase tanto o traballo tutelado como a súa exposición, aínda que esta última terá un peso maior na cualificación. Para iso teranse en conta o seguinte:

- 1.- Non se admitirán traballos total ou parcialmente copiados. Terán esta consideración os traballos que consistan ou inclúan a edición dos contidos de páxinas web ou realizados mediante IA. Esta actuación equivale a copiar nun exame.
- 2.- Os traballos deben realizarse en grupos de de tres persoas (excepcionalmente por razóns xustificadas poderán ser de 2 ou 4).
- 3.- O tema será asignado polo docente responsable.
4. Contido: Desenvolvemento da temática do traballo, no hanse de integrar as fontes bibliográficas e informativas que se manexaron e as conclusións resultado do estudo.
- 5.- Extensión máxima 15 páxinas, letra arial 12, espazo simple, formato PDF.

Competencias avaliadas: A3, B11, C7, C10, C24, D1, D4, D7, D10, D11.

Avaliaranse os seguintes resultados de aprendizaxe: Rap. 1, Rap. 3 y Rap 6.

AVALIACIÓN GLOBAL: Considerarase que o alumnado opta polo sistema de avaliación global cando se non se presenta ao primeiro do cuestionarios correspondente á proba 2, que, en todo caso, realizarase transcorrido un mes desde o inicio do cuatrimestre.

Proba obxectiva consistente nun exame final da materia, cunha parte práctica e outra teórica:

- A parte teórica cun exame de 20 preguntas tipo test e unha pregunta longa que avaliarán os contidos teóricos correspondentes a sesión maxistral. A pregunta longa terá un valor de 2 puntos sobre 10, e pártela tipo test de 8 sobre 10. Para poder obter un 5 é necesario ter correctamente contestadas ao menos 13 preguntas do test. As preguntas incorrectas non restan puntuación (60 % da cualificación final).

- A parte práctica avaliarase cun exame final escrito que constará de 10 preguntas tipo test sobre un caso práctico e que avaliará os coñecementos obtidos nas prácticas de laboratorio. Cada Pregunta terá un valor de 1 punto (40 % da cualificación final). Segunda convocatoria e seguintes (xullo e fin de carreira):: A adquisición de competencias na segunda convocatoria avaliarase a través dunha proba obxectiva consistente nun exame final da materia, con dous partes (teórica e práctica), que serán avaliadas co mesmo sistema que para os non asistentes. As datas de exame da segunda convocatoria e da convocatoria fin de carreira son as aprobadas pola Xunta de Centro da ESEI e atópanse publicasen na páxina web <http://www.esei.uvigo.es>.

Avaliaranse aos seguintes resultados de aprendizaxe: Rap.1, Rap.2, Rap. 3, Rap.4, Rap.5, Rap 6, Rap.7, Rap.8 e Rap. 9 e as seguintes competencias: A1, B7, B11, B12, CB1, CB3, CG7, CG11, CG12, CE6, CE7, CE8, CE9, CE10, CE24, CE30, CE31, CT3,

CT7, CT8, CT10, CT16 e CT17.

DATAS DE AVALIACIÓN: A proba global realizarase na data oficial fixada pola Escola. Pode consultase en: <https://esei.uvigo.es/docencia/exames/> A probas da avaliación continua serán fixadas no cronograma da materia, con antelación suficiente, e publicadas en MOOVI e no calendario de actividades.

TITORÍAS: solicítasense co profesor correspondente a través do seu respectivo correo electrónico: (agarriga@uvigo.es e jfeijoomiranda@uvigo.es). Serán presenciais no despacho nº 26 da Facultade de Dereito e, excepcionalmente por causas xustificadas, poderán realizarse a través do campus virtual da Universidade.

EMPREGO DE DISPOSITIVOS MÓBILES Lémbrese ao alumnado a prohibición de uso de dispositivos móbiles ou computadores portátiles durante as probas de exame en cumprimento do artigo 13.2.d) do Estatuto do Estudante Universitario, relativo aos deberes do estudiantado universitario, que establece ou deber de "Absterse da utilización ou cooperación en procedementos fraudulentos nas probas de avaliación, nos traballos que se realicen ou en documentos oficiais da universidade".

Tampouco se poderán utilizar teléfonos móbiles durante o desenvolvemento das clases.

Bibliografía. Fontes de información

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FAYOS GARDÓ, A. (editor), **La Propiedad intelectual en la era digital**, 9788490858448, Dykinson, Madrid

GARCÍA MEXÍA, P. (Dir.), **Derechos y libertades, internet y tics**, 9788490536704, Tirant lo Blanch, 2014

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MOLES PLAZA, R., **Derecho y control en Internet: la regulabilidad en Internet**, 9788434432376, Ariel, 2003

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PIÑAR MAÑAS, J. L. (Director), **Reglamento general de protección de datos : hacia un nuevo modelo europeo de privacidad**, 978-84-290-1936-0, Reus, Madrid

RALLO LOMBARTE, A. y GARCÍA MAHAMUT, R., **Hacia un nuevo derecho europeo de protección de datos**, 978-84-9086-390-9, Tirant lo Blanch, Valencia

VALERO TORRIJOS, J. (Coord.), **La protección de los datos personales en Internet ante la innovación tecnológica**, 9788490149706, Thomson Reuters Aranzadi, Cizur Menor (Navarra)

AA.VV., **La implementación del reglamento general de Protección de Datos en España y el impacto de sus cláusulas abiertas**, 9788411478496, Tirant lo Blanch, 2023

Recomendacións

IDENTIFYING DATA				
Development and software quality				
Subject	Development and software quality			
Code	006G151V01404			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language				
Department				
Coordinator				
Lecturers				
E-mail				

----- UNPUBLISHED TEACHING GUIDE -----

IDENTIFYING DATA				
Sistemas de negocio				
Subject	Sistemas de negocio			
Code	006G151V01405			
Study programme	Grao en Enxeñaría Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4	1c
Teaching language	Castelán Galego			
Department				
Coordinator				
Lecturers				
E-mail				
Web	http://moovi.uvigo.gal			
General description	A asignatura céntrase en dotar o estudante das competencias necesarias para coñecer, deseñar, e implementar sistemas de información avanzados que sexan empregados nas empresas polo seu equipo xerencial. Moitas destas ferramentas se engloban dentro das siglas ERP, CRM e os que se denominan de business intelligence (de intelixencia de negocio). O inglés se emprega en materiais escritos.			

Resultados de Formación e Aprendizaxe

Code	
A2	Que os estudantes saiban aplicar os seus coñecementos ó seu traballo ou vocación dunha forma profesional e posúan as competencias que adoitan demostrarse por medio da elaboración e defensa de argumentos e a resolución de problemas dentro da súa área de estudo.
A3	Que os estudantes teñan a capacidade de reunir e interpretar datos relevantes (normalmente dentro da súa área de estudo) para emitir xuízos que inclúan unha reflexión sobre temas relevantes de índole social, científica ou ética.
A4	Que os estudantes poidan transmitir información, ideas, problemas e solución a un público tanto especializado coma non especializado.
B4	Capacidade para definir, avaliar e seleccionar plataformas hardware e software para o desenvolvemento e a execución de sistemas, servizos e aplicacións informáticas, de acordo cos coñecementos adquiridos.
B5	Capacidade para concebir, desenvolver e manter sistemas, servizos e aplicacións informáticas empregando os métodos da enxeñaría de software como instrumento para o aseguramento de súa calidade, de acordo cos coñecementos adquiridos.
B8	Coñecemento das materias básicas e tecnoloxías, que capaciten para a aprendizaxe e desenvolvemento de novos métodos e tecnoloxías, así como as que lles doten dunha gran versatilidade para adaptarse a novas situacións.
B9	Capacidade para resolver problemas con iniciativa, toma de decisións, autonomía e creatividade. Capacidade para saber comunicar e transmitir os coñecementos, habilidades e destrezas da profesión de Enxeñeiro Técnico en Informática.
B12	Coñecemento e aplicación de elementos básicos de economía e de xestión de recursos humanos, organización e planificación de proxectos, así como a lexislación, regulación e normalización no ámbito dos proxectos informáticos, de acordo cos coñecementos adquiridos.
C6	Coñecemento axeitado do concepto de empresa, marco institucional e xurídico da empresa. Organización e xestión de empresas
C8	Capacidade para planificar, concibir, despregar e dirixir proxectos, servizos e sistemas informáticos en tódolos ámbitos, liderando a súa posta en marcha e mellora continua e valorando o seu impacto económico e social
C10	Capacidade para elaborar o pliego de condicións técnicas dunha instalación informática que cumpra os estándares e normativas vixentes
C11	Coñecemento, administración e mantemento de sistemas, servizos e aplicacións informáticas
C25	Capacidade para desenvolver, manter e avaliar servizos e sistemas software que satisfagan todos os requisitos do usuario e se comporten de forma fiable e eficiente, sexan asequibles de desenvolver e manter e cumpran normas de calidade, aplicando as teorías, principios, métodos e prácticas da Enxeñaría do Software
C29	Capacidade de identificar, avaliar e xestionar os riscos potenciais asociados que puidesen presentarse
C30	Capacidade para deseñar solucións apropiadas nun ou máis dominios de aplicación utilizando métodos da enxeñaría do software que integren aspectos éticos, sociais, legais e económicos
C31	Capacidade para comprender a contorna dunha organización e as súas necesidades no ámbito das tecnoloxías da información e as comunicacións
D4	Capacidade de análise, síntese e avaliación
D5	Capacidade de organización e planificación
D11	Razoamento crítico

Resultados previstos na materia

Expected results from this subject	Training and Learning Results
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RA1: Coñecer a estrutura interna dos sistemas de soporte ao negocio presentes na actualidade nas empresas	A2 A3 A4	B4 B5 B8 B9 B12	C6 C8 C10 C11 C25 C29 C30 C31	D4 D5 D11
RA2: Entender e ser capaz de realizar a análise e deseño completo dun sistema ERP, CRM e BI. Saber adaptar cada módulo do sistema ás necesidades das empresas.	A2 A3 A4	B4 B5 B8 B9 B12	C6 C8 C10 C11 C25 C29 C30 C31	D4 D5 D11
RA3: Dotar de novas funcionalidades aos sistemas existentes e deseñar algoritmos de integración con outras fontes de información empresarial.	A2 A3 A4	B4 B5 B8 B9 B12	C6 C8 C10 C11 C25 C29 C30 C31	D4 D5 D11
RA4: Deseñar os mecanismos de mellora de devanditos sistemas e a súa adecuación aos fins da organización.	A2 A3 A4	B4 B5 B8 B9 B12	C6 C8 C10 C11 C25 C29 C30 C31	D4 D5 D11

Contidos

Topic

Introdución aos sistemas de soporte ao negocio	Introdución Arquitecturas de sistemas informaticas para empresas Conceptos de servizos Cloud para empresas Estruturas, implementaciones e administración de Base de datos para empresas (exemplo con PostgreSQL)
Sistemas ERP	Definicións e conceptos Compoñentes de ERPs E-business: conceptos e implementaciones Programación para E-business (exemplos con Django Framework) Instalación, administración e utilización dun ERP como Odoo
Sistemas CRM	Definicións e conceptos de xestión de Clientes Aplicacións en sistemas integrados como Odoo.
Sistemas BI	Compoñentes empregados e tecnoloxías Requisitos para sistemas de intelixencia de negocios Aplicación de aprendizaxe de maquina, intelixencia artificial, e Big Data a empresas.
Análise da situación empresarial e deseño do sistema	Análise da situación dos negocios e deseño dos sistemas informáticas
Definición de arquitecturas e procesos de integración de sistemas.	Arquitecturas e procesos de integración

Planificación

	Class hours	Hours outside the classroom	Total hours
Lección maxistral	18	25	43
Prácticas de laboratorio	15	35	50
Traballo tutelado	14	9	23
Presentación	2.5	17	19.5
Exame de preguntas de desenvolvemento	2.5	10	12.5

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Metodoloxía docente

	Description
Lección maxistral	Exposición dos contidos do curso, con énfase especial sobre o ensino en base de exemplos e casos prácticos.
Prácticas de laboratorio	Resolver problemas relacionados cos sistemas de información empresarial. As solucións requiren sínteses, programación informática, implantación de sistemas informáticos e análises.
Traballo tutelado	O/A estudante, de maneira individual ou en grupo, elabora un documento sobre a temática da materia ou prepara seminarios, investigacións, memorias, ensaios, resumos de lecturas, conferencias etc.
Presentación	Presentación dos traballos de fin de materia por parte do alumno.

Atención personalizada

Methodologies	Description
Prácticas de laboratorio	Resolver problemas relacionados con los sistemas de información empresarial. Las soluciones requieren síntesis, programación informática, implantación de sistemas informáticos y análisis.

Avaliación

	Description	Qualification	Training and Learning Results			
Prácticas de laboratorio	As prácticas de laboratorio son obrigatorias. Cata práctica consiste dun conxunto de problemas e terá unha data de entrega estipulada. Para superar a materia, é necesario unha puntuación total, igual ou superior a 5 puntos (sobre 10). Resultados previstos avaliados: RA1, RA2, RA3, RA4	35	A2 A3 A4	B4 B5 B8 B9 B12	C6 C8 C10 C11 C25 C29 C30 C31	D4 D5 D11
Presentación	Cada estudante fai unha investigación e presentación dun tema relacionados coa materia. Terase en conta tamén na avaliación as opinións do resto dos/as estudantes. Resultados previstos avaliados: RA1, RA2, RA3, RA4	15	A2 A3 A4	B4 B5 B8 B9 B12	C6 C8 C10 C11 C25 C29 C30 C31	D4 D5 D11
Exame de preguntas de desenvolvemento	Haberá probas para avaliar os coñecementos do alumnado, de carácter obrigatorio. Resultados previstos avaliados: RA1, RA2, RA3, RA4	50	A2 A3 A4	B4 B5 B8 B9 B12	C6 C8 C10 C11 C25 C29 C30 C31	D4 D5 D11

Other comments on the Evaluation

SISTEMA DE AVALIACIÓN CONTINUA

PROBA1: Avaliación teórica1

Descrición: Proba obxectiva que incluíra avaliación de conceptos teóricos e resolución de exercicios.

Metodoloxía(s) aplicada(s): Examen de preguntas de desenvolvemento

%Cualificación: 25%

Resultados de formación e aprendizaxe: A2, A3, A4, B4, B5, B8, B9, B12, C6, C8, C10, C11, C25, C29, C30, C31, D4, D5, D11.

Resultados previstos na materia: RA1, RA2, RA3, RA4

PROBA2: Avaliación teórica2

Descrición: Proba obxectiva que incluíra avaliación de conceptos teóricos e resolución de exercicios.

Metodoloxía(s) aplicada(s): Examen de preguntas de desenvolvemento

%Cualificación: 25%

Resultados de formación e aprendizaxe: A2, A3, A4, B4, B5, B8, B9, B12, C6, C8, C10, C11, C25, C29, C30, C31, D4, D5, D11.

Resultados previstos na materia: RA1, RA2, RA3, RA4

PROBA3: Prácticas de laboratorio

Descrición: Entrega das prácticas de laboratorio plantexadas o longo do curso nas datas estipuladas previamente.

Metodoloxía aplicada: Prácticas de laboratorio.

%Cualificación: 35%

Mínimo: Para a liberación desta parte da asignatura o/a estudante deberá obter unha cualificación igual ou superior a 5 puntos (sobre 10) nesta prueba.

Resultados de formación e aprendizaxe: A2, A3, A4, B4, B5, B8, B9, B12, C6, C8, C10, C11, C25, C29, C30, C31, D4, D5, D11.

Resultados previstos na asignatura: RA1, RA2, RA3, RA4

PROBA4: Presentación

Descrición: Cada estudante fai unha investigación e presentación dun tema relacionados coa materia. Terase en conta tamén na avaliación as opinións do resto dos/as estudantes.

Metodoloxía aplicada: Presentación

%Cualificación: 15%

Resultados de formación e aprendizaxe: A2, A3, A4, B4, B5, B8, B9, B12, C6, C8, C10, C11, C25, C29, C30, C31, D4, D5, D11.

Resultados previstos: RA1, RA2, RA3, RA4

Observaciones:

Para superar a asignatura será necesario obter alomenos o 50% da nota máxima da parte teórica (PROBA1+PROBA2), que todas as prácticas sexan presentadas en tempo e prazo especificado cunha puntuación total igual ou superior a 5 puntos (sobre 10) (PROBA 3), e que a suma das notas de teoría e prácticas alcance, alomenos, o 50% da nota máxima da materia. Polo tanto, en caso de que unha ou máis prácticas non sexan entregadas e defendidas nos prazos especificados, sen unha xustificación aceptable para o profesor, a nota final será un 0.

SISTEMA DE AVALIACIÓN GLOBAL

Procedemento para a elección da modalidade de avaliación global: Se considera que o/a estudante opta polo sistema de avaliación global se non se presenta a Proba 1 Avaliación teórica 1 do sistema de avaliación continua.

PROBA1: Avaliación teórica

Descrición: Proba obxectiva que incluírá avaliación de conceptos teóricos e resolución de exercicios.

Metodoloxía aplicada: Examen de preguntas de desenvolvemento

%Cualificación: 50%

Resultados de formación e aprendizaxe: A2, A3, A4, B4, B5, B8, B9, B12, C6, C8, C10, C11, C25, C29, C30, C31, D4, D5, D11.

Resultados previstos na materia: RA1, RA2, RA3, RA4

PROBA2: Prácticas de laboratorio

Descrición: Entrega das prácticas de laboratorio plantexadas o longo do curso nas datas estipuladas previamente.

Metodoloxía aplicada: Prácticas de laboratorio.

%Cualificación: 35%

Mínimo: Para a liberación desta parte da asignatura o/a estudante deberá obter unha cualificación igual ou superior a 5 puntos (sobre 10) nesta proba.

Resultados de formación e aprendizaxe: A2, A3, A4, B4, B5, B8, B9, B12, C6, C8, C10, C11, C25, C29, C30, C31, D4, D5, D11.

Resultados previstos na materia: RA1, RA2, RA3, RA4

PROBA3: Presentación

Descrición: Cada estudante fai unha investigación e presentación dun tema relacionados coa materia. Terase en conta tamén na avaliación as opinións do resto dos/as estudantes.

Metodoloxía aplicada: Presentación

%Cualificación: 15%

Resultados de formación e aprendizaxe: A2, A3, A4, B4, B5, B8, B9, B12, C6, C8, C10, C11, C25, C29, C30, C31, D4, D5, D11.

Resultados previstos: RA1, RA2, RA3, RA4

CRITERIOS DE AVALIACIÓN PARA CONVOCATORIA EXTRAORDINARIA E FIN DE CARREIRA

Se aplica o sistema de avaliación global, tanto se o/a estudante proven da avaliación continua como global.

PROCESO DE CUALIFICACIÓN DE ACTAS

Independentemente do sistema de avaliación e a convocatoria, en caso de non superar algunha parte da avaliación, pero a puntuación global fose superior a 4 (sobre 10), a cualificación en actas será 4.

DATAS DE AVALIACIÓN

As datas das probas correspondentes ao sistema de avaliación continua publicarase no calendario de actividades, dispoñible na páxina web da ESEI <https://esei.uvigo.es/docencia/horarios/>.

As datas oficiais de exame das diferentes convocatorias, aprobadas oficialmente pola Xunta de Centro da ESEI, atópanse publicadas na páxina web da ESEI <https://esei.uvigo.es/docencia/horarios/>.

EMPREGO DE DISPOSITIVOS MÓBILES

Lémbrese a todo o alumnado a prohibición do uso de dispositivos móbiles en exercicios e prácticas, en cumprimento do artigo 13.2.d) do Estatuto do Estudante Universitario, relativo aos deberes do estudiantado universitario, que establece o deber de "Absterse da utilización ou cooperación en procedementos fraudulentos nas probas de avaliación, nos traballos que se realicen ou en documentos oficiais da universidade."

CONSULTA/SOLICITUDE DE TUTORÍAS

As tutorías poden consultarse a través da páxina persoal do profesorado, accesible a través de <https://esei.uvigo.es/docencia/profesorado/>

Bibliografía. Fontes de información

Basic Bibliography

R. Kelly Rainer, Brad Prince, Casey Cegielski, **Introduction to Information Systems (5th Edition)**, 9781118674369, 5, Wiley, 2013

Paige Baltzan, **Business Driven Information Systems (6th Edition)**, 9781260004717, 6, McGraw Hill, 2018

Peter Harrington, **Machine Learning in Action**, 9781617290183, 1, Manning, 2012

Complementary Bibliography

Carlo Verrellis, **Business Intelligence: Data Mining and Optimization for Decision Making**, 978-0470511398, 2009

Daniel Reis, **Odoo 12 Development Essentials**, 9781789532470, 2, Packt Publishing, 2018

Recomendacións

Subjects that are recommended to be taken simultaneously

Aprendizaxe baseado en proxectos/O06G151V01402

IDENTIFYING DATA**Application development and integration**

Subject	Application development and integration			
Code	006G151V01406			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	García Pérez-Schofield, Baltasar			
Lecturers	García Pérez-Schofield, Baltasar			
E-mail	jbgarcia@uvigo.es			
Web	http://webs.uvigo.es/jbgarcia			
General description	The objective of this subject is to show the particularities of the development of applications by teams of several members.			
	English Friendly subject: International students may request from the teachers: a) resources 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.
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.
B2	Ability to manage the project's activities from the computing field in accordance with the acquired knowledge and training.
B4	Ability to define, assess and select hardware and software platforms for the development and execution of computing systems, services and applications, according to the acquired knowledge and training.
B5	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.
B6	Ability to conceive and develop centralized or distributed computing systems and architectures, integrating hardware, software and networks, according to the knowledge and training acquired.
B9	Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to communicate the knowledge contents, skills and abilities of the Computer Science Engineer profession.
C11	Knowledge, administration and maintenance of computer systems, services and applications.
C18	Knowledge and application of the characteristics, functions and structure of data bases, allowing their appropriate use, and design, analysis and implementation of applications based on them.
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.
C29	Ability to identify, assess and deal with associated risks that could potentially arise.
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

Expected results from this subject

Expected results from this subject	Training and Learning Results			
RA1. Develop all type of software through all the phases.	A2 A5	B1 B2 B4 B5 B6 B9	C11 C18 C19 C22 C25 C27 C28 C29	D4 D5 D6 D7 D8 D9 D11
RA3. Learn practical methods for the specification of all components during the development of a software package.	A2 A5	B1 B5	C11 C18 C19 C22 C25 C27 C29	D4 D5 D6 D7 D8 D9 D11
RA4. Learn the available technics for software integration.	A2 A5	B1 B4 B5 B6 B9	C27 C29	D4 D5 D6 D7 D8 D9 D10 D11 D12
RA5. Learn methods and standards for the development, verification and maintenance of an integrated application.	A2	B1 B2 B4 B5 B6 B9	C11 C18 C19 C22 C25 C27 C28 C29	D4 D5 D6 D7 D8 D9 D10 D11 D12
RA6. Be able to apply software engineering techniques to obtain applications of big quality with the requested functionalities, considering the system as a group of applications.	A2 A5	B1 B2 B4 B5 B6 B9	C11 C18 C19 C22 C25 C27 C28 C29	D4 D5 D6 D7 D8 D10 D11
RA7. Work like part of a team that develops software projects composed by several phases and control milestones.	A2	B1 B2 B4 B5 B6 B9	C11 C18 C19 C22 C25 C27 C28 C29	D4 D5 D6 D7 D8 D9 D10 D11 D12
RA8. Present an adapted form of project's documentation to each one of the people involved in its development: analysts, designers, programmers and customers.	A2 A5	B1 B2 B9	C28 C29	D4 D5 D7 D8 D9 D10 D11 D12

Contents

Topic

Introduction Bases of object orientation.

Techniques	Codification guidelines Design and code generation. Programming by contract. Test-driven development.
Persistence	Orthogonal persistence. Persistence tools.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	15	22	37
Project based learning	17.5	42.5	60
Problem solving	15	19	34
Project	2	4	6
Problem and/or exercise solving	3	10	13

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Lectures will be centered in the presentation of the necessary concepts in the simplest way possible. They will be accompanied by audiovisual means and small exercises aimed at strengthening understanding.
Project based learning	Exercise classes, from the second half of the semester on, will consist in the development of a group project, specially enforcing the interaction among members.
Problem solving	Exercise classes in the first half of the semester will consist of the resolution of guided simple exercises, strengthening the understanding of topics presented in the theoretical lectures.
	Continuous evaluation: mandatory (80% assistance is required). Global evaluation: not mandatory.

Personalized assistance

Methodologies	Description
Project based learning	Several virtual tools (email, videoconference, forums...), will be available for tutorial sessions. These sessions will be previously agreed.

Assessment

	Description	Qualification	Training and Learning Results			
Project	The student will develop a group project, supported by small exercises in the sessions of exercise classes, along all the subject. Results: RA1, RA2, RA3, RA4, RA5, RA6, RA7, RA8.	60	A5	B1 B5 B6 B9	C29	D4 D5 D6 D7 D8 D9 D10 D11 D12
Problem and/or exercise solving	They will make two written exams during the course of the subject, one in the half and another at the end. Said proofs will be eliminatory, so that students passing them will not have to make them again at the theoretical part in first option. Results: RA2, RA3, RA4, RA5, RA8.	40	A2	B1 B2 B4 B5 B6 B9	C11 C18 C19 C22 C25 C27	D4 D5 D6 D7 D8 D9 D10 C29

Other comments on the Evaluation

Continuous evaluation system

TEST 1: Partial 1.

Description: Eliminatory test, that is, in terms of the theoretical part, those students who pass these tests (Partial 1 & Partial 2), will not need to do the first option test.

Methodology(s) applied(s): Resolution of problems and/or exercises.

% Qualification: 30%

Minimum % A student must obtain a mark equal to or greater than 4 points (out of 10) in order to pass this test.

Evaluated training and learning results: A5, B5, B9, C29, C30, D4, D5, D6, D7, D8, D11.

Expected results in the subject evaluated: RA3, RA8.

TEST 2: Partial 2.

Description: Eliminatory test, that is, in terms of the theoretical part, those students who pass these tests (Partial 1 & Partial 2), will not need to do the first option test.

Methodology(s) applied(s): Resolution of problems and/or exercises.

% Qualification: 30%

Minimum % A student must obtain a mark equal to or greater than 4 points (out of 10) in order to pass this test.

Evaluated training and learning results: A5, B5, B9, C29, C30, D4, D5, D6, D7, D8, D11.

Expected results in the subject evaluated: RA3, RA8.

TEST 3: Project.

Description: Students will carry out a project as the subject progresses, taking advantage of and applying the theoretical knowledge assimilated in the theoretical session. The student will need to deliver in this project at the end of the course.

Methodology(s) applied: Project.

% Qualification: 40%

Minimum % A student must obtain a grade equal to or greater than 4 points (out of 10)) in order to pass this test.

Evaluated training and learning results: A2, B2, B4, B5, B9, B12, C18, C19, C25, C27, C28, C29, C30, C36, D4, D5, D6, D7, D8.

Expected results in the subject evaluated: RA3, RA6, RA8.

☐ All students who take any of the tests are understood to accept the continuous assessment procedure described above.

☐ If a student does not take any of the tests, they will be assigned, at most, a mark of 4 in it, according to the rest of the marks.

Global evaluation system

Procedure for choosing the global evaluation modality: during a period of one month from the beginning of the semester, the enrolled students can formally state their intention to take advantage of the continuous evaluation system.

TEST 1: First opportunity.

Description: Resolution of exercises.

Methodology(s) applied(s): Resolution of problems and/or exercises.

% Rating: 100%.

Minimum %: A student must obtain a grade equal to or greater than 5 points (out of 10)) in order to pass this test.

Evaluated training and learning results: A2, A5, B2, B4, B5, B9, B12, C18, C19, C25, C27, C28, C29, C30, C26, D4, D5, D6, D7, D8, D11.

Expected results in the subject evaluated: RA3, RA6, RA8.

Evaluation criteria for second opportunity and end of degree

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

Record qualification process

Regardless of the evaluation system and the option, if any part of the evaluation is not passed, but the overall score is greater than 4 (out of 10), the final qualification 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 opportunity, 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 the university student, which establishes the duty to "Refrain from using or cooperation in fraudulent procedures in the evaluation tests, in the works that are carried out or in official documents of the university."

Inquiry/request for tutorials

Tutorial schedules can be consulted through the personal page of the teaching staff, accessible through <https://esei.uvigo.es/docencia/profesorado/>

Sources of information

Basic Bibliography

McConnell, Steve, **Code Complete: A Practical Handbook of Software Construction**, 978-0735619678, 2, Microsoft Press, 2004

Albahari, Joseph, **C# 10 IN A NUTSHELL**, 978-1098121952, 1, O'Reilly, 2022

Whitaker, R.B., **The C# Player's Guide**, 978-0985580155, 5, StarBound Software, 2022

Complementary Bibliography

Recommendations

IDENTIFYING DATA**Architectural design of large software systems**

Subject	Architectural design of large software systems			
Code	006G151V01407			
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			
E-mail	dgpena@uvigo.es ribadas@uvigo.es			
Web	http://moovi.uvigo.gal			
General description	This subject covers all software engineering lifecycle but it is focused on complex, high-dimension, software systems design. In this kind of systems, techniques and usual software engineering tools require a greater degree of complexity in the distribution of tasks and in its general aims. Diverse and necessary aptitudes needed to focus complex software systems development from a component-oriented point of view are discussed with an industrial production perspective (software factories).			
	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.
A3	Students will be able to gather and interpret relevant data (normally within their field of study) that will allow them to 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.
B5	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.
B9	Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to 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 multidisciplinary 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 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

Topic	
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 systems	Use of integration middlewares between components and subsystems. 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 not take into account the heterogeneity of the students.

Methodologies	
	Description
Lecturing	Theoretical contents presentation. With the aim to facilitate the understanding and increasing the student attention, diverse examples and exercises requiring his/her active participation will be included
Laboratory practical	Practical problems solving, including software programming related to subject contents.
	CONTINUOUS ASSESSMENT Character: mandatory Attendance: mandatory Minimum: There is no minimum GLOBAL ASSESSMENT Character: not mandatory Attendance: not mandatory
Seminars	Answering of general student questions and sharing of specific theoretical and/or practical problems related to the subject
Presentation	Topic elaboration and presentation in small groups, including oral presentation and proposal of practical applications

Personalized assistance

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

Assessment		Qualification	Training and Learning Results			
	Description					
Laboratory practical	Regular attendance to the laboratory and participation (question answering, etc.)	5	A4 A5	B9	C13 C30	D8 D9 D14
	EXPECTED RESULTS IN THE SUBJECT BEING EVALUATED: LO1, LO2, LO3, LO4, LO5, LO6					
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.	15	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					
Objective questions exam	Individual multiple-choice tests which include theoretical and practical contents of the subject	35	A3 A5	B5 B9	C13 C19 C22 C25 C28 C32	D6
	EXPECTED RESULTS IN THE SUBJECT BEING EVALUATED: LO1, LO3, LO5, LO6					
Project	Project development integrating subject contents.	45	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					

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 ASSESSMENT 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, accessible through <https://esei.uvigo.es/docencia/profesorado/>.

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 Goncalves, **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

IDENTIFYING DATA				
Advanced software engineering methods				
Subject	Advanced software engineering methods			
Code	O06G151V01408			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Gómez Rodríguez, Alma María			
Lecturers	Gómez Rodríguez, Alma María Otero Cerdeira, Lorena Rodríguez Martínez, Francisco Javier			
E-mail	alma@uvigo.es			
Web	http://http://moovi.uvigo.gal			
General description	The subject introduces and makes a deeper approach in the use of mathematical based methods in the definition and development of software systems. These methods will be used in definition and refinement of programs. English Friendly subject: International students may request from the teachers: a) resources 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.			
A4	Students will be able to present information, ideas, problems and solutions both to specialist and non-specialist audiences.			
B2	Ability to manage the project's activities from the computing field in accordance with the acquired knowledge and training.			
B9	Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to communicate the knowledge contents, skills and abilities of the Computer Science Engineer profession.			
B10	Ability to carry out measurements, calculus, assessments, valuations, expert's reports, studies, reports, task planning and other analogous computing jobs, according to the knowledge and training acquired.			
C8	Ability to plan, conceive, implement and manage computing projects, services and systems in every area, monitoring their implementation and their continuing improvement and assessing their economic and social impact.			
C13	Knowledge, design and efficient use of the most appropriate data structures and types for the resolution of a problem.			
C26	Ability to assess clients' needs and determine the software requirements to satisfy these needs, reconciling conflicting goals through attempts to reach acceptable compromises within the limits imposed by costs, available times, existing developed systems and organizations themselves.			
C29	Ability to identify, assess and deal with associated risks that could potentially arise.			
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.			
C35	Ability to select, design, implement, integrate and manage information systems that meet the needs of organizations, once the costs and quality criteria have been identified.			
C36	Ability to design systems, applications and services based on network technologies, including the Internet, web, e-commerce, multimedia, interactive services and mobile computing.			
D4	Analysis, synthesis and evaluation capacity			
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.			
D10	Interpersonal relationship skills.			
D11	Critical thinking			

Expected results from this subject

Expected results from this subject	Training and Learning Results			
RA1: Know and comprise the main characteristics of the formal methods applied to the tasks of Software Engineering.	A4	B10	C8 C26 C35	D4 D11

RA2: Comprise the importance to use a formal approach in the development of software of quality.	A2	B2	C29 C32 C35	D4 D7 D11
RA3: Specify and model the requests exposed by users using a formal languages of specification.	A2	B2 B9 B10	C8 C13 C26 C29 C35 C36	D6 D10
RA4: Understand how the formal specification languages allow the mathematical verification of the specification and facilitate the automatic code generation.		B10	C29 C35	D7 D11
RA5: Use properly the tools of formal models in the activities of software specification.	A2	B2 B9	C8 C13 C35 C36	
RA6: Comprise the concepts associated to formal verification		B10	C29	D7
RA7: Be able of validating a software application formally described.	A2	B2 B10	C29 C35 C36	D6 D7

Contents

Topic	
INTRODUCTION	Deficiencies of less formal approaches. Concepts of formal methods. Formal methods commandments.
SOFTWARE FORMAL MODELING.	Basic concepts. Logical bases. Languages for formal specification: Z, VDM... The language of specification: Z. Formal definitions in Z. Basic Types. Diagrams. Sets. Relations. Functions. Sequences. Bags. Operations. Formal proof: Initiation theorem and Preconditions.
FORMAL VERIFICATION	Code and Specification Application to the life-cycle.
DEVELOPMENT PROCESS WITH FORMAL TECHNIQUES	Changes in life cycle due to the use of formal methods Applications of formal techniques. Clean Room software engineering.

Planning

	Class hours	Hours outside the classroom	Total hours
Problem solving	15	30	45
Mentored work	5.5	15.5	21
Presentation	6	12	18
Lecturing	23	0	23
Objective questions exam	1.5	20	21.5
Essay questions exam	1.5	20	21.5

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Problem solving	Application to practical exercises of the theoretical methods .
Mentored work	This tries to promote the autonomous learning of students, under the tutelage of the teacher in various scenarios (academic and professional). It is primarily about learning "how to do things." It is an option based on students taking responsibility for their own learning. It is based on the independent learning of students and the monitoring of that learning by the teacher-tutor.

Presentation	It consists of a group work technique for the study of a topic. The final result must be a document setting out the conclusions reached. Then the students will make a verbal presentation in which they present issues, works, concepts, facts or principles in a dynamic way; subjected to questions from classmates and the teacher.
Lecturing	It addresses the learning of the theoretical contents through the use of blackboard, audiovisual media, etc.

Personalized assistance

Methodologies	Description
Mentored work	The student will be provided with followup to carry out the tasks entrusted.

Assessment

Description		Qualification Training and Learning Results					
Problem solving	It will consist in the development of one practical project autonomously and the explanation of the work to the teacher.	25	A2	B2	C13	D4	
				B9	C26	D7	
				B10	C29	D11	
					C35		
					C36		
Mentored work	It will consist in the study and development of a theoretical work in groups. This method of evaluation is associated to the results of learning: RA3 and RA5.	20	A2	B9	C13	D4	
					C29	D7	
					C32		
					C35		
					C36		
Presentation	It will be carried out in workgroups. This method of evaluation is associated with learning outcomes: RA1, RA2, RA4.	25	A2	B2	C8	D4	
			A4	B10	C13	D6	
					C26	D10	
					C29		
					C32		
					C35		
					C36		
Objective questions exam	It will consist of several tests throughout the course, which will also allow monitoring of the student's evolution. This method of evaluation is associated with the learning outcomes: RA1, RA2, RA6, RA7.	20	A2	B10	C8	D6	
					C32	D7	
					C35		
					C36		
Essay questions exam	The proof will consist of theoretical questions and exercises that the student has to develop to demonstrate the acquired knowledge. This method of evaluation is associated with the learning outcomes: RA1, RA2, RA3, RA5, RA6, RA7.	10	A2	B9	C13	D7	
					C35	D11	

Other comments on the Evaluation

CONTINUOUS ASSESSMENT SYSTEM

TEST 1: Theoretical evaluation

Description: Objective test that will include evaluation of theoretical concepts.

Methodology(s) applied(s): Examination of objective questions.

% Qualification: 10%

Minimum %: For the release of this part of the course, the student must obtain a grade equal to or greater than 4 points (out of 10)).

Evaluated skills: A2,B10,C8,C32,C35,C36,D6,D7

Assessed learning outcomes: RA1, RA2, RA4

TEST 2: Theoretical evaluation

Description: Objective test that will include evaluation of theoretical concepts and resolution of exercises.

Methodology(s) applied(s): Examination of objective questions. .

% Qualification: 10%

Minimum % (if applicable) For the release of this part of the subject the student must obtain a grade equal to or greater than 4 points (out of 10)).

Evaluated skills: A2,B10,C8,C32,C35,C36,D6,D7

Assessed learning outcomes: RA1, RA2, RA4, RA6, RA7

TEST 3: Practical-theoretical evaluation

Description: Objective test that will include evaluation of theoretical concepts and resolution of exercises.

Methodology(s) applied(s): Examination of development questions. .

% Qualification: 10%

Minimum % (if applicable) For the release of this part of the subject the student must obtain a grade equal to or greater than 4 points (out of 10)).

Assessed skills: A2, B9,C13,C35,D7,D11

Assessed learning outcomes: RA3, RA4, RA5

TEST 4: Exhibition works

Description: Presentation in the classroom of the theoretical work carried out in groups

Methodology(s) applied: Presentation

% Qualification: 25%

Minimum % (if applicable) For the release of this part of the subject the student must obtain a grade equal to or greater than 5 points (out of 10)).

Evaluated skills: A2,A4, B2,B10,C8, C13,C26,C29,C32,C35,C36,D4,D6,D10

Assessed learning outcomes: RA1, RA2, RA4

TEST 5: Delivery of theoretical work

Description: Realization of the documentation analysis of the subject to prepare a theoretical summary that will later be presented in the classroom

Methodology(s) applied(s): Supervised work

% Qualification: 20%

Minimum %: For the release of this part of the subject the student must obtain a grade equal to or greater than 5 points (out of 10)).

Evaluated skills: A2,B9,C13,C29,C32,D4,D7

Assessed learning outcomes: RA3, RA5

TEST 6: Delivery of practical work

Description: Development of a practical project autonomously and the defense before the professor of the same.

Applied Methodology(s): Troubleshooting

% Qualification: 25%

Minimum %: For the release of this part of the subject the student must obtain a grade equal to or greater than 5 points (out of 10)).

Evaluated skills: A2,B2,B9, B10, C13, C26, C29, C35, C36, D4, D7, D11

Assessed learning outcomes: RA3, RA5

IMPORTANT

- All students who take any of the tests are understood to accept the continuous assessment procedure described above.
- If a student does not take any of the tests, a grade of 0 will be assigned to it.

GLOBAL EVALUATION SYSTEM

Procedure for choosing the global assessment modality: It is considered that the student opts for the global assessment system if they do not take Test 1 of the continuous assessment system).

TEST 1: Theoretical, practical and laboratory evaluation

Description: Objective test that will include evaluation of theoretical concepts and resolution of exercises.

Methodology(s) applied(s): Problem solving, Examination of objective questions and Examination of development questions. They must appear in the top table.

% Rating: 100%

% Minimum

Assessed competencies: All of the subject

Evaluated learning outcomes: All of the subject

EVALUATION CRITERIA FOR EXTRAORDINARY CALL AND FINAL DEGREE

The global evaluation systems previously exposed will be used.

RECORD QUALIFICATION PROCESS

Regardless of the evaluation system and the call, if any part of the evaluation is not passed, but the overall score is greater than 4 (out of 10), the qualification 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 cooperation in fraudulent procedures in the evaluation tests, in the works that are carried out or in official documents of the university."

CONSULTATION/REQUEST FOR TUTORIALS

The tutorials can be consulted through the personal page of the teaching staff, accessible through <https://esei.uvigo.es/docencia/profesorado/>

Sources of information

Basic Bibliography

Pressman, Roger S., **Ingeniería del Software: Un enfoque práctico**, 9781456287726, 7, McGraw Hill, 2010

Spivey, J.M., **Understanding Z : a specification language and its formal semantics**, 0-521-33429-2, Prentice-Hall, 1988

Woodcock, Jim, **Using Z [Recurso de Internet] : specifcation, refinement, and proof**, 2010

Complementary Bibliography

Rosalind Barden, Susan Stepney, and David Coope, **Z in practice**, 0-13-124934-7, 1, Prentice-Hall, 1994

John J. Marciniak,, **Encyclopedia of software engineering**,, 0-471-54004-8, 1, John Wiley & Sons, 1994

Página de métodos formales, <http://fmnet.info/>,

Página del lenguaje Z, <http://www.zuser.org/>,

Recommendations

Subjects that it is recommended to have taken before

Software engineering 1/O06G151V01204

Software engineering 2/O06G151V01208

IDENTIFYING DATA				
Service-oriented web architectures				
Subject	Service-oriented web architectures			
Code	O06G151V01409			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	2nd
Teaching language				
Department				
Coordinator				
Lecturers				
E-mail				

----- UNPUBLISHED TEACHING GUIDE -----

IDENTIFYING DATA				
Cloud computing and software				
Subject	Cloud computing and software			
Code	006G151V01410			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	2nd
Teaching language				
Department				
Coordinator				
Lecturers				
E-mail				

----- UNPUBLISHED TEACHING GUIDE -----

IDENTIFYING DATA				
Software processes				
Subject	Software processes			
Code	006G151V01411			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	2nd
Teaching language				
Department				
Coordinator				
Lecturers				
E-mail				

----- UNPUBLISHED TEACHING GUIDE -----

IDENTIFYING DATA				
Applications with scripting languages				
Subject	Applications with scripting languages			
Code	O06G151V01412			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	2nd
Teaching language	#EnglishFriendly Spanish			
Department				
Coordinator	García Pérez-Schofield, Baltasar			
Lecturers	García Pérez-Schofield, Baltasar			
E-mail	jbgarcia@uvigo.es			
Web	http://webs.uvigo.es/jbgarcia/			
General description	Development of applications by means of script languages.			
	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.
A5	Students will acquire the learning skills that are required to pursue further studies with a high degree of independence.
B2	Ability to manage the project's activities from the computing field in accordance with the acquired knowledge and training.
B4	Ability to define, assess and select hardware and software platforms for the development and execution of computing systems, services and applications, according to the acquired knowledge and training.
B5	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.
B9	Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to communicate the knowledge contents, skills and abilities of the Computer Science Engineer profession.
B12	Knowledge and application of basic elements of economics and human resource management, organization and planning of projects, as well as legislation, regulation and standardization in the field of computer projects, according to the knowledge acquired.
C18	Knowledge and application of the characteristics, functions and structure of data bases, allowing their appropriate use, and design, analysis and implementation of applications based on them.
C19	Knowledge and application of the necessary tools for storing, processing and accessing information Systems, including web-based ones.
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.
C29	Ability to identify, assess and deal with associated risks that could potentially arise.
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.
C36	Ability to design systems, applications and services based on network technologies, including the Internet, web, e-commerce, multimedia, interactive services and mobile computing.
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
D11	Critical thinking

Expected results from this subject	
Expected results from this subject	Training and Learning Results

RA3. Know practical methods for the specification of all the components during the development of a software package.	A2 A5	B5	C18 C19 C25 C27 C28 C29 C30 C36	D4 D5 D6 D7 D8 D11
RA6. Be able to apply software engineering techniques leading to the obtention of high quality applications with the requested functionalities, considering the system as a group of applications.	A2 A5	B2 B4 B5 B9 B12	C18 C19 C25 C27 C28 C29 C30 C36	D4 D5 D6 D7 D8 D11
RA8. Present in an adequate way the documentation of a project to the people involved in its development: analysts, designers, programmers and customers.	A2 A5	B2 B9	C28 C29 C30	D4 D5 D6 D7 D8 D11

Contents

Topic	
Introduction	Historical review. Evolution of the languages of *script. Current tendencies.
Web programming languages.	Encapsulation. Inheritance. Polymorphism. Object model. Creation and distribution of applications.
Persistence	Simple serialization in formats like JSON and XML.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	18	29	47
Laboratory practical	11.5	48.5	60
Problem and/or exercise solving	3	10	13
Project	20	10	30

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Lectures of the theoretical contents for each topic, by means of audiovisual resources. This method will be combined with illustrative examples of code and with the realization of exercises to motivate and increase the interest of the student.
Laboratory practical	The aim is that the student can apply the theoretical contents to the solution of simple problems of programming, that will guide the process to make a complete project. Continuous evaluation: mandatory (80% of assistance is required). Global evaluation: not mandatory.

Personalized assistance

Methodologies	Description
Lecturing	Tutorial sessions will be available by virtual means (email, videoconference, forums, ...), when needed. In that case, meeting times will be previously agreed.

Assessment

Description	Qualification Training and Learning Results
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Problem and/or exercise solving	Students will have to pass two partial exams, one roughly in the half of the matter, and another at the end. Those students that approve these exams will not need to present themselves to first option. Results: RA3, RA8. Each one is 30% of the final mark.	60	A5	B5 B9	C29 C30	D4 D5 D6 D7 D8 D11
Project	Students will write a project to measure their advance on the subject, taking advantage of and applying the knowledge assimilated from theoretical classes. This project is expected to be delivered at the end of the subject. Results: RA3, RA6, RA8.	40	A2	B2 B4 B5 B9 B12	C18 C19 C25 C27 C28 C29 C30 C36	D4 D5 D6 D7 D8

Other comments on the Evaluation

Continuous evaluation system

TEST 1: Partial 1.

Description: Eliminary test, that is, in terms of the theoretical part, those students who pass these tests (Partial 1 & Partial 2), will not need to do the first option test.

Methodology(s) applied(s): Resolution of problems and/or exercises.

% Qualification: 30%

Minimum % A student must obtain a mark equal to or greater than 4 points (out of 10) in order to pass this test.

Evaluated training and learning results: A5, B5, B9, C29, C30, D4, D5, D6, D7, D8, D11.

Expected results in the subject evaluated: RA3, RA8.

TEST 2: Partial 2.

Description: Eliminary test, that is, in terms of the theoretical part, those students who pass these tests (Partial 1 & Partial 2), will not need to do the first option test.

Methodology(s) applied(s): Resolution of problems and/or exercises.

% Qualification: 30%

Minimum % A student must obtain a mark equal to or greater than 4 points (out of 10) in order to pass this test.

Evaluated training and learning results: A5, B5, B9, C29, C30, D4, D5, D6, D7, D8, D11.

Expected results in the subject evaluated: RA3, RA8.

TEST 3: Project.

Description: Students will carry out a project as the subject progresses, taking advantage of and applying the theoretical knowledge assimilated in the theoretical session. The student will need to deliver in this project at the end of the course.

Methodology(s) applied: Project.

% Qualification: 40%

Minimum % A student must obtain a grade equal to or greater than 4 points (out of 10)) in order to pass this test.

Evaluated training and learning results: A2, B2, B4, B5, B9, B12, C18, C19, C25, C27, C28, C29, C30, C36, D4, D5, D6, D7, D8.

Expected results in the subject evaluated: RA3, RA6, RA8.

☐ All students who take any of the tests are understood to accept the continuous assessment procedure described above.

☐ If a student does not take any of the tests, they will be assigned, at most, a mark of 4 in it, according to the rest of the marks.

Global evaluation system

Procedure for choosing the global evaluation modality: during a period of one month from the beginning of the semester, the enrolled students can formally state their intention to take advantage of the continuous evaluation system.

TEST 1: First opportunity.

Description: Resolution of exercises.

Methodology(s) applied(s): Resolution of problems and/or exercises.

% Rating: 100%.

Minimum %: A student must obtain a grade equal to or greater than 5 points (out of 10)) in order to pass this test.

Evaluated training and learning results: A2, A5, B2, B4, B5, B9, B12, C18, C19, C25, C27, C28, C29, C30, C26, D4, D5, D6, D7, D8, D11.

Expected results in the subject evaluated: RA3, RA6, RA8.

Evaluation criteria for second opportunity and end of degree

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

Record qualification process

Regardless of the evaluation system and the option, if any part of the evaluation is not passed, but the overall score is greater than 4 (out of 10), the final qualification 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 opportunity, 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 the university student, which establishes the duty to "Refrain from using or cooperation in fraudulent procedures in the evaluation tests, in the works that are carried out or in official documents of the university."

Inquiry/request for tutorials

Tutorial schedules can be consulted through the personal page of the teaching staff, accessible through <https://esei.uvigo.es/docencia/profesorado/>

Sources of information

Basic Bibliography

García Perez-Schofield, Baltasar, **Introducción a la programación con Python**, 1, Bubok.es, 2018

Complementary Bibliography

<http://es.diveintopython.net/>, **Sumérgete en Python**, 2001

Miguel Grinberg, **Flask Web Development 2e: Developing Web Applications with Python**, 978-1491991732, 2, O'Reilly Media, Inc, 2018

Recommendations

IDENTIFYING DATA				
Desenvolvemento áxil de aplicacións				
Subject	Desenvolvemento áxil de aplicacións			
Code	O06G151V01413			
Study programme	Grao en Enxeñaría Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4	2c
Teaching language	Castelán Galego			
Department				
Coordinator	Rodríguez Martínez, David			
Lecturers	Rodríguez Martínez, David			
E-mail	david.rodriquez.martinez@uvigo.es			
Web	http://moovi.uvigo.gal			
General description	Nesta materia o alumno coñecerá as bases do desenvolvemento áxil de software, así como as distintas metodoloxías enmarcadas neste campo de desenvolvemento de software. Ademais, o alumno deberá aplicar as devanditas metodoloxías no desenvolvemento dun produto software.			

Resultados de Formación e Aprendizaxe	
Code	
A2	Que os estudantes saiban aplicar os seus coñecementos ó seu traballo ou vocación dunha forma profesional e posúan as competencias que adoitan demostrarse por medio da elaboración e defensa de argumentos e a resolución de problemas dentro da súa área de estudo.
A4	Que os estudantes poidan transmitir información, ideas, problemas e solución a un público tanto especializado coma non especializado.
A5	Que os estudantes desenvolvan aquelas habilidades de aprendizaxe necesarias para emprender estudos posteriores cun alto grao de autonomía.
B1	Capacidade para concebir, redactar, organizar, planificar, desenvolver e asinar proxectos no ámbito da enxeñaría en informática que teñan por obxecto, de acordo cos coñecementos adquiridos, a concepción, o desenvolvemento ou a explotación de sistemas, servizos e aplicacións informáticas.
B2	Capacidade para dirixir as actividades obxecto dos proxectos do ámbito da informática de acordo cos coñecementos adquiridos.
B5	Capacidade para concebir, desenvolver e manter sistemas, servizos e aplicacións informáticas empregando os métodos da enxeñaría de software como instrumento para o aseguramento de súa calidade, de acordo cos coñecementos adquiridos.
B9	Capacidade para resolver problemas con iniciativa, toma de decisións, autonomía e creatividade. Capacidade para saber comunicar e transmitir os coñecementos, habilidades e destrezas da profesión de Enxeñeiro Técnico en Informática.
B12	Coñecemento e aplicación de elementos básicos de economía e de xestión de recursos humanos, organización e planificación de proxectos, así como a lexislación, regulación e normalización no ámbito dos proxectos informáticos, de acordo cos coñecementos adquiridos.
C7	Capacidade para deseñar, desenvolver, seleccionar e avaliar aplicacións e sistemas informáticos, asegurando a súa fiabilidade, seguridade e calidade, conforme aos principios éticos e á lexislación e normativa vixente
C9	Capacidade para comprender a importancia da negociación, os hábitos de traballo efectivos, o liderado e as habilidades de comunicación en todos os contornos de desenvolvemento de software
C22	Coñecemento e aplicación dos principios, metodoloxías e ciclos de vida da enxeñaría de software
C25	Capacidade para desenvolver, manter e avaliar servizos e sistemas software que satisfagan todos os requisitos do usuario e se comporten de forma fiable e eficiente, sexan asequibles de desenvolver e manter e cumpran normas de calidade, aplicando as teorías, principios, métodos e prácticas da Enxeñaría do Software
C26	Capacidade para valorar as necesidades do cliente e especificar os requisitos software para satisfacer estas necesidades, reconciliando obxectivos en conflito mediante a procura de compromisos aceptables dentro das limitacións derivadas do custo, do tempo, da existencia de sistemas xa desenvolvidos e das propias organizacións
C28	Capacidade de identificar e analizar problemas e deseñar, desenvolver, implementar, verificar e documentar solucións software sobre a base dun coñecemento axeitado das teorías, modelos e técnicas actuais
C29	Capacidade de identificar, avaliar e xestionar os riscos potenciais asociados que puidesen presentarse
D4	Capacidade de análise, síntese e avaliación
D5	Capacidade de organización e planificación
D6	Capacidade de abstracción: capacidade de crear e utilizar modelos que reflexen situacións reais
D7	Capacidade de buscar, relacionar e estruturar información provinte de diversas fontes e de integrar ideas e coñecementos.
D9	Capacidade de integrarse rapidamente e traballar eficientemente en equipos unidisciplinares e de colaborar nun entorno multidisciplinar
D10	Capacidade de relación interpersonal.
D11	Razoamento crítico

D12 Liderado

D14 Ter motivación pola calidade e a mellora continua

Resultados previstos na materia

Expected results from this subject	Training and Learning Results			
RA1: Coñecer as bases do desenvolvemento áxil de software	A2 A4 A5	B1 B2	C9 C22	D4 D5 D6 D9 D10 D11 D12 D14
RA2: Coñecer as distintas metodoloxías áxiles existentes para o desenvolvemento de software	A4 A5	B5	C9 C22 C25	D4 D7 D11
RA3: Saber aplicar as principais metodoloxías de desenvolvemento áxil de software	A2 A4 A5	B1 B2 B5 B9 B12	C7 C9 C22 C25 C26 C28 C29	D4 D5 D6 D9 D10 D11 D12 D14
RA4: Coñecer e saber aplicar métodos áxiles de xestión de proxectos	A2 A4 A5	B1 B2 B5 B9 B12	C7 C9 C22 C25 C26 C28 C29	D4 D5 D6 D7 D9 D10 D11 D12 D14
RA5: Identificar e saber valorar as vantaxes e desvantaxes das metodoloxías áxiles fronte a outras metodoloxías de desenvolvemento de software	A4 A5	B5 B12	C22 C25 C28	D4 D7 D10 D11
RA6: Empregar as probas de software como un parte crave do desenvolvemento de software	A2 A4 A5	B1 B5 B9	C7 C22 C25 C26 C28 C29	D4 D5 D6 D7 D9 D10 D11 D14

Contidos

Topic	
Bases do Desenvolvemento Áxil de Aplicacións (DAA)	Introdución ás bases do DAA e presentación das principais metodoloxías.
Boas Prácticas no DAA	Estudo das prácticas básicas e máis importantes no DAA.
Xestión de Proxectos en DAA	Introdución e aprendizaxe das principais metodoloxías áxiles para a xestión de proxectos, como, por exemplo, Scrum.
Metodoloxías de DAA	Introdución e aprendizaxe das principais metodoloxías áxiles para o desenvolvemento de aplicacións, como, por exemplo, a programación extrema.
Probas de Software no DAA	Introdución ás principais metodoloxías áxiles para a realización de probas de aplicacións, como, por exemplo, TDD e BDD.

Planificación

	Class hours	Hours outside the classroom	Total hours
Lección maxistral	17	21	38
Prácticas de laboratorio	8	8	16
Resolución de problemas	2	9	11

Presentación	3	9	12
Traballo tutelado	10.25	20.75	31
Exame de preguntas obxectivas	2	9	11
Proxecto	10.25	20.75	31

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Metodoloxía docente	
	Description
Lección maxistral	Exposición dos contidos teóricos da materia. Co fin de facilitar a comprensión da materia e aumentar o interese do alumno, inclúiranse diversos exemplos nos que se pode requirir a participación activa do alumno.
Prácticas de laboratorio	Estudo teórico e práctico das tecnoloxías necesarias para o desenvolvemento do proxecto e dunha proposta de arquitectura para o mesmo. AVALIACIÓN CONTINUA CARACTER: Obrigatorio ASISTENCIA: Obligatoria (mínimo 80% prácticas e 100% nas 2 sesións de presentación) AVALIACIÓN GLOBAL CARACTER: Obrigatorio
Resolución de problemas	Realización de diferentes probas sobre os contidos de carácter teórico e práctico correspondentes á materia impartida durante as clases de aula AVALIACIÓN CONTINUA CARACTER: Obrigatorio ASISTENCIA: Obligatoria AVALIACIÓN GLOBAL CARACTER: Obrigatorio
Presentación	Preparación e presentación en pequenos grupos dun tema relacionado coa materia. Na avaliación do traballo terase en conta o contido do traballo, a presentación oral do mesmo e a contextualización dentro da materia. Ademais, avaliarase a capacidade do alumnado para cualificar os traballos presentados polos compañeiros. AVALIACIÓN CONTINUA CARACTER: Obrigatorio ASISTENCIA: Obligatoria AVALIACIÓN GLOBAL CARACTER: Obrigatorio
Traballo tutelado	Realización dun proxecto grupal no que se aplicarán de forma práctica metodoloxías áxiles simulando unha contorna real. Cada grupo de traballo deberá facer varias entregas nas que cada alumno será avaliado polo traballo individual, o traballo grupal e por unha proba escrita na que se avaliarán os seus coñecementos do proxecto e da metodoloxía empregada. AVALIACIÓN CONTINUA CARACTER: Obrigatorio ASISTENCIA: Obligatoria AVALIACIÓN GLOBAL CARACTER: Obrigatorio

Atención personalizada	
Methodologies	Description
Lección maxistral	Tempo reservado para atender, guiar e resolver as dúbidas do alumnado. Para a atención ao alumnado utilizaranse como ferramentas correo electrónico e Campus Remoto baixo a modalidade de concertación previa.
Prácticas de laboratorio	Atención ás preguntas e dúbidas dos alumnos que poidan xurdir ao longo do traballo a realizar nas clases e o desenvolvemento do proxecto.

Avaliación			
	Description	Qualification	Training and Learning Results

Presentación	Preparación e presentación en pequenos grupos dun tema relacionado coa materia. Na avaliación do traballo terase en conta o contido do traballo, a presentación oral do mesmo e a contextualización dentro da materia. Ademais, avaliarase a capacidade do alumnado para cualificar os traballos presentados polos compañeiros.	10	A4 B9 A5	D5 D7 D9 D10 D11 D12 D14
	Resultados de aprendizaxe: RA2, RA4 e RA5.			
Exame de preguntas obxectivas	PROBAS DE TEORÍA: Realizaranse dúas probas individuais e escritas correspondentes aos contidos impartidos na Lección maxistral e Resolución de problemas. Con estas probas preténdese comprobar si o estudante vai alcanzando as competencias, e constarán de preguntas tipo test e cuestións a razoar. Ademais da materia específica que abarque cada unha destas probas, débese ter en conta que se necesitarán e usarán conceptos dos temas anteriores, xa que todos os contidos da materia están interrelacionados.	45	A2 B1 C7 A4 B2 C9 A5 B5 C22 B9 C25 B12 C26 C28 C29	D5 D6 D7 D9 D10 D11 D12 D14
	Resultados de aprendizaxe: RA1, RA3, RA4 e RA6.			
Proxecto	Realización dun proxecto grupal no que se aplicarán de forma práctica metodoloxías áxiles simulando unha contorna real. Cada grupo de traballo deberá facer varias entregas nas que cada alumno será avaliado polo traballo individual, o traballo grupal e por unha proba escrita na que se avaliarán os seus coñecementos do proxecto e da metodoloxía empregada.	45	A2 B1 C7 A4 B2 C9 A5 B5 C22 B9 C25 B12 C26 C28 C29	D5 D6 D7 D9 D10 D11 D12 D14
	Resultados de aprendizaxe: RA1, *RA3, RA4 e RA6.			

Other comments on the Evaluation

SISTEMA DE AVALIACIÓN CONTINUA

PROBA 1: primeira proba de teoría asociada ao primeiro bloque teórico

Descrición: é unha proba escrita correspondente aos contidos impartidos na Lección maxistral e Resolución de problemas (Actividades de Teoría).

Metodoloxías aplicadas: "Exame de preguntas obxectivas" e "Resolución de problemas e/ou exercicios".

% Calificación: 22,5 % da nota final

% Mínimo: o mínimo aplícase sobre a media ponderada obtida entre esta proba e a PROBA 2 (segunda proba de teoría) sendo devandito mínimo un 5 (sobre 10). A maiores sobre esta proba aplícanse un mínimo dun 4 (sobre 10)

Competencias avaliadas: A2, A4, A5, B1, B2, B5, B9, B12, C7, C9, C22, C25, C26, C28, C29, D5, D6, D7, D9, D10, D11, D12, D14.

Resultados de aprendizaxe avaliados: RA1, RA3, RA4 y RA6

PROBA 2: segunda proba de teoría asociada ao segundo bloque teórico

Descrición: é unha proba escrita correspondente aos contidos impartidos na Lección maxistral e Resolución de problemas (Actividades de Teoría).

Metodoloxías aplicadas: "Exame de preguntas obxectivas" e "Resolución de problemas e/ou exercicios".

% Calificación: 22,5 % de la nota final

% Mínimo: o mínimo aplícase sobre a media ponderada obtida entre esta proba e a PROBA 2 (segunda proba de teoría) sendo devandito mínimo un 5 (sobre 10). A maiores sobre esta proba aplícanse un mínimo dun 4 (sobre 10)

Competencias avaliados: A2, A4, A5, B1, B2, B5, B9, B12, C7, C9, C22, C25, C26, C28, C29, D5, D6, D7, D9, D10, D11, D12, D14.

Resultados de aprendizaxe avaliados: RA1, RA3, RA4 y RA6

TRABALLO TEÓRICO: Presentación dun traballo teórico grupal ou individual

Descrición: consisten nunha investigación sobre un tema proposto relacionado coas metodoloxías áxiles que deberá ser exposto na aula. Por defecto será un traballo grupal (Actividades de Teoría).

Metodoloxías aplicadas: "Presentación".

% Calificación: 10,0 % de la nota final

% Mínimo o mínimo será dun 5 (sobre 10).

Competencias avaliadas: A4, A5, B1, B2, B5, B9, B12, C7, C9, C22, C25, C26, C28, C29, D4, D5, D6, D7, D9, D10, D11, D12, D14.

Resultados de aprendizaxe avaliadas: RA2, RA4 y RA5

PROBA 3: primeira entrega do proxecto de prácticas: SPRINT 1

Descrición: consiste na entrega do primeiro sprint do proxecto executado baixo a metodoloxía áxil e a documentación asociada á xestión do proxecto. Traballo realizado en grupo.

Metodoloxías aplicadas: " Proxecto ".

% Calificación: 22,5 % de la nota final

% Mínimo: o mínimo aplícase sobre a media ponderada obtida entre esta proba e a PROBA 2 (segunda proba de teoría) sendo devandito mínimo un 5 (sobre 10). A maiores sobre esta proba aplícanse un mínimo dun 4 (sobre 10)

Competencias avaliadas: A2, A4, A5, B1, B2, B5, B9, B12, C7, C9, C22, C25, C26, C28, C29, D5, D6, D7, D9, D10, D11, D12, D14.

Resultados de aprendizaxe avaliados: RA1, RA3, RA4 y RA6

PROBA 4: segunda entrega do proxecto de prácticas: SPRINT 2

Descrición: consiste na entrega do segundo sprint do proxecto executado baixo a metodoloxía áxil e a documentación asociada á xestión do proxecto. Traballo realizado en grupo.

Metodoloxías aplicadas: □Proxecto□.

% Calificación: 22,5 % de la nota final

% Mínimo: o mínimo aplícase sobre a media ponderada obtida entre esta proba e a PROBA 2 (segunda proba de teoría) sendo devandito mínimo un 5 (sobre 10). A maiores sobre esta proba aplícanse un mínimo dun 4 (sobre 10)

Competencias avaliadas: A2, A4, A5, B1, B2, B5, B9, B12, C7, C9, C22, C25, C26, C28, C29, D5, D6, D7, D9, D10, D11, D12, D14.

Resultados de aprendizaxe avaliados: RA1, RA3, RA4 y RA6

· Todos os estudantes que se presenten a calquera das probas enténdese que se acollen ao procedemento de avaliación continua descrito anteriormente. No caso de que devandito estudante non se presente a algunha das probas restantes asignaráselles unha cualificación de 0 nelas.

· Para aplicar as porcentaxes descritas en todas as probas e calcular a cualificación final, é necesario obter como mínimo un 4 (sobre 10) na media ponderada entre as dúas probas de teoría (PROBA 1 e 2) e entre as dúas probas de prácticas (PROBA 3 e 4), pero só considerárase que o estudante superou a materia se dita cualificación final é igual ou superior a 5 (sobre 10).

· Se o estudante que se acolle ao procedemento de avaliación continua non supera a materia, pero obtén como nota media entre as probas de teoría (PROBA 1 e 2), entre as probas de prácticas (PROBA 3 e 4) ou no TRABALLO TEÓRICO unha cualificación maior ou igual a 5 (sobre 10), conservaráselle dita nota só para a segunda opción (2ª edición de actas). Se o

estudiante opta por presentarse en segunda opción á parte cuxa nota é maior ou igual a 5, non se conservará dita nota.

SISTEMA DE AVALIACIÓN GLOBAL

Procedemento para a elección da modalidade de avaliación global: Ao principio do curso (dúas primeiras semanas do cuadrimestre) habilitarase un formulario para seleccionar o modo de avaliación seleccionado polo alumnado. No caso de que o alumnado non cubra o cuestionario asumirase que opta polo sistema de avaliación global.

PROBA 1: primeira proba de teoría asociada ao primeiro bloque teórico

Descrición: é unha proba escrita correspondente aos contidos impartidos na Lección maxistral e Resolución de problemas (Actividades de Teoría).

Metodoloxías aplicadas: "Exame de preguntas obxectivas" e "Resolución de problemas e/ou exercicios".

% Calificación: 22,5 % da nota final

% Mínimo: o mínimo aplícase sobre a media ponderada obtida entre esta proba e a PROBA 2 (segunda proba de teoría) sendo devandito mínimo un 5 (sobre 10). A maiores sobre esta proba aplícanse un mínimo dun 4 (sobre 10)

Competencias avaliadas: A2, A4, A5, B1, B2, B5, B9, B12, C7, C9, C22, C25, C26, C28, C29, D5, D6, D7, D9, D10, D11, D12, D14.

Resultados de aprendizaxe avaliados: RA1, RA3, RA4 y RA6

PROBA 2: segunda proba de teoría asociada ao segundo bloque teórico

Descrición: é unha proba escrita correspondente aos contidos impartidos na Lección maxistral e Resolución de problemas (Actividades de Teoría).

Metodoloxías aplicadas: "Exame de preguntas obxectivas" e "Resolución de problemas e/ou exercicios".

% Calificación: 22,5 % de la nota final

% Mínimo: o mínimo aplícase sobre a media ponderada obtida entre esta proba e a PROBA 2 (segunda proba de teoría) sendo devandito mínimo un 5 (sobre 10). A maiores sobre esta proba aplícanse un mínimo dun 4 (sobre 10)

Competencias avaliados: A2, A4, A5, B1, B2, B5, B9, B12, C7, C9, C22, C25, C26, C28, C29, D5, D6, D7, D9, D10, D11, D12, D14.

Resultados de aprendizaxe avaliados: RA1, RA3, RA4 y RA6

TRABALLO TEÓRICO: Presentación dun traballo teórico grupal ou individual

Descrición: consisten nunha investigación sobre un tema proposto relacionado coas metodoloxías áxiles que deberá ser exposto na aula. Por defecto será un traballo grupal (Actividades de Teoría).

Metodoloxías aplicadas: "Presentación".

% Calificación: 10,0 % de la nota final

% Mínimo o mínimo será dun 5 (sobre 10).

Competencias avaliadas: A4, A5, B1, B2, B5, B9, B12, C7, C9, C22, C25, C26, C28, C29, D4, D5, D6, D7, D9, D10, D11, D12, D14.

Resultados de aprendizaxe avaliadas: RA2, RA4 y RA5

PROBA 3: primeira entrega do proxecto de prácticas: SPRINT 1

Descrición: consiste na entrega do primeiro sprint do proxecto executado baixo a metodoloxía áxil e a documentación asociada á xestión do proxecto. Traballo realizado en grupo.

Metodoloxías aplicadas: " Proxecto ".

% Calificación: 22,5 % de la nota final

% Mínimo: o mínimo aplícase sobre a media ponderada obtida entre esta proba e a PROBA 2 (segunda proba de teoría) sendo devandito mínimo un 5 (sobre 10). A maiores sobre esta proba aplícanse un mínimo dun 4 (sobre 10)

Competencias avaliadas: A2, A4, A5, B1, B2, B5, B9, B12, C7, C9, C22, C25, C26, C28, C29, D5, D6, D7, D9, D10, D11, D12, D14.

Resultados de aprendizaxe avaliados: RA1, RA3, RA4 y RA6

PROBA 4: segunda entrega do proxecto de prácticas: SPRINT 2

Descrición: consiste na entrega do segundo sprint do proxecto executado baixo a metodoloxía áxil e a documentación asociada á xestión do proxecto. Traballo realizado en grupo.

Metodoloxías aplicadas: [Proxecto].

% Calificación: 22,5 % de la nota final

% Mínimo: o mínimo aplícase sobre a media ponderada obtida entre esta proba e a PROBA 2 (segunda proba de teoría) sendo devandito mínimo un 5 (sobre 10). A maiores sobre esta proba aplícanse un mínimo dun 4 (sobre 10)

Competencias avaliadas: A2, A4, A5, B1, B2, B5, B9, B12, C7, C9, C22, C25, C26, C28, C29, D5, D6, D7, D9, D10, D11, D12, D14.

Resultados de aprendizaxe avaliados: RA1, RA3, RA4 y RA6

- Todos os estudantes que se presenten a calquera das probas enténdese que se acollen ao procedemento de avaliación continua descrito anteriormente. No caso de que devandito estudante non se presente a algunha das probas restantes asignaráselles unha cualificación de 0 nelas.
- Para aplicar as porcentaxes descritas en todas as probas e calcular a cualificación final, é necesario obter como mínimo un 4 (sobre 10) na media ponderada entre as dúas probas de teoría (PROBA 1 e 2) e entre as dúas probas de prácticas (PROBA 3 e 4), pero só considerárase que o estudante superou a materia se dita cualificación final é igual ou superior a 5 (sobre 10).
- Se o estudante que se acolle ao procedemento de avaliación continua non supera a materia, pero obtén como nota media entre as probas de teoría (PROBA 1 e 2), entre as probas de prácticas (PROBA 3 e 4) ou no TRABALLO TEÓRICO unha cualificación maior ou igual a 5 (sobre 10), conservaráselle dita nota só para a segunda opción (2ª edición de actas). Se o estudante opta por presentarse en segunda opción á parte cuxa nota é maior ou igual a 5, non se conservará dita nota.

CRITERIOS DE AVALIACIÓN PARA CONVOCATORIA EXTRAORDINARIA E FIN DE CARREIRA

Empregaranse o sistema de avaliación global exposto anteriormente.

PROCESO DE CALIFICACIÓN DE ACTAS

Independentemente do sistema de avaliación e a convocatoria, en caso de non superar algunha parte (teoría ou prácticas) da avaliación, pero a puntuación global fose superior a 5 (sobre 10), a cualificación en actas será 4.

DATAS DE AVALIACIÓN

As datas das probas correspondentes ao sistema de avaliación continua publicarase no calendario de actividades, dispoñible na páxina web da ESEI <https://esei.uvigo.es/docencia/horarios/>.

As datas oficiais de exame das diferentes convocatorias, aprobadas oficialmente pola Xunta de Centro da ESEI, atópanse

EMPREGO DE DISPOSITIVOS MÓBILES

Lémbrese a todo o alumnado a prohibición do uso de dispositivos móbiles en exercicios e prácticas, en cumprimento do artigo 13.2.d) do Estatuto do Estudante Universitario, relativo aos deberes do estudiantado universitario, que establece o deber de "Absterse da utilización ou cooperación en procedementos fraudulentos nas probas de avaliación, nos traballos que se realicen ou en documentos oficiais da universidade".

CONSULTA/SOLICITUDE DE TITORIAS

As titorías poden consultarse a través da páxina persoal do profesorado, accesible a través de <https://esei.uvigo.es/docencia/profesorado/>

Bibliografía. Fontes de información

Basic Bibliography

Peter Tahchiev, Felipe Leme, Vincent Massol y Gary Gregory, **JUnit In Action**, 978-1930110991, 2ª, Manning, 2010
Mike Cohn, **User Stories Applied: for Agile Software Development**, 978-0321205681, 1ª, Addison-Wesley, 2004
Kent Beck, **Test-Driven Development: by example**, 978-0321146533, 1ª, Addison-Wesley, 2003
Kent Beck, **Extreme Programming: Explained**, 978-0321278654, 2ª, Addison-Wesley, 2005
Chris Sims y Hillary Louise Johnson, **The Elements of Scrum**, 978-0982866917, 1ª, Dymaxicon, 2011
Mike Cohn, **Succeeding with Agile: Software Development Using Scrum**, 978-0321579362, 1ª, Addison-Wesley, 2010
David J. Anderson, **Kanban: successful evolutionary change for your technology business**, 978-0984521401, 1ª, Blue Hole Press, 2010
Mike Cohn, **Agile Estimating and Planning**, 978-0131479418, 1ª, Prentice Hall Professional Technical Reference, 2012
Glenford J. Myers, Tom Badgett, Corey Sandler, **The Art of Software Testing**, 978-1118031964, 3ª, John Wiley & Sons, 2012
Kent Beck y Martin Fowler, **Planning extreme programming**, 978-0201710915, 1ª, Addison-Wesley, 2001

Complementary Bibliography

Steve Freeman y Nat Pryce, **Growing Object-Oriented Software, Guided By Tests**, 978-0321503626, 1ª, Addison-Wesley, 2010
Paul M. Duvall, Steve Matyas y Andrew Glover, **Continuous integration: improving software quality and reducing risk**, 978-0321336385, 1ª, Addison-Wesley, 2007
Martin Fowler, **Refactoring: Improving the Design of Existing Code**, 978-0134757599, 1ª, Addison-Wesley, 2000
Henrik Kniberg, **Scrum y XP desde las Trincheras**, 978-1430322641, 1ª, InfoQ, 2007
Carlos Blé Jurado, Juan Gutiérrez Plaza, Fran Reyes Perdomo y Gregorio Mena, **Diseño Ágil con TDD**, 978-1445264714, 1ª, Lulu, 2010
Kenneth S. Rubin, **Essential Scrum: A Practical Guide to the Most Popular Agile Process**, 978-0137043293, 1ª, Addison-Wesley, 2013
George Meszaros, **xUnit Test Patterns: Refactoring Test Code**, 978-0131495050, 5ª, Addison-Wesley, 2012

Recomendacións

Subjects that it is recommended to have taken before

Enxeñaría do software I/O06G151V01204
Enxeñaría do software II/O06G151V01208
Deseño de arquitecturas de grandes sistemas de software/O06G151V01407

IDENTIFYING DATA				
Web services and technologies				
Subject	Web services and technologies			
Code	O06G151V01414			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	González Peña, Daniel			
Lecturers	González Peña, Daniel			
E-mail	dgpena@uvigo.es			
Web	http://moovi.uvigo.gal			
General description	This subject has character of introduction and deepening in the utilisation of the necessary technologies to develop systems that afterwards have to be used inside the Web. This subject will deal with techniques, environments, platforms and programming tools necessary to implement high-quality information systems in the field of the Web, in order to the student be able to develop distributed applications through the Web.			
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.
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.
B8	Knowledge of the essential subjects and technologies that will allow students to learn and develop new methods and technologies, as well as those that will endow them with versatility to adapt to new situations.
B9	Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to communicate the knowledge contents, skills and abilities of the Computer Science Engineer profession.
C4	Essential knowledge of use and programming of computers, operating systems, data bases and computer programs with application in engineering.
C5	Knowledge of the structure, organization, functioning and interconnection of computing systems, the foundations of their programming, and their application to the resolution of specific problems in engineering.
C14	Ability to analyze, design, build and maintain applications in a robust, safe and efficient way, choosing the most appropriate paradigm and programming languages.
C19	Knowledge and application of the necessary tools for storing, processing and accessing information Systems, including web-based ones.
C23	Ability to design and assess human-computer interfaces to guarantee accessibility and usability of computer systems, services and applications.
C36	Ability to design systems, applications and services based on network technologies, including the Internet, web, e-commerce, multimedia, interactive services and mobile computing.
C37	Ability to understand, apply and manage the security and safety of computing systems.
D4	Analysis, synthesis and evaluation capacity
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.
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

Expected results from this subject	
Expected results from this subject	Training and Learning Results

New	A2 A5		C5 C14 C19 C36	D4 D11
LO2: To design and implement web pages by employing usability and accessibility criteria and based on an efficient resource use	A2 A5	B8 B9	C4 C5 C14 C19 C23 C36	D4 D6 D7 D9 D10 D11
LO3: To create efficient Web systems enabling content management	A2 A5	B9	C4 C5 C14 C19 C36	D4 D6 D7 D9 D10 D11
LO4: To manage database communication and its connection in web environments efficiently	A2 A5	B9	C4 C5 C19 C36	D9 D10 D11
LO5: To configure secure environments for Web systems development	A2 A5		C14 C37	D4 D11
LO6: To correctly apply advanced Web concepts during Web systems development	A2 A4 A5	B9	C4 C5 C14 C19 C36 C37	D4 D6 D7 D11

Contents

Topic	
Introduction to web applications development	Concepts, architecture, usability, accessibility, languages, development tools
Development environments configuration	Web servers, DB configuration.
Web design and client-side programming	Tools, user interface graphic design, languages and standards
Server-side programming and data access	Server-side programming languages, DB connection and querying
Web security	Secure connections, authentication and authorization
Advanced technologies	Frameworks, languages and recent libraries

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 not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Theoretical contents presentation. With the aim to facilitate the understanding and increasing the student attention, diverse examples and exercises requiring his/her active participation will be included
Laboratory practical	Realisation of problems of practical character that include the programming of software related with the contents of the matter.
	CONTINUOUS ASSESSMENT Character: Compulsory Attendance: Compulsory
	GLOBAL ASSESSMENT Character: Compulsory Attendance: Not Compulsory

Seminars	Answering of general student questions and sharing of specific theoretical and/or practical problems related to the subject
Presentation	Topic elaboration and presentation in small groups, including oral presentation and proposal of practical applications

Personalized assistance

Tests Description

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

	Description	Qualification	Training and Learning Results
Laboratory practical	Working in the project at the laboratory, which includes a coutinuous assessment of the student's progress through the course. EXPECTED RESULTS IN THE SUBJECT BEING EVALUATED: LO1, LO2, LO3, LO4, LO5, LO6	15	A4 A5 C4 C5 C37 D9 D10
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: LO6.	10	A4 B9 C4 C5 C14 C19 C36 C37 D4 D6 D7 D9 D10 D11
Objective questions exam	Several multiple-choice tests during the course that include theoretical and practical contents of the subject. EXPECTED RESULTS IN THE SUBJECT BEING EVALUATED: LO1, LO2, LO3, LO4, LO5, LO6	30	A5 C5 C14 C19 D6
Project	Project development integrating subject contents. EXPECTED RESULTS IN THE SUBJECT BEING EVALUATED: LO1, LO2, LO3, LO4, LO5, LO6	45	A2 A5 B8 B9 C4 C5 C14 C19 C23 C36 C37 D4 D6 D7 D9 D10 D11

Other comments on the Evaluation

CONTINUOUS ASSESSMENT SYSTEM

Continuous evaluation of laboratory practices

Description: monitoring of the student in the development of the project during laboratory practices throughout the course.

Applied methodology: laboratory practice.

% Qualification: 15%.

% Minimum: There is no required minimum.

Evaluated training and learning results: A4, A5, C4, C5, D9, D10.

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: 10%.

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

Evaluated training and learning results: A4, B9, C4, C5, C14, C19, C36, D4, D6, D7, D9, D10, D11.

Expected results in the subject being evaluated: LO6.

Written exam 1

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

Applied methodology: examination of objective questions.

% Qualification: 15%.

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

Evaluated training and learning results: A5, C5, C14, C19, D6.

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

Written exam 2

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

Applied methodology: examination of objective questions.

% Qualification: 15%.

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

Evaluated training and learning results: A5, C5, C14, C19, D6.

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

Web project delivery 1

Description: first delivery of a web project that integrates the 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, A5, B8, B9, C4, C5, C14, C19, C23, C36, D4, D6, D7, D9, D10, D11.

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

Web project delivery 2

Description: second delivery of a web project that integrates the 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, A5, B8, B9, C4, C5, C14, C19, C23, C36, D4, D6, D7, D9, D10, 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 EVALUATION SYSTEM

Procedure for choosing the global evaluation 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 take advantage of the evaluation system global.

Written exam

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

Applied methodology: examination of objective questions.

% Qualification: 40%.

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

Evaluated training and learning results: A5, C5, C14, C19, D6.

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

Global delivery web project

Description: delivery of a web project that integrates the contents seen in the matter and all the requirements included in the continuous evaluation modality.

Applied methodology: project.

% Qualification: 60%.

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

Evaluated training and learning results: A2, A5, B8, B9, C4, C5, C14, C19, C23, C36, D4, D6, D7, D9, D10, D11.

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

EVALUATION CRITERIA FOR EXTRAORDINARY CALL AND END OF CAREER

Continuous evaluation system: the same continuous evaluation system will be used as the one previously exposed for the ordinary call, with the exception that the "Laboratory practical" will be a face-to-face practical test on the delivered web project.

Global evaluation system: the same as the one previously exposed for the ordinary call.

RECORD QUALIFICATION PROCESS

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

accessible through <https://esei.uvigo.es/docencia/profesorado/>.

Sources of information

Basic Bibliography

Leon Shklar and Rich Rosen, **Web application architecture. Principles, Protocols and Practices**, 978-0470518601, 2, Wiley, 2009

David Gourley, Brian Totty, Marjorie Sayer, Anshu Aggarwal, Sailu Reddy, et al, **HTTP: The Definitive Guide**, 978-1565925090, 1, O'Reilly, 2002

Complementary Bibliography

Steven M. Schafer, **HTML, XHTML, and CSS Bible**, 978-0470523964, 5, Wiley, 2010

Recommendations

Subjects that are recommended to be taken simultaneously

Applications developing for the Internet/O06G151V01417

IDENTIFYING DATA				
Creación de contidos dixitais				
Subject	Creación de contidos dixitais			
Code	006G151V01415			
Study programme	Grao en Enxeñaría Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4	1c
Teaching language	Castelán Francés Galego			
Department				
Coordinator	Campos Bastos, Celso			
Lecturers	Campos Bastos, Celso			
E-mail	ccampos@uvigo.es			
Web	http://classter.esei.uvigo.es, moovi.uvigo.gal			
General description	Os contidos desta materia proporcionan ao alumno un achegamento ás problemáticas e ás tecnoloxías que permiten desenvolver contido dixital en particular de carácter gráfico, cada vez máis dinámicos, interactivos, adaptables e baseados nas posibilidades que ofrece Internet. O alumno traballará con conceptos de produción dixital como xeometría 3D, cámaras, iluminación e texturado que lle permitirán crear escenas dixitais. Tamén se traballará no espazo imaxe coa finalidade de coñecer as ferramentas que permitan a creación de interfaces e contidos complementarios e de promoción. Por último, mediante ferramentas de edición profundarase na produción de contido videográfico, o manexo de formatos dixitais e o workflow asociado aos novos procesos de produción, distribución, intercambio e consumo.			

Resultados de Formación e Aprendizaxe

Code	
A4	Que os estudantes poidan transmitir información, ideas, problemas e solución a un público tanto especializado coma non especializado.
A5	Que os estudantes desenvolvan aquelas habilidades de aprendizaxe necesarias para emprender estudos posteriores cun alto grao de autonomía.
B4	Capacidade para definir, avaliar e seleccionar plataformas hardware e software para o desenvolvemento e a execución de sistemas, servizos e aplicacións informáticas, de acordo cos coñecementos adquiridos.
B9	Capacidade para resolver problemas con iniciativa, toma de decisións, autonomía e creatividade. Capacidade para saber comunicar e transmitir os coñecementos, habilidades e destrezas da profesión de Enxeñeiro Técnico en Informática.
B11	Capacidade para analizar e valorar o impacto social e medioambiental das solucións técnicas, comprendendo a responsabilidade ética e profesional da actividade de Enxeñeiro Técnico en Informática.
C3	Capacidade para comprender e dominar os conceptos básicos de matemática discreta, lóxica, algorítmica e complexidade computacional, e a súa aplicación para a resolución de problemas propios da enxeñería
C4	Coñecementos básicos sobre o uso e programación dos ordenadores, sistemas operativos, bases de datos e programas informáticos con aplicación na enxeñería
C12	Coñecemento e aplicación dos procedementos algorítmicos básicos das tecnoloxías informáticas para deseñar solucións a problemas, analizando a idoneidade e complexidade dos algoritmos propostos
C13	Coñecemento, deseño e utilización de forma eficiente dos tipos e estruturas de datos máis axeitados á resolución dun problema
C14	Capacidade para analizar, deseñar, construír e manter aplicacións de forma robusta, segura e eficiente, elixindo o paradigma e as linguaxes de programación máis axeitadas
C20	Coñecemento e aplicación dos principios fundamentais e técnicas básicas da programación paralela, concurrente, distribuída e de tempo real
C23	Capacidade para deseñar e avaliar interfaces persoa-computador que garantan a accesibilidade e usabilidade aos sistemas, servizos e aplicacións informáticas
C36	Capacidade de concibir sistemas, aplicacións e servizos baseados en tecnoloxías de rede, incluíndo Internet, web, comercio electrónico, multimedia, servizos interactivos e computación móbil
D4	Capacidade de análise, síntese e avaliación
D6	Capacidade de abstracción: capacidade de crear e utilizar modelos que reflexen situacións reais
D10	Capacidade de relación interpersonal.
D11	Razoamento crítico
D14	Ter motivación pola calidade e a mellora continua

Resultados previstos na materia

Expected results from this subject	Training and Learning Results
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R1: Presentacións e contido coherente	A4 A5	B4 B9 B11	C3 C4 C12	D4 D6 D10 D11 D14
R2: Coñecer conceptos e desenvolvemento de habilidades e destrezas para a creación de contidos de natureza dixital.	A4	B9 B11	C4 C13 C14 C20 C23 C36	D4 D6 D11
R3: Situar ao alumno nun nivel de coñecemento que lle permita criticar, avaliar e decidir sobre o uso de ferramentas para a creación e edición de contidos dixitais e a súa integración co desenvolvemento e distribución de software.		B4 B11	C3 C13 C14 C20	D6 D10 D11
R4: Coñecer as técnicas e as tecnoloxías asociados aos contidos dixitais.		B4	C12 C14 C20 C23 C36	D11 D14
R5: Creación dos contidos dixitais asociados co desenvolvemento, promoción e distribución dunha aplicación software.	A5	B9	C4 C14 C20	D6 D10

Contidos

Topic	
1. Presentacións e Contido Coherente.	1.1 Propósito e mensaxe. 1.2 Adaptarse á audiencia 1.3 Planificación 1.4 O Comezo 1.5 Desenvolvemento 1.6 O Final 1.7 Deseño Visual
2. Escenas Tridimensionais	2.1 Introducción 2.2 Navegación e Visualización 2.3 Creación, Selección e Modificación 2.4 Transformacións 2.5 Cámaras e efectos de Iluminación 2.6 Materiais
3. Infografía, imaxe e fotografía	3.1 Conceptos Básicos 3.2 Axustes sobre a imaxe 3.3 Ferramentas de Debuxo. Mapas de Bits e vectoriais 3.4 Rotulación e uso de Capas
4. Animación e Vídeo	4.1 Conceptos Básicos 4.2 Manexo do Tempo 4.3 Fragmentos de Vídeo. Transicións 4.4 Titulación e Conceptos Avanzados

Planificación

	Class hours	Hours outside the classroom	Total hours
Lección maxistral	22.5	27	49.5
Presentación	2	2	4
Prácticas de laboratorio	20	51.5	71.5
Traballo	5	20	25

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Metodoloxía docente

	Description
Lección maxistral	Presentación dos conceptos básicos da creación de contidos dixitais. Exporanse os conceptos nos que se fundamenta a Infografía por computador, e os ámbitos de aplicación e uso da mesma en diferentes áreas do coñecemento humano. Abordarase a creación de escenas tanto de elementos bidimensionais como de natureza tridimensionais, así como os distintos procesos que teñen asociados a súa creación. Recóllense de forma detallada as técnicas e os mecanismos máis habituais para a xeración de gráficos por computador.

Presentación	Os alumnos deberán realizar unha exposición dos temas propostos en clase ao resto dos seus compañeiros. Cada alumno exporá os aspectos máis relevantes do tema da súa presentación, o cal será comentado polos seus compañeiros con axuda do profesor.
Prácticas de laboratorio	As prácticas centraranse na utilización de aplicacións informáticas que permitan o a creación, deseño e experimentación sobre contidos dixitais de distintas natureza. Cubriranse contornas bidimensionais e tridimensionais e tanto de natureza discreta como as imaxes, como de natureza continua como o vídeo. As prácticas desenvólvense en base a exercicios e casos prácticos a resolver. As horas de traballo persoal do alumno referidas a este particular, serán utilizadas por parte do alumno para finalizar os exercicios prácticos propostos en clase e o desenvolvemento dos contidos específicos necesarios para o traballo final. AVALIACIÓN CONTINUA Carácter: Obrigatorio Asistencia: Non obrigatoria AVALIACIÓN GLOBAL Carácter: Obrigatorio Asistencia: Non obrigatoria

Atención personalizada

Methodologies	Description
Lección maxistral	A atención personalizada, individual ou en grupo, realizarase tanto na aula durante o desenvolvemento das prácticas, como nas horas de tutorías e nos accesos On-Line que leven a cabo. As tutorías podranse realizar mediante medios telemáticos.
Presentación	A atención personalizada, individual ou en grupo, realizarase tanto na aula durante o desenvolvemento das prácticas, como nas horas de tutorías e nos accesos On-Line que leven a cabo. As tutorías podranse realizar mediante medios telemáticos.
Prácticas de laboratorio	A atención personalizada, individual ou en grupo, realizarase tanto na aula durante o desenvolvemento das prácticas, como nas horas de tutorías e nos accesos On-Line que leven a cabo. As tutorías poderanse realizar mediante medios telemáticos.
Tests	Description
Traballo	A atención personalizada, individual ou en grupo, realizarase tanto na aula durante o desenvolvemento das prácticas, como nas horas de tutorías e nos accesos On-Line que leven a cabo. As tutorías podranse realizar mediante medios telemáticos.

Avaliación

	Description	Qualification	Training and Learning Results			
Presentación	Inclúe a preparación dun tema e a súa exposición oral atendendo aos contidos vistos na Lección Maxistral. O traballo será avaliado por compañeiros e compañeiras ademais de polo profesorado da materia, atendendo á calidade xeral da presentación e ás habilidades e actitudes mostradas polos estudantes. Permitirá avaliar os seguintes resultados previstos: R1, R2, R3, R4, R5	30	A4	B4 B9 B11	C3 C4 C13 C20	D4 D6 D10 D11 D14
Prácticas de laboratorio	A avaliación do alumno realizarase mediante as entregas que farán os alumnos dos contidos que se desenvolveron aos longo das prácticas de laboratorio. Permitirá avaliar os seguintes resultados previstos: R1, R2, R3, R4	30	A4 A5	B4 B9 B11	C3 C4 C12 C13 C14 C20 C23 C36	D4 D6 D10 D11 D14
Traballo	Todos os estudantes deberán realizar un traballo ou proxecto final da materia. O proxecto realizarase de forma individual. O traballo final consistirá na creación dun contido dixital, principalmente unha escena 3D, que demostre o manexo e a capacidade de creación de elementos dixitais. A idea do traballo final será proposta ao profesor para a súa aceptación. Este requisito é necesario para que o traballo sexa válido. A idea do traballo poderá ser modificada, a petición do alumno, sempre que haxa un tempo razoable entre a petición de modificación e a data final de entrega do traballo. Permitirá avaliar os seguintes resultados previstos: R1, R2, R3, R4, R5	40	A4 A5	B4 B9 B11	C3 C4 C12 C13 C14 C20 C23 C36	D4 D6 D10 D11 D14

Other comments on the Evaluation

O desenvolvemento da materia ao longo do curso presenta de forma paralela fundamentos teóricos e manexo de ferramentas de creación de contidos dixitais.

Os fundamentos teóricos presentaranse ao longo das sesións teóricas previstas nos horarios do centro. A avaliación realizarase mostrando na práctica os coñecementos adquiridos.

O desenvolvemento da materia ao longo do curso presenta técnicas básicas na realización de contidos dixitais de carácter gráfico. O tratamento dixital de contidos 2D e 3D, desde a súa creación ata a súa edición, modificación e publicación serán presentados de forma teórica, pero é na práctica onde está o verdadeiro valor do manexo destas técnicas.

O desenvolvemento de contidos bidimensionais e tridimensionais desenvolverase ao longo das prácticas en aulas de informática durante todo o cuadrimestre. Os contidos prácticos están totalmente relacionados cos fundamentos teóricos presentados nas sesións maxistrais, por esta razón, presentaranse de forma sincronizada. Os contidos organízanse en "prácticas" de duración variable e o seu desenvolvemento poderán requirir unha ou varias sesións. As prácticas serán desenvolvidas de forma individual polo alumno e deberán ser entregadas ao profesor para a súa corrección ao longo do curso, unha vez finalizadas e nos prazos previstos na planificación da materia. En ningún caso, a entrega efectiva dunha práctica superará en máis dunha semana á data prevista para a súa finalización.

SITEMA DE AVALIACIÓN CONTINUA

Os contidos presentados na Lección Maxistral son de utilidade para un correcto desenvolvemento das restantes partes da materia. Por este motivo, os contidos vistos na Lección Maxistral son avaliados conxunta e intrinsecamente relacionados coa avaliación das Presentacións, as Prácticas e o Traballo.

A continuación detállanse as probas que se realizarán ao longo do curso.

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PRESENTACIÓNS

Descrición: Proba mediante a cal os estudantes presentan un tema de libre elección tentando respectar os contidos vistos na teoría. Esta presentación ira acompañada dun documento PowerPoint ou similar para o que crearon contido específico utilizando as técnicas vistas nas clases de prácticas.

Metodoloxía aplicada: Os estudantes desenvolverán contido específico para acompañar as presentacións e farán unha exposición oral sobre un tema para elixir libremente polo estudante. Permitirá obter unha puntuación máxima de 10 puntos.

%Cualificación: Representa o 30% da nota final. P

%Mínimo: O aprobado obtérase cunha nota superior ou igual que 5 puntos. É necesario obter unha puntuación mínima que represente o 40% da nota máxima (10 puntos) para poder facer media co resto de notas da materia.

Competencias avaliadas: A4, B4, B9, B11, C3, C4, C13, C20, D4, D6, D10, D11, D14.

Resultados previstos da materia: R1, R2, R3, R4, R5.

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PRÁCTICAS DE LABORATORIO

Descrición: Durante as sesións de prácticas que se realizarán ao longo do curso desenvolveranse unha serie de contidos dixitais que os estudantes terán que reproducir. Estes contidos serán entregados para a súa revisión e avaliación.

Metodoloxía aplicada: Nas datas previstas ao longo do cuadrimestre os alumnos deberán entregar os contidos desenvolvidos nas clases de prácticas. As entregas realizaranse de forma individual e serán revisadas e avaliadas polo profesor en función da calidade do contido desenvolvido. Será obrigatorio realizar as 6 entregas previstas para optar á nota máxima de 10 puntos. Como mínimo haberá que realizar 4 entregas para poder facer media coas restantes probas avaliadas.

%Cualificación: Representa o 30% da nota final. PL

%Mínimo: Para aprobar esta parte da materia o estudante deberá obter unha cualificación igual ou superior a 5 puntos (sobre 10). Se o número de entregas é inferior a 4 ou a avaliación é inferior a 4 puntos a nota resultante será suspenso e non poderá facer media coas restantes notas da materia considerándose toda a materia suspenso.

Competencias avaliadas: A4, A5, B4, B9, B11, C3, C4, C12, C13, C14, C20, C23, C36, D4, D6, D10, D11, D14.

Resultados previstos da materia: R1, R2, R3, R4.

TRABALLO

Descrición: Os estudantes terán que realizar un traballo ou proxecto final da materia. O proxecto realizarase de forma individual. O traballo final consistirá na creación dun contido dixital, principalmente unha escena 3D, que demostre o manexo e a capacidade de creación de contido dixital. A idea do traballo final será proposta ao profesor para a súa aceptación. Este requisito é necesario para que o traballo sexa válido. A idea do traballo poderá ser modificada, a pedimento do alumno, sempre que haxa un tempo razoable entre a petición de modificación e a data final de entrega do traballo.

Metodoloxía aplicada: Os estudantes realizarán un traballo de libre elección que conleve o desenvolvemento de contido dixital. A final de cuatrimestre entregaranse os ficheiros finais e intermedios que permitan a correcta avaliación da calidade e a orixinalidade do traballo desenvolvido polo estudante.

%Cualificación: Representa o 40% da nota final. T

%Mínimo: Para aprobar esta parte da materia o estudante deberá obter unha cualificación igual ou superior a 5 puntos (sobre 10). Poderá facer media coas restantes partes cunha cualificación igual ou superior a 4 puntos, e unha avaliación inferior a 4 puntos será suspenso e non poderá facer media coas restantes notas da materia considerándose toda a materia suspensa.

Competencias avaliadas: A4, A5, B4, B9, B11, C3, C4, C12, C13, C14, C20, C23, C36, D4, D6, D10, D11, D14.

Resultados previstos da materia:: R1, R2, R3, R4, R5.

A nota final (NFinal) da avaliación continua calcularase mediante o sumatorio das notas obtidas en cada parte na porcentaxe fixada. Neste sentido:

$$NFinal = P30\% + PL30\% + T40\%$$

SITEMA DE AVALIACIÓN GLOBAL

Procedemento para a elección da modalidade de avaliación global: Nas 6 primeiras semanas desde o comezo do cuatrimestre, o alumnado matriculado que queira optar pola modalidade de avaliación global deberá manifestar, formalmente, a súa intención de acollerse ao sistema de avaliación global, presentando ademais a proposta de contido dixital que ten intención de realizar como traballo da materia.

A avaliación global realízase en base a unha proba de avaliación global onde levará a cabo a correspondente presentación. Na mesma data, os estudantes poderán entregar as prácticas de laboratorio e realizarán a entrega do traballo da materia. A avaliación global realizarase nas datas oficiais de exame para cada oportunidade de avaliación (ordinaria e extraordinaria). Constará dos mesmos elementos e son de aplicación os mesmos criterios de nota que se explicaron para a avaliación continua. É necesario un mínimo do 40% da nota en cada elemento para facer media. No caso de que a nota obtida nun elemento do exame sexa inferior a un 40% suspenderase toda a materia.

A nota final da avaliación global calcularase mediante o sumatorio das notas obtidas en cada elemento na porcentaxe fixada. Neste sentido:

$$NFinal = P30\% + PL30\% + T40\%$$

CONVOCATORIA EXTRAORDINARIA DE FIN DE CARRERA

A avaliación correspondente á convocatoria extraordinaria de fin de carreira axustarase aos mesmos parámetros descritos anteriormente para o Sistema de Avaliación Global.

PROCESO DE CUALIFICACIÓN DE ACTAS

Todos os alumnos están obrigados a realizar e/o presentar as probas necesarias para calcular a cualificación que correspondan a P, PL, e T, descritas nos apartados anteriores. Os alumnos que non realizasen as probas asociadas con algunha das probas terán a cualificación de **Non Presentado**. Os alumnos que **NON** presentasen os traballos asociados a T serán cualificados coa nota calculada seguindo o mecanismo comentado nos apartados anteriores, se esta nota é inferior a 4. No caso de que a nota calculada sexa superior a 4 a cualificación NFinal será 4.

DATAS DE AVALIACIÓN

As datas das probas correspondentes ao sistema de avaliación continua publicarase no calendario de actividades, dispoñible na páxina web da ESEI. <https://esei.uvigo.es/docencia/horarios/>

As datas oficiais de exame das diferentes convocatorias, aprobadas oficialmente pola xunta de centro da ESEI, atópanse

publicadas na páxina web da ESEI. <https://esei.uvigo.es/docencia/horarios/>

EMPREGO DE DISPOSITIVOS MÓBILES

Lémbrese a todo o alumnado a prohibición do uso de dispositivos móbiles en exercicios e prácticas, en cumprimento do artigo 13.2.d) do Estatuto do Estudiante Universitario, relativo aos deberes do estudiantado universitario, que establece o deber de "Absterse da utilización ou cooperación en procedementos fraudulentos nas probas de avaliación, nos traballos que se realicen ou en documentos oficiais da universidade".

CONSULTA/SOLICITUDE DE TITORÍAS

As titorías poden consultarse a través da páxina persoal do profesorado, accesible a través de <https://esei.uvigo.es/docencia/profesorado/>

Bibliografía. Fontes de información

Basic Bibliography

MEDIAactive, **Aprender 3ds Max 2017 con 100 ejercicios prácticos**, 978-8426724014, 1, Marcombo, 2016

Complementary Bibliography

Alberto Cairo, **El arte funcional**, 978-8498890679, 1, ALAMUT, 2011

Nancy Duarte, **Slide:ology**, 978-0596522346, 1, Conecta, 2011

Nancy Duarte, **Resonancia**, 978-8498752007, 1, Gestión 2000, 2012

Adobe Press, **Photoshop CC (Diseño Y Creatividad)**, 978-8441534414, 1, ANAYA MULTIMEDIA, 2013

Recomendacións

IDENTIFYING DATA				
Mobile devices				
Subject	Mobile devices			
Code	O06G151V01416			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Sorribes Fernández, José Manuel			
Lecturers	Sorribes Fernández, José Manuel			
E-mail	sorribes@uvigo.es			
Web	http://moovi.uvigo.gal			
General description	Has character of specialisation in the programming of applications for mobile devices employing the last available technologies. The matter is focused so that any student with knowledges of programming oriented to objects, was able to develop programs for mobile and wireless devices that cover a wide rank of applications, from games and multimedia applications until corporate applications.			
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.
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.
B5	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.
B6	Ability to conceive and develop centralized or distributed computing systems and architectures, integrating hardware, software and networks, according to the knowledge and training acquired.
B9	Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to communicate the knowledge contents, skills and abilities of the Computer Science Engineer profession.
C4	Essential knowledge of use and programming of computers, operating systems, data bases and computer programs with application in engineering.
C5	Knowledge of the structure, organization, functioning and interconnection of computing systems, the foundations of their programming, and their application to the resolution of specific problems in engineering.
C23	Ability to design and assess human-computer interfaces to guarantee accessibility and usability of computer systems, services and applications.
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.
C36	Ability to design systems, applications and services based on network technologies, including the Internet, web, e-commerce, multimedia, interactive services and mobile computing.
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
D11	Critical thinking
D13	Entrepreneurial spirit and professional ambition
D14	Have motivation for quality and continuous improvement

Expected results from this subject

Expected results from this subject	Training and Learning Results			
RA1. Handle distinct surroundings of development for the construction of applications for mobile devices.	A2		C4	D7 D9
RA2. Know the distinct operating systems used by the mobile devices.	A2 A5		C4 C5 C27 C28 C36	D4 D5 D6 D7 D8 D9 D11
RA3. Ensure the good operation of the applications developed.	A2 A4 A5	B5 B6 B9	C5 C23 C25 C27 C28 C36	D4 D5 D6 D7 D8 D9 D11 D13 D14
RA4. Understand the specific needs of this type of devices because of his architecture.	A2 A4 A5	B5 B6 B9	C4 C5 C27 C28 C36	D4 D5 D6 D7 D8 D9 D11 D13
RA5. Properly handle graphics and processing capabilities.	A2	B5 B6 B9	C4 C5 C23 C27 C28 C36	D4 D5 D6 D7 D8 D9 D11
RA6. Assume the responsibility of the information integrity and the unauthorised access to the same.	A2 A4 A5	B5 B9		D4 D5 D6 D7 D8 D9 D11 D14

Contents

Topic	
Development for mobile devices	Introduction, Development tools, Debugging and Emulation
Basic programming of applications for mobile devices	Business Logic and Design, Resources, Constants, Interface, Components and Events.
User Interaction Components. Dialogs	AlertDialog, Toast, Component Customizations
Basic User Interface	Elementary components, user interaction, debugging
Visualization of Collections. Lists	ArrayAdapter and ListView
Selection items. Menus	OptionsMenu and ContextMenu
Storage	Storage preferences, internal file system, XML, internal and external storage
Multiactivities	Activity class and life cycle of an activity. Interaction between activities of a mobile application. Data sharing and application context
Storage with SQLite	Use of SQLiteOpenHelper and SQLiteDatabase. Execution of operations DML and DDL with databases SQLite.
Web applications with Android WebView and Apache Cordova	Using WebView. HTML+JavaScript applications, compilation and execution. Ionic, basics.
Connectivity with internet services. Multithread activities	Connectivity with web services, HTTP connections, connections over TCP/UDP sockets, XML and JSON exchange formats. I work with multithreaded activities with AsyncTask and Executor
Signature and publication of applications	Workflow, creation of necessary files, submission of the application to a Market.

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	15	32	47
Laboratory practical	23.5	42.5	66
Problem solving	4	0	4
Autonomous problem solving	7	11	18
Objective questions exam	3	10	13
Project	0	2	2

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
	Description
Lecturing	They consist in masterclasses where will give the theoretical base of the matter and will expose examples, in addition to establishing the existent relation between the different topics. The professor will be able to request the active participation of the students.
Laboratory practical	Realization of complementary activities where the student propose an alternative solution to problems seen in classes of theory or practical. CONTINUOUS ASSESSMENT Mandatory character. Attendance: Not mandatory. OVERALL EVALUATION Mandatory character.
Problem solving	Resolution of doubts of the work in group during the hours of practices of laboratory.
Autonomous problem solving	Realization of a final practice that will allow to evaluate the work of the students during all the subject.

Personalized assistance

Methodologies	Description
Autonomous problem solving	All the forms of tutorship sessions will be able to make by telematic means (email, videoconference, forums of MOOVI, ...) Under the modality of previous concertation.

Assessment	
	Description
	Qualification
	Training and Learning Results
Objective questions exam	They will make two proofs written partial, one roughly in the half of the course, and another at the end. These proofs are eliminatory, that is to say, regarding the theoretical part, those students that approve these proofs will not need to present to first option. Results of learning: RA2, RA4, RA5, RA6.
Project	The students will make a project to measure that advance the subject, taking advantage of and applying the theoretical knowledges assimilated in the magistral session. This project will be necessary to deliver it when the subject finishes. Results of learning: RA1, RA2, RA3, RA4, RA5, RA6.

Other comments on the Evaluation

CONTINUOUS ASSESSMENT SYSTEM

TEST 1: Evaluation objective questions

Description: Multiple choice test that will include evaluation of theoretical concepts corresponding to the first six topics. This test will take place approximately in the middle of the course.

Methodology(s) applied(s): Examination of objective questions.

% Qualification: 30%

% Minimum: For the release of this part of the course the student must obtain a grade equal to or greater than 4 points (out of 10).

Assessed skills: A2, A4, A5, B5, C4, C5, C27, C28, C36, D4, D5, D7, D8, D11

Assessed learning outcomes: RA2, RA4, RA5, RA6.

TEST 2: Evaluation objective questions

Description: Multiple choice test that will include evaluation of theoretical concepts corresponding to the first six topics. This test will take place approximately at the end of the course.

Methodology(s) applied(s): Examination of objective questions.

% Qualification: 30%

% Minimum: For the release of this part of the course the student must obtain a grade equal to or greater than 4 points (out of 10).

Assessed skills: A2, A4, A5, B5, C4, C5, C27, C28, C36, D4, D5, D7, D8, D11

Assessed learning outcomes: RA2, RA4, RA5, RA6

TEST 3: Project

Description: Delivery and defense of a project consisting of the development of an application for Android mobiles. The project will be presented and defended at the end of the course.

Methodology(s) applied: Project.

% Qualification: 40%

% Minimum: For the release of this part of the course, the student must obtain a grade equal to or greater than 5 points (out of 10).

Evaluated skills: A2, B5, B6, B9, C4, C23, C25, C27, C28, C36, D4, D5, D6, D7, D8, D9, D11, D13, D14

Assessed learning outcomes: RA1, RA2, RA3, RA4, RA5, RA6

- All students who take any of the tests are understood to be following the subject in person and therefore must follow the evaluation procedure described above.
- If a student does not take any of the tests, they will be assigned, at most, a grade of 4 in the total, according to the rest of the grades.
- The theme and scope of the project will be agreed with the teacher on the stipulated dates that will be published in Moovi.
- The project can be carried out in groups.
- In case of not passing the subject in the first call, the following will be saved for the extraordinary call and end of degree:
 - The mark of test 1 and test 2 in case of having passed both with an average score of 5.
 - The project mark in case of having obtained a minimum mark of 5.

GLOBAL EVALUATION SYSTEM

Procedure for choosing the global assessment modality: It is considered that the student opts for the global assessment system if they do not take Test 1 of the continuous assessment system.

TEST 1: Theoretical evaluation

Description: It consists of an individual test of the total subject.

Methodology(s) applied(s): Examination of objective questions.

% Qualification: 60%

% Minimum: For the release of this part of the course, the student must obtain a grade equal to or greater than 5 points (out of 10).

Assessed skills: A2, A4, A5, B5, C4, C5, C27, C28, C36, D4, D5, D7, D8, D11

Assessed learning outcomes: RA2, RA4, RA5, RA6

TEST 2: Project

Description: Delivery and defense of a project consisting of the development of an application for Android mobiles.

Methodology(s) applied: Project.

% Qualification: 40%

% Minimum: For the release of this part of the course, the student must obtain a grade equal to or greater than 5 points (out of 10).

Evaluated skills: A2, B5, B6, B9, C4, C23, C25, C27, C28, C36, D4, D5, D6, D7, D8, D9, D11, D13, D14

Assessed learning outcomes: RA1, RA2, RA3, RA4, RA5, RA6

- The theme and scope of the project will be agreed with the teacher on the stipulated dates that will be published in Moovi.
- If a student does not take any of the tests, they will be assigned, at most, a grade of 4 in the total, according to the rest of the grades.
- The project will be done individually.
- In case of not passing the subject in the first call, the following will be saved for the extraordinary call and end of degree:
 - The mark of test 1 in case of having obtained a minimum mark of 5.
 - The project mark in case of having obtained a minimum mark of 5.

EVALUATION CRITERIA FOR EXTRAORDINARY CALL AND FINAL DEGREE

The global assessment system set out above will be used for both continuous and global assessment students.

RECORD QUALIFICATION PROCESS

Regardless of the evaluation system and the call, if any part of the evaluation is not passed, but the overall score is greater than 4 (out of 10), the qualification 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 evaluations of 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 the use or cooperation in fraudulent procedures in the evaluation tests, in the works that are carried out or in official documents of the university."

CONSULTATION/REQUEST FOR TUTORIALS

The tutorials can be consulted through the personal page of the teaching staff, accessible through <https://esei.uvigo.es/docencia/profesorado/>

Sources of information

Basic Bibliography

Tomás Gironés, Jesús; Lloret Mauri, Jaime, **El Gran Libro de Android**, 9788426733665, 9, Marcombo - 978-8426733665, 2022

Complementary Bibliography

Tomás Gironés, Jesús; Puga, Gonzalo; Santamaría, David; Barroso, Jorge, **El gran libro de android avanzado**, 9788426722577, 5, Marcombo - 978-8426722577, 2019

Ribas Lequerica, Joan, **Desarrollo De Aplicaciones Para Android**, 9788441538092, 1, Anaya Multimedia - 978-8441538092, 2017

Recommendations

IDENTIFYING DATA**Applications developing for the Internet**

Subject	Applications developing for the Internet			
Code	O06G151V01417			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Reboiro Jato, Miguel			
Lecturers	Novo Lourés, María Reboiro Jato, Miguel			
E-mail	mrjato@uvigo.es			
Web	http://moovi.uvigo.gal			
General description	This subject focuses on the programming of applications oriented to the use of the latest technologies available for the generation of rich Internet applications. Special attention will be paid to the set of APIs available in Java for the use of XML, multithreaded application development, database access and distributed client/server programming using TCP sockets, UDP datagrams and remote method invocation. 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.
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.
B6	Ability to conceive and develop centralized or distributed computing systems and architectures, integrating hardware, software and networks, according to the knowledge and training acquired.
B9	Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to communicate the knowledge contents, skills and abilities of the Computer Science Engineer profession.
C12	Knowledge and application of basic algorithmic procedures of computer technologies to design solutions to problems, analyzing the appropriacy and complexity of the proposed algorithms.
C13	Knowledge, design and efficient use of the most appropriate data structures and types for the resolution of a problem.
C14	Ability to analyze, design, build and maintain applications in a robust, safe and efficient way, choosing the most appropriate paradigm and programming languages.
C18	Knowledge and application of the characteristics, functions and structure of data bases, allowing their appropriate use, and design, analysis and implementation of applications based on them.
C19	Knowledge and application of the necessary tools for storing, processing and accessing information Systems, including web-based ones.
C20	Knowledge and application of the fundamental principles and basic techniques of parallel, concurrent, distributed and real-time programming.
C23	Ability to design and assess human-computer interfaces to guarantee accessibility and usability of computer systems, services and applications.
C27	Ability to solve problems of integration according to available strategies, standards and technologies.
C36	Ability to design systems, applications and services based on network technologies, including the Internet, web, e-commerce, multimedia, interactive services and mobile computing.
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.
D9	Ability to quickly integrate and work efficiently in unidisciplinary teams and to collaborate in a multidisciplinary environment
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			
LO1. Know the fundamental bases of Internet	A2 A4 A5	B9	C18 C19 C20	D4 D7 D9 D11 D14
LO2. Communicate two or more applications over a network	A2 A4 A5	B6 B9	C12 C13 C14 C18 C19 C20 C23 C27 C36	D4 D5 D6 D9 D11 D14
LO3. Adequately manage the multithreading capabilities of programs so that they can efficiently serve multiple simultaneous clients	A2 A4 A5	B6 B9	C12 C13 C14 C18 C19 C20 C23 C27 C36	D4 D5 D6 D9 D11 D14
LO4. Adequately manage database access capabilities	A2 A4 A5	B6 B9	C12 C13 C14 C18 C19 C20 C23 C27 C36	D4 D5 D6 D9 D11 D14
LO5. Use a markup language for storing information	A2 A4 A5	B6 B9	C12 C13 C14 C18 C19 C20 C23 C27 C36	D4 D5 D6 D9 D11 D14
LO6. Know the basics of remote procedure invocation for application integration.	A2 A4 A5	B6 B9	C12 C13 C14 C18 C19 C20 C23 C27 C36	D4 D5 D6 D9 D11 D14
LO7. Perform the complete design of the requirements of an application that uses Internet resources	A2 A4 A5	B6 B9	C12 C13 C14 C18 C19 C20 C23 C27 C36	D4 D5 D6 D9 D14

Contents

Topic	
Introduction	Introduction to Internet and the Web, including the development of the protocol HTTP.
Sockets	Use of sockets for the communication between applications employing TCP and UDP protocols.

Multithreading	Analysis of the capacities of the multithreaded systems and his use in Internet applications, especially, in server applications.
Database access	Database access and integration from remote or local applications.
XML	Use of XML and other related technologies.
Web services	Introduction to web services and related technologies (SOAP, WSDL and UDDI).

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	16.5	16.5	33
Laboratory practical	8	8	16
Problem and/or exercise solving	3	14	17
Presentation	3	10	13
Project	22	49	71

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Exposition of the theoretical contents of the subject. In order to facilitate the understanding of the subject and increase the student's interest, various examples will be included in which the student's active participation may be required. CONTINUOUS ASSESSMENT Character: not mandatory Attendance: not mandatory GLOBAL ASSESSMENT Character: not mandatory
Laboratory practical	Practical exercises on the contents of the material that will be solved collaboratively by all the students. These exercises are complemented with optional exercises with which students can deepen in a practical way in the contents of the subject after being worked on in the classroom. CONTINUOUS ASSESSMENT Character: mandatory Attendance: not mandatory Grading will take into account both the classes attended and active participation in them. GLOBAL ASSESSMENT Character: not mandatory

Personalized assistance

Methodologies	Description
Laboratory practical	Attention to students' questions and doubts that may arise during the work to be done in the classes.
Tests	Description
Project	Weekly monitoring of the work on the project and resolution of any doubts that may arise in relation to it.
Presentation	Guidance on the topic of the presentation during the preparation of the presentation and leading a discussion on the topic after the presentation.

Assessment

	Description	Qualification	Training and Learning Results			
Laboratory practical	Regular attendance and active participation in solving exercises in the practical laboratory.	10	A2 A4 A5	B9	C12 C13 C18 C19 C20	D4 D5 D6 D9 D14
	Expected results from this subject: LO2, LO3, LO4, LO5, and LO6.					

Problem and/or exercise solving	Realisation of different tests throughout the course that will include theoretical and practical content corresponding to the subject matter taught during the classroom classes.	40	A2 A5	B9	C18 C19 C20	D4 D11
Expected results from this subject: LO1, LO2, LO3, LO4, LO5, and LO6						
Presentation	Preparation and presentation in small groups of a topic related to the subject. The evaluation of the work will take into account the content of the work, its oral presentation and its contextualisation within the subject.	10	A4 A5			D4 D7 D9 D11 D14
In addition, students will be assessed on their ability to grade the work presented by their peers.						
Expected results from this subject: LO1						
Project	Carrying out a project in which the theoretical and practical contents of the subject are applied in a practical way.	40	A2 A4 A5	B6 B9	C12 C13 C14 C18 C19 C20 C23 C27 C36	D4 D5 D6 D9 D14
Multiple submissions will be made throughout the course.						
Expected results from this subject: LO2, LO3, LO4, LO5, LO6, and LO7.						

Other comments on the Evaluation

EVALUATION CRITERIA FOR THE 1ST EDITION OF THE RECORDS

Throughout the first month of the course, those students who wish to do so may request, through the subject's Moovi, to be assessed using the global assessment method.

[Continuous Assessment]

Final grade = 0.1 * grade for "Presentation" + 0.1 * grade for "Laboratory practical" + 0.4 * grade for "Project" + 0.4 * grade for "Problem and/or exercise solving".

[Global Assessment]

In this type of assessment, the same criteria as in continuous assessment will be applied, with the following differences:

- The "Presentation" methodology will only be presented to the lecturers of the subject.
- In the "Problem and/or exercise solving" methodology, there will be a single test.
- In the "Project" methodology, there will be a single submission, and additionally, a final test on the project must be done.

Final grade = 0.1 * grade for "Presentation" + 0.45 * grade for "Project" + 0.45 * grade for "Problem solving and/or exercises"

EVALUATION CRITERIA FOR EXTRAORDINARY AND END-OF-COURSE EXAMS

The same assessment criteria as in the 1st edition of the records will be maintained for both continuous assessment and global assessment, with the sole difference that in both types of assessment, the "Presentation" methodology will only be presented to the lecturers of the subject.

In the particular case where a student evaluated through the criteria of continuous assessment has passed all the parts that require a minimum score but still does not reach a 5 in the overall grade due to obtaining less than a 5 in the "Laboratory practical" methodology, they must take a practical test on the contents of the laboratory practices to pass this methodology.

GRADING PROCESS

In any of the calls, the student must pass each of the assessment methodologies and the partial tests of which they are composed in order to pass the subject. An assessment methodology will be considered to be passed when a mark equal to or higher than 50% of the maximum mark for that methodology is obtained. In addition, a test will be considered to be passed when a mark equal to or higher than 40% of the maximum mark for that test is obtained. In the event that a student does not pass any of the methodologies and/or tests, a maximum of 4.9 points will be assigned as the final mark for the subject.

In the specific case of the "Laboratory practical" methodology, no minimum mark will be required.

EVALUATION DATES

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CONSULTATION/REQUEST FOR TUTORING

Tutoring can be consulted through the faculty member's personal page, accessible through <https://esei.uvigo.es/docencia/profesorado/>.

Sources of information

Basic Bibliography

Cay S. Horstmann, **Core Java, Vol. II-Advanced Features, 12th Edition**, 978-0137870899, 1ª, Oracle Press, 2022

Martin Kalin, **Java web services, up and running**, 978-1449365110, 1ª, O'Reilly, 2009

George Reese, **Database Programming with JDBC and Java**, 978-1565926165, 2ª, O'Reilly, 2000

Bill Evjen ... [et al.], **Professional XML**, 978-0471777779, 1ª, Wiley Publishing, 2007

Joe Fawcett, Danny Ayers y Liam R.E. Quin, **Beginning XML**, 978-1118162132, 5ª, John Wiley & Sons, 2012

Complementary Bibliography

David Parsons, **Desarrollo de aplicaciones web dinámicas con XML y Java**, 978-8441525924, 1ª, Anaya Multimedia, 2009

Balachander Krishnamurthy, **Web protocols and practice : HTTP/1.1, networking protocols, caching, and traffic measurement**, 978-0201710885, 1ª, Addison Wesley, 2001

Eben Hewitt, **Java SOA cookbook**, 978-0596520724, 1ª, O'Reilly, 2009

Recommendations

Subjects that are recommended to be taken simultaneously

Mobile devices/O06G151V01416

Web services and technologies/O06G151V01414

Subjects that it is recommended to have taken before

Programming 2/O06G151V01109

Databases 1/O06G151V01209

Concurrency and distribution/O06G151V01308

IDENTIFYING DATA				
Industrial IT				
Subject	Industrial IT			
Code	O06G151V01418			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language				
Department				
Coordinator				
Lecturers				
E-mail				

----- UNPUBLISHED TEACHING GUIDE -----

IDENTIFYING DATA				
Information handling advanced techniques				
Subject	Information handling advanced techniques			
Code	006G151V01419			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	2nd
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Lorenzo Iglesias, Eva María			
Lecturers	Lorenzo Iglesias, Eva María Sorribes Fernández, José Manuel			
E-mail	eva@uvigo.es			
Web	http://moovi.uvigo.gal			
General description	This course presents the opportunity to introduce students to the world of emerging technologies in databases through the detailed exposition of the new needs and demands that organizations pose to databases, and the theoretical introduction (and practice when possible) of the new data management models and technologies that are emerging. 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.
A3	Students will be able to gather and interpret relevant data (normally within their field of study) that will allow them to 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.
B9	Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to 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.
C18	Knowledge and application of the characteristics, functions and structure of data bases, allowing their appropriate use, and design, analysis and implementation of applications based on them.
C26	Ability to assess clients' needs and determine the software requirements to satisfy these needs, reconciling conflicting goals through attempts to reach acceptable compromises within the limits imposed by costs, available times, existing developed systems and organizations themselves.
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.
C31	Ability to understand the environment of an organization and its needs in the area of information and communication technologies.
C35	Ability to select, design, implement, integrate and manage information systems that meet the needs of organizations, once the costs and quality criteria have been identified.
D5	Organizational and planning skills
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
D12	Leadership

Expected results from this subject

Expected results from this subject	Training and Learning Results		
RA1: Understand the new needs of the organisations and know the modifications proposed from the own relational model.	A3	C31 C35	D7

RA2: Know the last advances related with databases: Documental Databases, Distributed Databases, Multimedia Databases, Space-temporal Databases, etc.	A4	C26	D8
		C31	D11
RA3: Comprise and develop systems of analytical processing on line (OLAP), DataWarehouse and Data Mining	A2	C13	D9
		C18	D10
			D12
RA4: Participate in the installation of Datawarehouse and SIAD tools.	A2	B9	C18
			D5
			D9
			D10

Contents

Topic	
Decision Support Systems	On-Line Analytical Process DataWarehouse DataMining Business Intelligence systems
Special purpose databases	Object Oriented Databases Distributed Databases XML Databases
Other Database models	,

Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	1	0	1
Lecturing	4	0	4
Case studies	6	14	20
Laboratory practical	18	37	55
Report of practices, practicum and external practices	20	40	60
Essay questions exam	3	7	10

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Introductory activities	Efforts to make contact and gather information about the students, and to present the subject.
Lecturing	Presentation by the teacher of the contents on the subject under study, theoretical and / or guidelines for a job, exercise or project to be developed by the student.
Case studies	Analysis of an event, issue or actual event in order to know, interpret, solve, generate hypotheses, comparing data, reflect, complete knowledge, diagnose and training in alternative dispute resolution procedures.
Laboratory practical	Activities application of knowledge to specific situations and basic skills acquisition and related procedural matter under study. CONTINUOUS EVALUATION Character: Compulsory Attendance: Not compulsory GLOBAL EVALUATION Character: Compulsory

Personalized assistance

Methodologies	Description
Lecturing	The sessions of personalized assistance will be able to make by telematic means (email, videoconference, FAITIC, ...) under the modality of appointment.
Laboratory practical	The sessions of personalized assistance will be able to make by telematic means (email, videoconference, FAITIC, ...) under the modality of appointment.

Assessment

	Description	Qualification	Training and Learning Results
Case studies	Proof in which the student/to has to analyse a fact, problem or real event with the purpose to know it, interpret it, resolve it, generate hypothesis, contrast data, reflect, complete knowledges, diagnose it and train in alternative procedures of solution. Expected subject matter outcomes: RA1, RA2	10	A3 C26 D7 A4 C31 D8 C35 D11

Laboratory practical	The practices of laboratory are compulsory, will have a date of presentation stipulated previously and will be evaluated separately. Expected subject matter outcomes: RA3, RA4	40	A2 B9 C13 D5 C18 D9 C30 D10 D12
Report of practices, practicum and external practices	Preparation of a report by part of the student/to in which they reflect the characteristics of the work carried out. The students/ace have to describe the tasks and procedures developed, show the results obtained or observations made, as well as the analysis and treatment of data. Expected subject matter outcomes: RA3, RA4	30	A2 B9 C13 D5 C18 D9 C30 D10 D12
Essay questions exam	Proofs that include open questions on a subject. The students/ace have to develop, relate, organise and present the knowledges that have on the matter in an answer argued. Expected subject matter outcomes: RA1, RA2	20	A3 A4 C26 D7 C31 D8 C35 D11

Other comments on the Evaluation

CONTINUOUS EVALUATION SYSTEM

TEST 1: Case study

Description: Test in which the student must analyze a fact, problem or real event in order to know it, interpret it, solve it, generate hypotheses, contrast data, reflect, complete knowledge, diagnose it and train in alternative solution procedures.

Methodology applied: Case Studies

Grading %: 10%

Training and learning outcomes: A3, A4, C26, C31, C35, D7, D8, D11.

Expected learning outcomes in the subject: RA1, RA2

TEST 2: Quizzes

Description: Tests that include open questions on a topic. Students must develop, relate, organize and present the knowledge they have about the subject in an argued answer, or by giving a specific answer within a test.

Methodology applied: Essay questions exam.

Grading %: 20%.

Training and learning outcomes: A3, A4, C26, C31, C35, D7, D8, D11.

Expected subject matter outcomes: RA1, RA2

TEST 3: Laboratory practicals

Description: The laboratory practicals are compulsory, will have a previously stipulated date of presentation and will be evaluated separately.

Methodology applied: Laboratory practicals.

Qualification %: 40%.

Training and learning results: A2, B9, C13, C18, C30, D5, D9, D10, D12.

Expected results in the subject: RA3, RA4

TEST 4: Internship report

Description: Elaboration of a report by the student in which the characteristics of the work carried out are reflected. It must describe the tasks and procedures developed, show the results obtained or observations made, as well as the analysis and treatment of data.

Methodology applied: Internship report, practicum and external internships.

% Qualification: 30%.

Training and learning results: A2, B9, C13, C18, C30, D5, D9, D10, D12.

Expected results in the subject: RA3, RA4

Observations:

- In case of performing any of the parts, the grade will be kept until the second edition of minutes.

GLOBAL EVALUATION SYSTEM

Procedure for choosing the global evaluation system: The student who wishes to be evaluated through the global evaluation system must notify the faculty no later than 6 weeks after the beginning of the course.

TEST 1: Theoretical-practical test.

Description: Objective test that will include evaluation of theoretical concepts and exercise resolution.

Methodology applied: Examination of development questions.

% Qualification: 30%.

Minimum: For the release of this part of the subject the student must obtain a grade equal to or higher than 1.5 points (out of 3).

Training and learning outcomes: A3, A4, C26, C31, C35, D7, D8, D11.

Expected results in the subject: RA1, RA2

TEST 2: Laboratory practicals

Description: Elaboration and defense of the set of laboratory practices proposed throughout the course.

Methodology applied: Laboratory practicals.

Qualification %: 40%.

Training and learning results: A2, B9, C13, C18, C30, D5, D9, D10, D12.

Expected results in the subject: RA3, RA4

TEST 3: Internship report

Description: Elaboration and defense of a report by the student in which the characteristics of the work carried out are reflected. It must describe the tasks and procedures developed, show the results obtained or observations made, as well as the analysis and treatment of data.

Methodology applied: Internship report, practicum and external internships.

% Qualification: 30%.

Training and learning results: A2, B9, C13, C18, C30, D5, D9, D10, D12.

Expected results in the subject: RA3, RA4.

EVALUATION CRITERIA FOR EXTRAORDINARY AND END OF COURSE EXAMS

The global evaluation system corresponding to the 1st call will be used both for students of continuous evaluation and for students of global evaluation.

QUALIFICATION PROCESS OF ACTS

For the global evaluation system and for the extraordinary and final exams, if any part of the evaluation is not passed, but the overall score is higher than 4 (out of 10), the grade in the acts will be 4.

EVALUATION DATES

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USE OF MOBILE DEVICES

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CONSULTATION/REQUEST FOR TUTORIALS

Tutorials can be consulted through the personal page of the teaching staff, accessible through <https://esei.uvigo.es/docencia/profesorado/>

Sources of information

Basic Bibliography

Hernández Orallo, J.; Ramírez Quintana, M.J.; Ferri Ramírez, C., **Introducción a la minería de datos**, 9788420540917, Pearson Educación, 2004

Connolly, T.M.; Begg, C., **Database Systems: A Practical Approach to Design, Implementation, and Management**, 978-0132943260, 6, Pearson Educación, 2015

Casters, M.; Bouman, R.M van Dongen, J., **Pentaho Kettle Solutions**, 9780470635179, Wiley Publishing, Inc, 2010

Complementary Bibliography

Recommendations

IDENTIFYING DATA				
ICT strategic management				
Subject	ICT strategic management			
Code	006G151V01420			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	2nd
Teaching language				
Department				
Coordinator				
Lecturers				
E-mail				

----- UNPUBLISHED TEACHING GUIDE -----

IDENTIFYING DATA				
Process modelling and simulation				
Subject	Process modelling and simulation			
Code	O06G151V01421			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	2nd
Teaching language				
Department				
Coordinator				
Lecturers				
E-mail				

----- UNPUBLISHED TEACHING GUIDE -----

IDENTIFYING DATA				
Codes Theory				
Subject	Codes Theory			
Code	006G151V01422			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	Vilares Ferro, Manuel			
Lecturers	Vilares Ferro, Manuel			
E-mail	vilares@uvigo.es			
Web	http://moovi.uvigo.gal			
General description	Teoría de Códigos es una asignatura optativa impartida en el segundo semestre del cuarto curso, en la que se pretende introducir a los alumnos en los conceptos básicos de la Teoría de Códigos. En el plan de estudios se establece como objetivos de aprendizaje que el alumno conozca y comprenda los fundamentos de Teoría de la Información y Codificación; los códigos de detección y corrección más importante; y los aspectos básicos relativos a la comprensión de datos y textos.			

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.			
B9	Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to communicate the knowledge contents, skills and abilities of the Computer Science Engineer profession.			
C4	Essential knowledge of use and programming of computers, operating systems, data bases and computer programs with application in engineering.			
C5	Knowledge of the structure, organization, functioning and interconnection of computing systems, the foundations of their programming, and their application to the resolution of specific problems in engineering.			
C7	Ability to design, develop, choose and assess computer applications and systems to guarantee their reliability, safety and quality, according to ethical principles and existing legislation and regulations.			
C13	Knowledge, design and efficient use of the most appropriate data structures and types for the resolution of a problem.			
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.			
C35	Ability to select, design, implement, integrate and manage information systems that meet the needs of organizations, once the costs and quality criteria have been identified.			
C37	Ability to understand, apply and manage the security and safety of computing systems.			
D4	Analysis, synthesis and evaluation capacity			
D5	Organizational and planning skills			

Expected results from this subject

Expected results from this subject		Training and Learning Results		
New	A2	B9	C5 C7 C28 C35 C37	D4 D5
New	A2	B9	C4 C5 C7 C13 C28 C35 C37	D4 D5
New	A2	B9	C4 C5 C7 C13 C28 C35 C37	D4 D5

Contents	
Topic	
TEMA 1: Fundamentos de la teoría de la información	1.1.- Propiedades de Z. Orden algoritmo euclidiano. Principio del buen orden. Teorema fundamental de la aritmética. Congruencias. El anillo $\mathbb{Z}_n$
TEMA 2: Codificación de la información en canales con ruido	2.1.- Códigos lineales 2.2.- Códigos Hamming 2.3.- Códigos de Golay
TEMA 3: Compresión de la información	3.1.- Códigos de descodificación única 3.2.- Codificación aritmética
(*)4.- Criptografía	(*)4.1.- Criptografía de clave pública. 4.2.- Criptografía de clave secreta.

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	22.5	45.5	68
Laboratory practical	27	53	80
Essay questions exam	2	0	2

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
	Description
Lecturing	
Laboratory practical	(*)En base á materia teórica proposta en clase, o profesor propondrá a implementación de casos prácticos por parte dos alumnos. Ditas prácticas se realizarán en grupos pequenos, tanto dentro como fóra das horas de aula, e serán avaliadas como parte da nota final, tendo o alumno que entregar o código implementado e unha pequena memoria en donde se especificarán aqueles aspectos do funcionamento da práctica requeridos polo profesor. AVALIACIÓN CONTINUA Carácter: Obrigatorio Asistencia: obrigatoria para as sesións nas que se realicen actividades de avaliación. AVALIACIÓN GLOBAL Carácter: Obrigatorio

Personalized assistance	
Methodologies	Description
Laboratory practical	

Assessment		Qualification	Training and Learning Results			
	Description					
Laboratory practical	(*)Os alumnos deberán realizar unha defensa das prácticas realizadas, consistente nunha proba de funcionamento e na contestación das preguntas realizadas polo profesor, co obxectivo de comprobar o aprendido polos alumnos durante a realización do traballo. A nota final dependerá da calidade do traballo realizado e da defensa realizada polos alumnos. Resultados de Aprendizaxe: RA2, RA3	40	A2	B9	C4 C5 C7 C13 C28 C35 C37	D4 D5
Essay questions exam	(*)Realización de dúas probas escritas obrigatorias nas que se examinará aos alumnos sobre os coñecementos adquiridos nas clases teóricas. Resultados de Aprendizaxe: RA1	60	A2	B9	C5 C7 C28 C35 C37	D4 D5

Other comments on the Evaluation

Sources of information
Basic Bibliography
Hill, Raymond, A First Course in Coding Theory , 0-19-853803-0, 1ª Ed, Clarendon Press, 1986
Roman, Steven, Introduction to Coding and Information Theory , 0-387-94704-3, 1ª Ed, Springer, 1997
van Lint, J.H., Introduction to Coding Theory , 3-540-64133-5, 2ª Ed, Springer, 1998
Complementary Bibliography

Pretzel, Oliver, **Error-Correcting Codes and Finite Fields. Student Edition**, 0-19-269067-1, 1ª Ed, Oxford University Press, 1996

Adamek, Jiri, **Foundations of Coding**, 0471621870, 1ª Ed, Wiley, 1991

Stinson, Douglas R., **Cryptography: Theory and Practice**, 978-1-58488-508-5, 3ª Ed, Chapman and Hall, 2006

O. Goldreich, **Foundations of Cryptography, Basic Applications**, 978-1-58488-508-5, 1ª Ed, Cambridge University Press, 2009

Menezes, Alfred J. y van Oorschot, Paul C. y Vanstone, Scott A., **Handbook of Applied Cryptography**, 0-8493-8523-7, 1ª Ed, CRC Press, 1996

Recommendations

IDENTIFYING DATA				
Corporate networks				
Subject	Corporate networks			
Code	006G151V01423			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	2nd
Teaching language				
Department				
Coordinator				
Lecturers				
E-mail				

----- UNPUBLISHED TEACHING GUIDE -----

IDENTIFYING DATA				
Internships 1				
Subject	Internships 1			
Code	006G151V01981			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Rodríguez Martínez, Francisco Javier			
Lecturers				
E-mail				
Web	http://esei.uvigo.es			
General description	Internships in companies are optional for students. The objective is for the student to acquire experience in the performance of the profession of technical engineer in computer science, and their roles and responsibilities in organizations. 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	
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.
B5	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.
B8	Knowledge of the essential subjects and technologies that will allow students to learn and develop new methods and technologies, as well as those that will endow them with versatility to adapt to new situations.
B9	Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to communicate the knowledge contents, skills and abilities of the Computer Science Engineer profession.
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.
C26	Ability to assess clients' needs and determine the software requirements to satisfy these needs, reconciling conflicting goals through attempts to reach acceptable compromises within the limits imposed by costs, available times, existing developed systems and organizations themselves.
C27	Ability to solve problems of integration according to available strategies, standards and technologies.
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.
C31	Ability to understand the environment of an organization and its needs in the area of information and communication technologies.
C34	Ability to select, design, implement, integrate and manage networks and communications infrastructures in organizations.
C36	Ability to design systems, applications and services based on network technologies, including the Internet, web, e-commerce, multimedia, interactive services and mobile computing.
C37	Ability to understand, apply and manage the security and safety of computing systems.
D8	Ability to work in situations of lack of information and / or under pressure
D9	Ability to quickly integrate and work efficiently in multidisciplinary teams and to collaborate in a multidisciplinary environment
D10	Interpersonal relationship skills.
D14	Have motivation for quality and continuous improvement

Expected results from this subject

Expected results from this subject	Training and Learning Results
------------------------------------	-------------------------------

Experience in the exert of the profession of engineer/to technician/it in computing and of the his more usual functions in some real surroundings of company.

B1 C25 D8
B5 C26 D9
B8 C27 D10
B9 C30 D14
C31
C34
C36
C37

Contents

Topic

Stay in a company developing own functions of -
an Engineer Technician in Computer Science,
related with the professional profile chosen by
the student. It is supported by the form teacher
and personal of the company. -

Planning

	Class hours	Hours outside the classroom	Total hours
Practicum, External practices and clinical practices	150	0	150

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Practicum, External practices and clinical practices	- The procedure of the realization of the external practices governs pole Regulation of Academic Practices of the Students of the University of Vigo and of the Upper School of Engineering Computing. - The student will realize a stay in a company developing own functions of the qualifications and of the professional profile and chosen.

Personalized assistance

Methodologies	Description
Practicum, External practices and clinical practices	The student will have a continuous tracking and an attention customized by the tutors. The tutors will be realized, preferably, by telematic means: email or the teacher's office in the remote campus of the university.

Assessment

	Description	Qualification	Training and Learning Results
Practicum, External practices and clinical practices	- The student must submit an explanatory report of the activities carried out during the practices, specifying their duration, units or departments of the company in which they were carried out, training received (courses, computer programs, etc.), the level of integration within the company and relations with staff. - The report must also include a conclusions section, which will contain a reflection on the adequacy of the teachings received during the degree course for the performance of the practice (most significant positive and negative aspects related to the development of the practices). In addition, the inclusion of information on the professional and personal experience obtained with the practices (personal assessment of the learning achieved throughout the practices, and own suggestions or contributions on the structure and operation of the company visited) will be valued. - The tutor of the company will deliver a report evaluating aspects related to the practices carried out by the student: punctuality, attendance, responsibility, teamwork ability and integration in the company, quality of the work carried out, etc. Learning outcome: RA1	100	B1 C25 D8 B5 C26 D9 B8 C27 D10 B9 C30 D14 C31 C34 C36 C37

Other comments on the Evaluation

- The student must submit an explanatory report of the activities carried out during the practices, specifying their duration, units or departments of the company in which they were carried out, training received (courses, computer programs, etc.), the level of integration within the company and relations with staff.

- The report must also include a conclusions section, which will contain a reflection on the adequacy of the teachings received during the degree course for the performance of the practice (most significant positive and negative aspects related to the development of the practices). In addition, the inclusion of information on the professional and personal experience obtained with the practices (personal assessment of the learning achieved throughout the practices, and own suggestions or contributions on the structure and operation of the company visited) will be valued.
- The tutor of the company will deliver a report evaluating aspects related to the practices carried out by the student: punctuality, attendance, responsibility, teamwork ability and integration in the company, quality of the work carried out, etc.

Learning outcome: RA1

Sources of information**Basic Bibliography****Complementary Bibliography**

Recommendations

Other comments

In order to enrol in external placements, you must have passed 150 ECTS credits of the degree.

IDENTIFYING DATA				
Internships 2				
Subject	Internships 2			
Code	006G151V01982			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	12	Optional	4th	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Rodríguez Martínez, Francisco Javier			
Lecturers				
E-mail				
Web	http://esei.uvigo.es			
General description	Internships in companies are optional for students. The objective is for the student to acquire experience in the performance of the profession of technical engineer in computer science, and their roles and responsibilities in organizations. 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	
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.
B5	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.
B8	Knowledge of the essential subjects and technologies that will allow students to learn and develop new methods and technologies, as well as those that will endow them with versatility to adapt to new situations.
B9	Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to communicate the knowledge contents, skills and abilities of the Computer Science Engineer profession.
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.
C26	Ability to assess clients' needs and determine the software requirements to satisfy these needs, reconciling conflicting goals through attempts to reach acceptable compromises within the limits imposed by costs, available times, existing developed systems and organizations themselves.
C27	Ability to solve problems of integration according to available strategies, standards and technologies.
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.
C31	Ability to understand the environment of an organization and its needs in the area of information and communication technologies.
C34	Ability to select, design, implement, integrate and manage networks and communications infrastructures in organizations.
C36	Ability to design systems, applications and services based on network technologies, including the Internet, web, e-commerce, multimedia, interactive services and mobile computing.
C37	Ability to understand, apply and manage the security and safety of computing systems.
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.
D14	Have motivation for quality and continuous improvement

Expected results from this subject

Expected results from this subject	Training and Learning Results
------------------------------------	-------------------------------

Experience in the exert of the profession of engineer/to technician/it in computing and of the his more usual functions in some real surroundings of company.

B1	C25	D8
B5	C26	D9
B8	C27	D10
B9	C30	D14
	C31	
	C34	
	C36	
	C37	

Contents

Topic

Stay in a company developing own functions of -
an Engineer Technician in Computer Science,
related with the professional profile chosen by
the student. It is supported by the form teacher
and personal of the company. -

Planning

	Class hours	Hours outside the classroom	Total hours
Practicum, External practices and clinical practices	300	0	300

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Practicum, External practices and clinical practices	- The procedure of the realization of the external practices governs pole Regulation of Academic Practices of the Students of the University of Vigo and of the Upper School of Engineering Computing. - The student will realize a stay in a company developing own functions of the qualifications and of the professional profile and chosen.

Personalized assistance

Methodologies	Description
Practicum, External practices and clinical practices	The student will have a continuous tracking and an attention customized by the tutors. The tutors will be realized, preferably, by telematic means: email or the teacher's office in the remote campus of the university.

Assessment

	Description	Qualification	Training and Learning Results
Practicum, External practices and clinical practices	- The student must submit an explanatory report of the activities carried out during the practices, specifying their duration, units or departments of the company in which they were carried out, training received (courses, computer programs, etc.), the level of integration within the company and relations with staff. - The report must also include a conclusions section, which will contain a reflection on the adequacy of the teachings received during the degree course for the performance of the practice (most significant positive and negative aspects related to the development of the practices). In addition, the inclusion of information on the professional and personal experience obtained with the practices (personal assessment of the learning achieved throughout the practices, and own suggestions or contributions on the structure and operation of the company visited) will be valued. - The tutor of the company will deliver a report evaluating aspects related to the practices carried out by the student: punctuality, attendance, responsibility, teamwork ability and integration in the company, quality of the work carried out, etc. Learning outcome: RA1	100	B1 C25 D8 B5 C26 D9 B8 C27 D10 B9 C30 D14 C31 C34 C36 C37

Other comments on the Evaluation

- The student must submit an explanatory report of the activities carried out during the practices, specifying their duration, units or departments of the company in which they were carried out, training received (courses, computer programs, etc.), the level of integration within the company and relations with staff.

- The report must also include a conclusions section, which will contain a reflection on the adequacy of the teachings received during the degree course for the performance of the practice (most significant positive and negative aspects related to the development of the practices). In addition, the inclusion of information on the professional and personal experience obtained with the practices (personal assessment of the learning achieved throughout the practices, and own suggestions or contributions on the structure and operation of the company visited) will be valued.
- The tutor of the company will deliver a report evaluating aspects related to the practices carried out by the student: punctuality, attendance, responsibility, teamwork ability and integration in the company, quality of the work carried out, etc.

Learning outcome: RA1

Sources of information**Basic Bibliography****Complementary Bibliography**

Recommendations

Other comments

In order to enrol in external placements, you must have passed 150 ECTS credits of the degree.

IDENTIFYING DATA				
Final Year Dissertation				
Subject	Final Year Dissertation			
Code	006G151V01991			
Study programme	Grado en Ingeniería Informática			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	12	Mandatory	4th	2nd
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Laza Fidalgo, Rosalia			
Lecturers				
E-mail				
Web	http://http://www.esei.uvigo.es/			
General description	The work of end of degree is a personal work that each student will realize of autonomous way under mentoring teaching, and owes to allowed show of form integrated the acquisition of the contained formative and the competitions associated to the title. The English uses in general to level of the documentation employee put students stop the development of the work			

Training and Learning Results	
Code	
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.
B3	Ability to design, develop, assess and ensure accessibility, ergonomics, usability and safety of computing systems, services and applications, as well as the information managed by them.
B5	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.
B6	Ability to conceive and develop centralized or distributed computing systems and architectures, integrating hardware, software and networks, according to the knowledge and training acquired.
B7	Ability to learn, understand and apply the necessary legislation during professional practice as a Computer Science Engineer and to use the relevant binding specifications, regulations and norms.
B8	Knowledge of the essential subjects and technologies that will allow students to learn and develop new methods and technologies, as well as those that will endow them with versatility to adapt to new situations.
B9	Ability to solve problems by taking the initiative, making decisions and acting independently and creatively. Ability to communicate the knowledge contents, skills and abilities of the Computer Science Engineer profession.
B10	Ability to carry out measurements, calculus, assessments, valuations, expert's reports, studies, reports, task planning and other analogous computing jobs, according to the knowledge and training acquired.
B11	Ability to analyze and assess the social and environmental impact of technical solutions, being aware of the ethical and professional responsibilities involved in the professional practice of a Computer Science Engineer.
C12	Knowledge and application of basic algorithmic procedures of computer technologies to design solutions to problems, analyzing the appropriacy and complexity of the proposed algorithms.
C13	Knowledge, design and efficient use of the most appropriate data structures and types for the resolution of a problem.
C14	Ability to analyze, design, build and maintain applications in a robust, safe and efficient way, choosing the most appropriate paradigm and programming languages.
C22	Knowledge and application of the principles, methodologies and life cycles of software engineering.
C23	Ability to design and assess human-computer interfaces to guarantee accessibility and usability of computer systems, services and applications.
C26	Ability to assess clients' needs and determine the software requirements to satisfy these needs, reconciling conflicting goals through attempts to reach acceptable compromises within the limits imposed by costs, available times, existing developed systems and organizations themselves.
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.
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
D8	Ability to work in situations of lack of information and / or under pressure
D11	Critical thinking
D13	Entrepreneurial spirit and professional ambition

Expected results from this subject

Expected results from this subject	Training and Learning Results			
RA2: Manufacture by heart of projects in the that collect : antecedents, problematic or state of the art, objective, phases of the project, development of the project, conclusions and future lines.	A5	B1 B3 B7 B9 B11	C22 C23 C28	D4
RA3: Design of prototypes, programs of simulaci3n, etc, by specifications	A5	B1 B3 B5 B6 B7 B8 B9 B10	C12 C13 C14 C22 C23 C26 C30	D5 D6 D8 D11 D13 D14

Contents

Topic

Following the recommendations of the Council of ----- Universities stop the design of plans of study of Degree in Engineering Computing (resolution of 8/6/2009, BOE 4/8/2009): "Original exercise to realize individually and present and defend in front of a university court, consistent in a proyect in him field of wools tecnologies specific of wool in Computing Enginering of naturaleza professional in him that synthesize and integrate wools competitions purchased in wools teaching".

Planning

	Class hours	Hours outside the classroom	Total hours
Mentored work	24	0	24
Project based learning	0	275	275
Essay	1	0	1

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Mentored work	Titon with the teaching staff titon of the TFG.
Project based learning	Development of the work of end of degree of individual form. It corresponds to the autonomous work of the/of the student/it.

Personalized assistance**Methodologies Description**

Mentored work	Titon with the teaching staff titon of the TFG to resolve doubts, problems, or any another question that present.
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Assessment

Description	Qualification	Training and Learning Results
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Essay1. The Court will assign 100% of the grade of the TFG, according to the rubric approved in the regulations of TFG for the degree of Degree in Computer Engineering.	100	A5	B1	C12	D4
			B3	C13	D5
			B5	C14	D6
2. Plagiarism, understanding as such the presentation as own of a work carried out by another person, or as the copy of texts without citing its origin, will entail the responsibilities that could have incurred the students who plagiarize. The evaluation panel will be responsible for reporting on these activities in the manner established by the regulations of the University of Vigo and for interpreting and assessing the magnitude of plagiarism and its reflection in the final grade that may involve, if the Court so decides, the numerical rating of zero in matter.			B6	C22	D8
			B7	C23	D11
			B8	C26	
			B9	C28	
			B10	C30	
			B11		

Evaluated learning outcomes: RA1, RA2, RA3.

Other comments on the Evaluation

DATES OF PRESENTATION IN THE DIFFERENT CALLS END OF CAREER CALL

The defense period will take place from November 20-23, 2023.

CALL FOR THE FIRST PERIOD

The defense period will take place from February 22-29, 2024.

CALL SECOND PERIOD

The defense period will run from July 1-4, 2024.

CALL FOR SECOND OPPORTUNITY

The defense period will be held from September 9-12, 2024.

PERMANENT CALL

Defence period during the whole academic year, deadline 12 September 2024.

All submission dates listed in the evaluation system are those approved by the ESEI Center Board. In case of error in transcribing them, the valid one is the one officially approved and published in the calendar of presentation and defense of TFG of the ESEI.

Sources of information

Basic Bibliography

Complementary Bibliography

Recommendations

Other comments

In order to pass the final project, it is necessary to have passed all the other subjects of the degree.