



(*)Escola de Enxeñaría Industrial

Information

For additional information about the centre and its degrees visit the centre's website <https://eei.uvigo.es/>

Grado en Ingeniería en Tecnologías Industriales

Subjects

Year 4th

| Code | Name | Quadmester | Total Cr. |
|---------------|--|------------|-----------|
| V12G363V01701 | Electronic instrumentation | 1st | 6 |
| V12G363V01702 | Technical Office | 1st | 6 |
| V12G363V01703 | Environmental technology | 1st | 6 |
| V12G363V01704 | Thermal technology | 1st | 6 |
| V12G363V01705 | Electrical systems | 1st | 6 |
| V12G363V01801 | Control and industrial automation | 2nd | 6 |
| V12G363V01802 | Basics of business administration | 2nd | 6 |
| V12G363V01902 | Electrical components in vehicles | 2nd | 6 |
| V12G363V01903 | Technical english 1 | 2nd | 6 |
| V12G363V01904 | Technical english 2 | 2nd | 6 |
| V12G363V01905 | Methodology for the preparation, presentation and management of technical projects | 2nd | 6 |
| V12G363V01906 | Advanced programming for engineering | 2nd | 6 |
| V12G363V01907 | Safety and industrial hygiene | 2nd | 6 |
| V12G363V01908 | Laser technology | 2nd | 6 |
| V12G363V01981 | Internships: Internships in companies | 2nd | 6 |
| V12G363V01991 | Final Year Dissertation | 2nd | 12 |
| V12G363V01999 | Internships/elective | 2nd | 6 |

| IDENTIFYING DATA | | | | |
|--|--|---------------------|-------------------------------|-------------------|
| Electronic instrumentation | | | | |
| Subject | Electronic instrumentation | | | |
| Code | V12G363V01701 | | | |
| Study programme | Grado en Ingeniería en Tecnologías Industriales | | | |
| Descriptors | ECTS Credits 6 | Choose Mandatory | Year 4th | Quadmester 1st |
| Teaching language | English | | | |
| Department | | | | |
| Coordinator | Eguizábal Gándara, Luis Eduardo | | | |
| Lecturers | Eguizábal Gándara, Luis Eduardo | | | |
| E-mail | eguizaba@uvigo.es | | | |
| Web | http://moovi.uvigo.gal/ | | | |
| General description | A Instrumentación Electrónica é a parte da electrónica que se ocupa da medición de calquera tipo de magnitud física, da conversión da mesma a magnitudes eléctricas e do seu tratamiento para proporcionar a información adecuada a un sistema de control, a un operador humano ou ambos. A instrumentación ten dous grandes temas de trabalho: - O estudo dos sensores e dos seus circuitos de acondicionamento. - O estudo dos equipos de Instrumentación, que se empregan na industria para a medida de calquera tipo de variable física. | | | |
| Skills | | | | |
| Code | | | | |
| Learning outcomes | | | | |
| Expected results from this subject | | | Training and Learning Results | |
| Contents | | | | |
| Topic | | | | |
| Topic 1: Introduction to the Electronic Instrumentation | Electronic instrumentation in the context of the control of processes. Systems of measure and its characterization. Introduction to the industry 4.0. IIoT | | | |
| Topic 2: Sensors | Definition, classification and study of the characteristics of operation. Criteria of selection. | | | |
| Topic 3: Data Acquisition System (DAS or DAQ). Auxiliary circuits | Bridges of measure. Fixers of tension. Sources of current. Converters V/I and I/V. Linealización. | | | |
| Topic 4: DAQ. Amplification and filtered of signals | Amplifiers of instrumentation, programmable amplifiers, amplifier of isolation. Types of filters. Technicians of implementation of active filters. | | | |
| Topic 5: DAQ. Circuits of conversion and multiplexed | Conversion A/D and D/a, types and technical characteristics. Circuits of show and retention (S&H). Analog switches. Multiplexer analog. | | | |
| Topic 6: Implementation of data acquisition systems | Basic structures. Criteria of election in function of the parameters of the system. | | | |
| Topic 7: Introduction to the control of processes based in the use of microcontrollers | Introduction to the control of processes Introduction to the microcontrollers Introduction to the actuators: hydraulic, tyres and electronic (Electronics of Power) | | | |
| Topic 8: Teams of electronic instrumentation | Classification, technical characteristics and connection of teams of instrumentation. Criteria of selection. Buses of instrumentation. | | | |
| Topic 9. Introduction to the Electronics of Power | Structure of a system of Electronic Power. Devices of power. Types of converters of electrical energy. Methods of calculation of powers. | | | |
| Topic 10: Systems of identification for the traceability and improvement of processes | Bar codes. RFID. NFC. Applications. | | | |
| Laboratory practice 1. Circuits with operational amplifiers. | Study of basic settings with operational amplifiers, linear settings and no linear. | | | |
| Laboratory practice 2. Introduction to Virtual instrumentation. LabVIEW. | Introduction to Virtual Instrumentatio. Flow of data of LabVIEW. Frontal panel and diagrams of blocks. Description of the main types of data and structures of LabView programming. DAQ cards NI6008. | | | |
| Laboratory practice 3: Conversion voltage-current and current-voltage | Implementation of circuits of conversion with floating load based in operational amplifiers. | | | |

Laboratory practice 4: Data acquisition system for it will implement a system of acquisition of complete data for the measurement of temperature.

Final project

- Implementation of a circuit of conditioning for the measure of a physical variable and his back acquisition by means of DAQ card.
- Implementation of a control system for a physical variable measurement, based on a microcontroller.
- Implementation of systems of storage of the information. Relational databases. ERP...

Planning

| | Class hours | Hours outside the classroom | Total hours |
|--------------------------|-------------|-----------------------------|-------------|
| Lecturing | 28 | 30 | 58 |
| Laboratory practical | 12 | 6 | 18 |
| Problem solving | 8 | 13 | 21 |
| Mentored work | 6 | 30 | 36 |
| Essay questions exam | 3 | 10 | 13 |
| Objective questions exam | 1 | 3 | 4 |

*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 will develop in the schedules fixed by the direction of the centre. They consist in an exhibition, by part of the professor, of the contents of the matter. Also it will proceed to show examples and technical solutions that illustrate properly the problematic to treat. The student will be able to expose all the doubts and questions that consider timely, during the session. Theacher will try participation the most active possible of the student. |
| Laboratory practical | It will show to the student some practical settings or simulations on the matter treated that they put of self-evident the technical characteristics of the settings made, as well as the form to make measures in the same by means of sensors and the instrumentation of the laboratory. |
| Problem solving | The complementary activity of the magistrates sessions in which they formulate problems and/or exercises related to the subject. The student will have to develop suitable solutions to the problems and/or exercises proposed in the classroom and of other extracted of the bibliography. They will identify possible doubts that will resolve in the classroom or in personalized tutoring. |
| Mentored work | This time devotes to the realisation of works of laboratory in team, related with the conditioning of sensors, visualisation of the variable measured and storage of information. |

Personalized assistance

| Methodologies | Description |
|----------------------|---|
| Laboratory practical | The teacher will personally attend to the doubts and queries of the students, about the study of concepts theory, laboratory practice or projects. Students will have the opportunity to attend tutorials personalized or in groups in the teacher's office at the time established for that purpose at the start of the course and that will be published on the course page |
| Mentored work | In the laboratory practical classes and in tutorials, each of the doubts that arise in the completion of the work will be solved in a personalized way. |

Assessment

| | Description | Qualification | Training and Learning Results |
|--------------------------|--|---------------|-------------------------------|
| Laboratory practical | The students will make the designs and planned settings in the billed of the practice and will deliver a memory with the results of the same. | 10 | |
| Mentored work | Once made the supervised work, the students will owe to elaborate a descriptive memory. It will fix a day for the delivery of the memory and the presentation of the work made, to the professor. This note will form part of the continuous evaluation. | 30 | |
| Essay questions exam | In the dates indicated by the calendar of examinations of the centre, will make the final proofs that will consist in questions of theory and problems of development. | 40 | |
| Objective questions exam | In the dates indicated by school and through continuous evaluation, will make the evaluation of short questions of test. | 20 | |

Other comments on the Evaluation

The long answer tests and multiple choice tests will be carried out on the dates set by the center and will represent 60% of the final grade. The remaining 40% will correspond to the grade obtained throughout the course, through continuous evaluation, of the laboratory practices and the supervised work. In each of these evaluations a minimum grade of 30% will be required

Students who are recognized by the management of the center for their resignation from continuous assessment, must attend the final test. This will represent 60% of the grade, the remaining 40% will be obtained through a practical exam and the completion of a work. In this case, the practical exam and the work will be compulsory, and in these tests a minimum grade of 50% must be obtained.

In the second call, the same procedure will be followed.

The practice note will only be saved for one academic year.

Ethical commitment:

The student is expected to exhibit appropriate ethical behavior. In the case of detecting unethical behavior (copying, plagiarism, use of unauthorized electronic devices, and others) it will be considered that the student does not meet the necessary requirements to pass the subject. In this case, the overall grade in the current academic year will be a failure (0.0).

The use of any electronic device will not be allowed during the evaluation tests unless expressly authorized. The fact of introducing an unauthorized electronic device in the exam room will be considered a reason for not passing this subject in this academic year and the overall grade will be failed (0.0).

THE ACQUISITION OF SKILLS AND ITS INFLUENCE ON THE EVALUATION

In this subject there is no competency assessment approach. Next, it is specified how the different teaching activities exercise the student in the different competencies and how their acquisition conditions the final grade obtained by the student.

CG3. Knowledge of basic and technological subjects, which enables them to learn new methods and theories and gives them the versatility to adapt to new situations.

The acquisition of this competence is guaranteed (in the scope of the subject) by its own contents. The self-assessment activities, the practicals and the different assessment tests deal with these content of a technological nature.

CT2. Problem resolution.

Students exercise in this competence through the proposed activities: problem sets and theoretical resolution of the assemblies proposed in the practice statements. The acquisition of competence in the field of the subject is justified by the fact that the assessment tests (thematic blocks and individual tests) consist almost entirely of problem solving.

This competence is achieved and evaluated in the proposed laboratory work. These are carried out in groups of two and at the end of them, each group must submit a written report of the activities carried out. The students who prepare the best works must make an oral presentation.

CT9. Apply knowledge.

The students exercise this competence, especially in the laboratory sessions, where they have to transfer to the simulations and to the assembly and real measurements what was studied in the theoretical sessions. The laboratory sessions are evaluated one by one, averaging the final grade as long as there is minimal attendance and use.

CT17 Teamwork.

The students exercise this competence in the laboratory sessions, since these sessions are carried out in teams of two. Collaboration between both students is necessary to successfully carry out the setups, measurements and data collection required in each experiment. The practice teacher verifies that the prior preparation and development of each of the sessions is the result of the collaboration of the two members of each group. In case of detecting anomalies in this sense, the qualifications of each member of the group are penalized and individualized.

Sources of information

Basic Bibliography

M. A. Pérez García, J. C. Álvarez Antón, J. C. Campo Rodríguez, F. J. Ferrero Martín y G. J. Grillo, **Instrumentación Electrónica**, Thomson, 2003

Franco, Sergio, **Design with amplifiers operational analog integrated circuits**, 3^a edición, Mc Graw-Hill, 2013

Essick, John, **Hands-on introduction to LabVIEW for scientists and engineers**, 1, Oxford University Press, 2011

Pérez García, M., **Instrumentación Electrónica: 230 problemas resueltos.**, 1^a, Garceta, 2012

Complementary Bibliography

Enrique Mandado Pérez, Jorge Marcos Acevedo, Celso Fernández Silva y José I. Armesto Quiroga, **Autómatas programables y sistemas de automatización**, Marcombo, 2009

Ramón Pallás Areny, **Analog Signal Processing**, John G. Webster, 2011

Recommendations

Subjects that continue the syllabus

Control and industrial automation/V12G360V01801

Subjects that it is recommended to have taken before

Automation and control fundamentals/V12G360V01304

Basics of circuit analysis and electrical machines/V12G360V01302

Electronic technology/V12G360V01401

IDENTIFYING DATA**Technical Office**

Subject Technical Office

Code V12G363V01702

Study programme Grado en Ingeniería en Tecnologías Industriales

| | | | | |
|-------------|--------------|-----------|------|------------|
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Mandatory | 4th | 1st |

Teaching language English

Department

Coordinator Cerqueiro Pequeño, Jorge

Lecturers Casal Guisande, Manuel
Cerqueiro Pequeño, Jorge

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General description The aim pursued with this course is to guide the student in the acquisition of the knowledge and the skills needed to qualify him for the handling and application of the methodologies, techniques and tools oriented to the elaboration, organisation and management of projects and another technical documentation regularly used in Engineering Offices, in ways that prepare the student to make use of these skills to carry out similar activities in his future professional activity in the real world.

In order to achieve that goal, the course uses a broad approach of the subjects in its contents, looking for the integration of the knowledge achieved along the student's previous courses and its application through the methodology, organisation and management of several different modalities of technical works, as they constitute the true essence of the Engineer profession in the framework of his professional competences and fields of activity.

This course promotes the development of its associated skills by means of using active and technical collaborative methodologies. In this way, the contents explained in theoretical classes are implemented and developed in the practical activities -oriented to the industrial reality of the profession-, thus assimilating the agile and precise use of the different rules of application and of the professional best practices established, while being supported by the new technologies to document, elaborate, manage and present the technical documentation that correspond to each particular case.

Skills

Code

B1 CG1 Ability to design, develop, implement, manage and improve products and processes in various industrial fields, through analytical, computational and experimental appropriate techniques.

B2 CG2 Ability to lead activities related to CG1 competence.

C18 CE18 Knowledge and skills to organize and manage projects. Know the organizational structure and functions of a project office.

D1 CT1 Analysis and synthesis.

D2 CT2 Problem solving.

D3 CT3 Oral and written proficiency in the own language.

D5 CT5 Information Management.

D6 CT6 Application of computer science in the field of study.

D7 CT7 Ability to organize and plan.

D8 CT8 Decision making.

D9 CT9 Application of knowledge.

D10 CT10 Self learning and work.

D14 CT14 Creativity.

D15 CT15 Objectification, identification and organization.

D16 CT16 Critical thinking.

D17 CT17 Working as a team.

D20 CT20 Ability to communicate with people not expert in the field.

Learning outcomes

Expected results from this subject

Training and Learning Results

Skills for using information and communication systems in the industrial field.

| | |
|-----|-----|
| C18 | D3 |
| | D5 |
| | D6 |
| | D9 |
| | D10 |
| | D17 |

| | | | |
|--|----------|---|--|
| Handling design methods, techniques and tools, and project organisation and management. | B1 B2 | C18 D2 D5 D6 D7 D8 D10 D15 D17 D20 | D1 |
| Skills for the elaboration of project documents and other similar technical documents. | B1 B2 | D1 D3 D5 D6 D7 D9 D14 D15 D17 | D1 |
| Skills for the technical management and supervision of projects in the Industrial Engineering field. | B2 | C18 | D1 D2 D3 D5 D6 D7 D8 D9 D14 D16 D17 D20 |
| Skills for appropriately communicating documents, procedures, and results in the Industrial Engineering field. | | | D3 D5 D6 D7 D14 D17 D20 |

Contents

Topic

| | |
|--|---|
| 1. Introduction and presentation of the course. | 1.1. Presentation. 1.2. Learning guide for the course. 1.3. Criteria and norms for the development of the course. 1.4. Relevant professional and legal aspects. |
| 2. The Engineering Office. | 2.1. Introduction to the Industrial Engineering Office. 2.2. Works of the Engineering Office. 2.3. Infrastructure of an Engineering Office. 2.4. Organisation and management of an Engineering Office. 2.5. Introduction to decision-making tools applied to the Project context. |
| 3. Technical reports and similar works. | 3.1. Technical reports. 3.2. Assessments, valuations and budgets. 3.3. Other similar technical works. 3.4. Criteria and norms for the elaboration and presentation of technical works. |
| 4. The Project Methodology. | 4.1. Introduction. 4.2. Theories about the Project. 4.3. Methodology of the Project process. 4.4. The phases of an industrial project. |
| 5. The normative and legal frame of the Project. | 5.1. The legal regulations and the Project. 5.2. Specific applicable technical norms. 5.3. Standardization, certification, homologation and quality aspects. 5.4. Industrial property: patent rights and transfer of technology. |
| 6. Documents in Industrial Projects. | 6.1. Report. 6.2. Plans. 6.3. Specifications. 6.4. Measurements and Budget. 6.5. Specific studies. |

| | |
|---|---|
| 7. Methods and techniques for the organisation and management of Projects. | 7.1. Organisation, supervision and coordination of Projects. 7.2. Methods and techniques for the management of Projects. 7.3. Techniques for the optimisation of Projects. 7.4. Tools for the computer-assisted management of Projects. |
| 8. Processing of Projects and of another technical documentation. | 8.1. Criteria and norms for the processing of Projects. 8.2. Process for the certification of Projects and other technical documents. 8.3. Management of licences, permissions and authorisations before public and private institutions. 8.4. Bidding and contracting of Projects. |
| 9. Engineering Supervision of industrial projects. | 9.1. Professionals that take part in the execution of projects. 9.2. Functions and activities of the Engineering or Work Supervision Office. 9.3. Legal frame that regulates the functions and responsibilities of the Engineering Supervision Office. 9.4. Obligations of the Engineering Supervision Office in matters of health and Security at work. |
| 10. Presentation and Oral Defence of Technical Documents. | 10.1. Oral presentations. 10.2. Preparation of presentations using electronic means. 10.3. Development of presentations through videoconference means. |
| Assignment 1. Elaboration of a technical report or similar work. | The students, either individually or in teams, will elaborate a technical report -or similar work- on a subject related with the industrial engineering field, starting from the information provided by the lecturer, and taking into account the indications received about the methodology to be used. |
| Assignment 2. Elaboration of a small project. | Organised the students in groups of three or four members, they will elaborate the necessary project documents to propose an efficient solution to a problem or need belonging to the Industrial Engineering field, following formal rigour and technician criteria. |
| Assignment 3. Development of a basic planning and scheduling proposal for the execution of an industrial project. | Each student on his own will elaborate a proposal for the time and resources planning and programming for the process of execution of an industrial project, using the appropriate methods and computer tools, and elaborating the required statistics report for the project. |
| Assignment 4. Public presentation of the developed work. | Final group presentation by each of the work teams on the results of all -or part of- the practical works developed in the course, addressed to the whole of the course student group. |

Planning

| | Class hours | Hours outside the classroom | Total hours |
|---|-------------|-----------------------------|-------------|
| Lecturing | 26 | 40 | 66 |
| Project based learning | 24 | 42 | 66 |
| Design Thinking | 0 | 6 | 6 |
| Mentored work | 0 | 6 | 6 |
| Problem and/or exercise solving | 4 | 0 | 4 |
| Report of practices, practicum and external practices | 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 | The theoretical contents will be presented by the lecturer, complemented with the active intervention of the students, and in total coordination with the development of the practical activities programmed. |
| Project based learning | Realisation of an interdisciplinary project resembling a real case with the students arranged in groups, requesting active participation of all members, and with the guidance of the lecturer. |
| Design Thinking | Development of design activities, by the student teams, of products related with the topics of the industrial engineering discipline, making use of the "Design Thinking" methodology. This encompasses an incremental approximation to the final product concept, by extensively empathizing with the customer and their needs, and going through a number of intermediate mock-ups and models. |
| Mentored work | Elaboration under the supervision of the lecturer, either individually or in teams, of activities related with the contents of the course, starting from the provided initial information and following the procedures and methodologies recommended. |

Personalized assistance

| Methodologies | Description |
|------------------------|---|
| Project based learning | Realisation of an interdisciplinary project resembling a real case with the students arranged in groups, requesting active participation of all members, and with the guidance of the lecturer. |

| | |
|-----------------|--|
| Design Thinking | Development of design activities, by the student teams, of products related with the topics of the industrial engineering discipline, making use of the "Design Thinking" methodology. This encompasses an incremental approximation to the final product concept, by extensively empathizing with the customer and their needs, and going through a number of intermediate mock-ups and models. |
| Mentored work | Elaboration under the supervision of the lecturer, either individually or in teams, of activities related with the contents of the course, starting from the provided initial information and following the procedures and methodologies recommended. |

Assessment

| | Description | Qualification | Training and Learning Results |
|---|--|---------------|---|
| Problem and/or exercise solving | A series of partial assessment tests will be carried out along the course, aiming to evaluate the knowledge acquired by the students on the main concepts explained in the theory classes. The length of the test will depend on the topics to be assessed with it. | 35 | B1 C18 D1 D5 D6 D8 D14 D15 D16 |
| Report of practices, practicum and external practices | A collection of written reports on the practical activities carried out will be elaborated by the students/student teams and delivered to the lecturer according to the established schedule. The commitment and implication of the students with the theory classes and the laboratory activities programmed will also be taken into account, as well as the meeting of the submission deadlines and the technical and format quality of the written works and the presentations. | 65 | B1 C18 D1 B2 D2 D3 D5 D6 D7 D8 D9 D10 D14 D15 D17 D20 |

Other comments on the Evaluation

Assessment of student's work -individually and/or in groups, either face-to-face or non-presentational- will be carried out by the lecturer by weighting appropriately the different grades obtained in the activities that were proposed along this course.

Students may opt to follow this course either in the 'Continuous Evaluation' or in the 'Non-Continuous Evaluation' modalities, this last only after obtaining the appropriate clearance from the EEI's Direction. In both cases the grading of the course will be made according to a numerical system, using values from 0.0 to 10.0 points according to the current laws that are applicable (R.D. 1125/2003 of 5th September, BOE Nr. 224 of 18th September). A minimum overall mark of 5.0 is required to pass this course.

For the First Announcement or Edition.

a) 'Continuous Evaluation' modality:

The final grade for the course will be calculated by combining the individual marks awarded in the assessment of the works proposed and elaborated in the practical classes (65% weight) along the course, with the mark awarded for the final test performed in the date stated by the School's Ruling (35% weight).

Those marks will assess the behaviour and the implication of the student both in class and in the realisation of the different programmed activities, plus the fulfillment of the deadlines for submitting the works that were proposed, and/or the presentation and defence of those works, etc.

Students not reaching the minimum value of 5.0 points out of 10.0 that are required for every section, they will either need to perform also the assessment in the Second Announcement date, or to elaborate additional works or practical exercises to achieve the learning goals that were established for the concerned sections.

b) 'Non-Continuous Evaluation' modality:

There is a two-week time period after the starting date of the course for the concerned students to justify with documents that it is not possible for them to follow the regular process of continuous evaluation.

In order to pass this course, students renouncing to continuous evaluation will be obliged to perform a final test covering

the whole contents of the course, both theoretical and practical, including short questions, reasoning questions, problem solving and development of practical cases. The mark awarded to the student assessment will be the final grade for the course.

A minimum mark of 5.0 points out of 10.0 possible will be required to pass the course.

For the Second Announcement or Edition.

Students who did not pass the course in the First Announcement, but that could have passed some specific parts of the theory or practical blocks, will be allowed to be assessed only regarding the failed parts, keeping the marks formerly awarded for the parts already passed, and applying the same assessment criteria to them.

Students wishing to improve their qualification, or students that failed the course on the First Announcement, will need to assist to the Second Announcement, where they will be assessed about the whole contents of the course, both theoretical and practical, including short questions, reasoning questions, problem solving and development of practical cases. Students are required to reach a minimum mark of 5.0 points out of 10.0 possible to pass the course.

Ethical commitment:

It is expected an appropriate ethical behaviour of the student. In case of detecting unethical behaviour (copying, plagiarism, unauthorized use of electronic devices, etc.) shall be deemed that the student does not meet the requirements for passing the subject. In this case, the overall grade for the course in the current academic year will be a Fail (0.0).

Sources of information

Basic Bibliography

Alam, M. Daud; Gühl, Uwe F., **PROJECT-MANAGEMENT IN PRACTICE: A GUIDELINE AND TOOLBOX FOR SUCCESSFUL PROJECTS**, 1st, Springer, 2016

Brusola Simón, Fernando, **OFICINA TÉCNICA Y PROYECTOS**, 1st, Servicio Publicaciones Universidad Pol. Valencia, 2011

Gómez-Senent Martínez, Eliseo; González Cruz, Mª Carmen, **TEORÍA Y METODOLOGÍA DEL PROYECTO**, 1^a, Servicio Publicaciones Universidad Pol. Valencia, 2008

Kerzner, Harold, **PROJECT MANAGEMENT: CASE STUDIES**, 4th, John Wiley and Sons, 2013

Project Management Institute, **A GUIDE TO THE PROJECT MANAGEMENT BODY OF KNOWLEDGE (PMBOK® GUIDE)**, 6th, Project Management Institute, 2017

Serer Figueroa, Marcos, **GESTIÓN INTEGRADA DE PROYECTOS**, 3^a, Ediciones UPC, 2010

Complementary Bibliography

De Cos Castillo, Manuel, **TEORIA GENERAL DEL PROYECTO I: GESTIÓN DE PROYECTOS**, 4^a, Síntesis, 2007

De Cos Castillo, Manuel, **TEORIA GENERAL DEL PROYECTO II: INGENIERIA DE PROYECTOS**, 4^a, Síntesis, 2007

Díaz Martín, Ángel, **EL ARTE DE DIRIGIR PROYECTOS**, 3^a, RA-MA, D.L., 2010

Kerzner, Harold, **PROJECT MANAGEMENT 2.0: LEVERAGING TOOLS, DISTRIBUTED COLLABORATION, AND METRICS FOR PROJECT SUCCESS**, 1st, John Wiley and Sons, 2015

Kerzner, Harold, **PROJECT MANAGEMENT: A SYSTEMS APPROACH TO PLANNING, SCHEDULING, AND CONTROLLING**, 11th, John Wiley and Sons, 2013

Kuster, Jürg et al., **PROJECT MANAGEMENT HANDBOOK**, 1st, Springer, 2015

Lock, Dennis, **PROJECT MANAGEMENT**, 10th, Routledge, 2013

Martínez de Pisón Ascasíbar, Francisco Javier et al., **LA OFICINA TÉCNICA Y LOS PROYECTOS INDUSTRIALES**, 1^a, Asociación Española de Ingeniería de Proyectos, 2002

Santos Sabrás, Fernando, **INGENIERÍA DE PROYECTOS**, 2^a, Eunsa, 2002

Recommendations

Subjects that continue the syllabus

Final Year Dissertation/V12G380V01991

Subjects that it is recommended to have taken before

Graphic expression: Graphic expression/V12G380V01101

Other comments

To register for this course, the students are required to have passed, or at least are registered in, all the courses from previous years to the one this course is placed on. It is necessary to stress the importance of having passed the two courses indicated in the previous section before taking this course.

Previously to the realisation of the scheduled assessments, students should check in the MooVi platform to know whether it is necessary for them to carry any particular documentation, materials, etc. into the exam room to perform the tests.

In case there are any discrepancies, the version in English of this guide will prevail.

IDENTIFYING DATA**Environmental technology**

| | | | | |
|---------------------|--|-----------|------|------------|
| Subject | Environmental technology | | | |
| Code | V12G363V01703 | | | |
| Study programme | Grado en Ingeniería en Tecnologías Industriales | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Mandatory | 4th | 1st |
| Teaching language | #EnglishFriendly English | | | |
| Department | | | | |
| Coordinator | Álvarez da Costa, Estrella Cameselle Fernández, Claudio | | | |
| Lecturers | Álvarez da Costa, Estrella Cameselle Fernández, Claudio | | | |
| E-mail | ealvarez@uvigo.es claudio@uvigo.es | | | |
| Web | http://moovi.uvigo.gal/ | | | |
| General description | Subject that belongs to the Block of Common Subjects of the Industrial Technologies. It is part of the curricula of all Degrees of Industrial Engineering. | | | |

This subject provides an approach to Environmental Engineering, which is necessary to develop any engineering project. In it we work areas of Chemistry and Process Engineering, in order to study the pollutants behaviour and their effect on the environment and organisms, to design physical-chemical processes to mitigate pollution, as well as to evaluate the environmental impact of the industrial wastes.

The subject's objective is to know, understand, and know how to apply the techniques used, on an industrial scale, in fields such as solid wastes treatment and management, wastewater treatment, soil remediation, treatment of polluting gas industrial emissions, and pollution prevention.

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.

Skills

Code

B7 CG7 Ability to analyze and assess the social and environmental impact of the technical solutions.

C16 CE16 Basic knowledge and application of environmental technologies and sustainability.

D1 CT1 Analysis and synthesis.

D2 CT2 Problem solving.

D3 CT3 Oral and written proficiency in the own language.

D9 CT9 Application of knowledge.

D10 CT10 Self learning and work.

D12 CT12 Research skills.

D17 CT17 Working as a team.

D19 CT19 Personal relationships.

Learning outcomes

Expected results from this subject

Training and Learning Results

| | | |
|--|-----|-----|
| Basic knowledge and application of environmental technologies and sustainability | C16 | D2 |
| | | D3 |
| | | D10 |
| | | D19 |
| Problem solving | C16 | D2 |
| | | D3 |
| | | D10 |
| | | D19 |

| | | |
|---|-----|--|
| Oral and writing communication | C16 | D2 D3 D10 |
| Knowledge application to practical and real cases | C16 | D2 D3 D10 D19 |
| Analysis and synthesis | C16 | D1 D2 D3 D9 D10 D12 D17 D19 |
| Ability to analyze and determine the social and environmental impact of the technical solutions to environmental problems | B7 | D1 D3 D9 D10 D17 D19 |

Contents

Topic

| | |
|---|--|
| Lesson 1: Introduction to the environmental technology. | 1. Material cycle economy. 2. Introduction to the best available techniques (BAT). |
| Lesson 2: Management of waste and effluents. | 1. Municipal waste management. 2. Industrial waste management. Industrial waste treatment facilities. 3. Regulations. |
| Lesson 3: Treatment of urban and industrial wastes. | 1. Valorization. 2. Physico-chemical treatment. 3. Biological treatment. 4. Thermal treatment. 5. Landfilling. 6. Soil remediation technologies |
| Lesson 4: Treatment of industrial and municipal wastewaters. | 1. Characteristics of municipal and industrial wastewaters. 2. Wastewater treatment plant. 3. Sludge treatment. 4. Water treatment and reuse 5. Regulations |
| Lesson 5: Air pollution. | 1. Types and origin of air pollutants. 2. Dispersion of pollutants in the atmosphere. 3. Effects of the air pollution. 4. Treatment of polluting gas emissions. 5. Regulations |
| Lesson 6: Sustainability and environmental impact assessment | 1. Sustainable development 2. Life cycle analysis and economy. 3. Ecological footprint and carbon footprint. 4. Introduction to the environmental impact assessment |
| Practice 1: Codification of wastes | |
| Practice 2: Preparation of immobilized activated carbon to be used as an adsorbent. | |
| Practice 3: Contaminants removal by adsorption with immobilized activated carbon. | |
| Practice 4: Coagulation-flocculation: definition of optimal operating conditions. | |
| Practice 5: Simulation of the activated sludge process in a WWTP. | |
| Practice 6: Life cycle analysis of a product. | |

Planning

| | Class hours | Hours outside the classroom | Total hours |
|--------------------------|-------------|-----------------------------|-------------|
| Lecturing | 26 | 52 | 78 |
| Problem solving | 11 | 22 | 33 |
| Laboratory practical | 12 | 12 | 24 |
| Objective questions exam | 1 | 0 | 1 |

| | | | |
|---|---|---|---|
| Problem and/or exercise solving | 2 | 0 | 2 |
| Report of practices, practicum and external practices | 0 | 6 | 6 |
| Case studies | 0 | 6 | 6 |

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

Methodologies

| | Description |
|----------------------|--|
| Lecturing | Teaching in the classroom of the key concepts and procedures for learning the syllabus contents. |
| Problem solving | Solving exercises with the teacher's help and independently. |
| Laboratory practical | Application of the knowledge acquired to the resolution of problems of environmental technology, using equipment and facilities available in the laboratory/computer room. |

Personalized assistance

| Methodologies | Description |
|----------------------|--|
| Laboratory practical | In tutorials, students can consult with their teacher any questions about laboratory practices or the report of practices to be done. The tutoring schedule of the teaching staff will be public and accessible to the students. |
| Lecturing | In tutorials, students can consult with their teacher any questions arising in the lectures and related to the contents seen in them. The schedule of tutorials of teachers will be public and accessible to students. |
| Problem solving | In tutorials, students can consult their teacher any questions about the resolution of problems raised in the classroom. The tutoring schedule of the teaching staff will be public and accessible to the students. |

Assessment

| | Description | Qualification | Training and Learning Results |
|---|--|---------------|--|
| Objective questions exam | "FINAL EXAM" consisting of theoretical questions related to the syllabus of the subject. CG7, CE16 and CT19 competences will be assessed in this exam, based on student responses to the questions. CT1, CT3 and CT10 competences are also evaluated, since the exam is written and requires students' analysis and synthesis skills. | 30 | B7 C16 D1 D3 D10 D19 |
| Problem and/or exercise solving | "FINAL EXAM" consisting of problems related to the syllabus of the subject. CT2, CT9 and CT19 competences will be assessed in this exam, based on the resolution of various exercises of environmental technology, which require the use of applied knowledge related to the contents of the subject. CT1, CT3 and CT10 competences are also evaluated, since the exam is written and requires students' analysis and synthesis skills. | 30 | D1 D2 D3 D9 D10 D19 |
| Report of practices, practicum and external practices | Detailed report for each practices that includes the results and their discussion. The competences: CG7, CE16, CT1, CT3, CT9 and CT10, are assessed based on the quality of the written report elaborated by each student on his/her own. The following points will be evaluated in the report: text style and correctness, structure and presentation, analysis and discussion of the results, and conclusions. Competences CT12 and CT17 will be assessed based on the laboratory work. Lab practices will be carried out in pairs, and it is expected the student develop research skills in the field of environmental technology. The written report must be done in pairs. | 10 | B7 C16 D1 D3 D9 D10 D12 D17 |

| | | | |
|--|--|----|-------------------------------|
| Case studies | All exercises, seminars, practical cases and theoretical / practical tests that are made and delivered to the teacher throughout the course, related to the concepts and contents of the syllabus. | 30 | B7 C16 D2 D3 D10 D12 |
| Throughout a four-month time several tests are performed. | | | |
| Competences CG7 and CE16 will be assessed considering the students' answers to the theoretical questions. | | | |
| Competences CT2, CT10 and CT12 will be assessed considering the students' answers to the exercises. | | | |
| Competencies CT3 will be assessed base on the two parts of the exam: theory and exercises; considering the precision and clarity of the answers. | | | |

Other comments on the Evaluation

Evaluation

A student who choose continuous assessment, to pass the course, must achieve a **MINIMUM SCORE of 4.0 points** (out of 10) **in each of the parts of the "FINAL EXAM"**, ie, theory (Objective questions exam) and problems (Problem and/or exercise solving). If a student reaches the minimum grade in both parts of the "FINAL EXAM", to pass the subject must obtain a **FINAL GRADE of ≥ 5.0** , that is, when the sum of grades of the "practice report", "Case study" and the "FINAL EXAM" (Exam of objective questions + Problem solving and/or exercises) is ≥ 5.0 .

Students who "*officially renounces continuous assessment*", will make a "FINAL EXAM" (Objective questions exam + Problem and/or exercise solving) that will be worth 90% of the final grade, and a "EXAM OF PRACTICES" that will be worth 10% of the final grade. In any case, to pass the course, the student must achieve 50% of the maximum score in each of the constituent parts of the subject, ie, theory, problems and practices.

Second call:

In the second call the same criteria apply.

In relation to the July exam, grades of the "Case studies" and "Practices report" are maintained, and students only have to repeat the "FINAL EXAM", ie, "Objective questions exam" + "Problem and/or exercise solving".

If, at the 1st call, a student suspended one of the parts of the "FINAL EXAM" (theory or problems) and approves the other party with a grade ≥ 6 , on the July exam, you only need to repeat the suspended part.

Ethical commitment:

The student is expected to present an adequate ethical behavior. If you detect unethical behavior (copying, plagiarism, unauthorized use of electronic devices, etc.) shall be deemed that the student does not meet the requirements for passing the subject. In this case the final grade, in the current academic year, will FAIL (0.0 points).

The use of electronic devices during the assessment tests will be allowed. The fact of introducing into the examination room an unauthorized electronic device, will be reason not pass the course in the current academic year, and the final grade will FAIL (0.0 points)

Sources of information

Basic Bibliography

Mihelcic, J.R. and Zimmerman, J. B., **Environmental Engineering: Fundamentals, sustainability, design**, Wiley, 2014

Davis, M.L. and Masten S.J., **Principles of Environmental Engineering and Science**, McGraw-Hill, 2014

Metcalf & Eddy, **Ingeniería de aguas residuales : tratamiento, vertido y reutilización**, McGraw-Hill, 1998

Acosta, J.A. et al., **Introducción a la contaminación de suelos**, Mundi-prensa, 2017

Complementary Bibliography

Tchobanoglous, G., **Gestión integral de residuos sólidos**, McGraw-Hill, 1996

Nemerow, N. L., **Tratamiento de vertidos industriales y peligrosos**, Diaz de Santos, 1998

Baird, C y Cann M., **Química Ambiental**, Reverté, 2014

Kiely, G., **Ingeniería Ambiental: fundamentos, entornos, tecnología y sistemas de gestión**, McGraw-Hill, 2001

Castells et al., **Reciclaje de residuos industriales: residuos sólidos urbanos y fangos de depuradora**, Díaz de Santos, 2009

Albergaria, J.M. and Nouws H.P.A., **Soil remediation**, Taylor and Francis, 2016

Sharma, H. D., and Reddy, K. R., **Geoenvironmental engineering: site remediation, waste containment, and emerging waste management technologies**, John Wiley & Sons, 2004

Wark and Warner, **Contaminación del aire: origen y control**, Limusa, 1996

Jonker, G. y Harmsen, J., **Ingeniería para la sostenibilidad**, Reverté, 2014

Azapagic, A. and Perdan S., **Sustainable development in practice: Case studies for engineers and scientists**, Wiley, 2011

Reddy, K.R., Cameselle, C. and Adams, J.A., **Sustainable Engineering: Drivers, Metrics, Tools, and Applications**, Wiley, 2019

Recommendations

Subjects that it is recommended to have taken before

Physics: Physics 1/V12G363V01102

Physics: Physics 2/V12G363V01202

Chemistry: Chemistry/V12G363V01205

Chemical technology/V12G363V01606

Other comments

Recommendations:

To enroll in this subject is necessary to have passed or be enrolled in all subjects of previous courses to the course that is located this subject.

IDENTIFYING DATA

Thermal technology

| | | | | |
|---------------------|---|-----------|------|------------|
| Subject | Thermal technology | | | |
| Code | V12G363V01704 | | | |
| Study programme | Grado en Ingeniería en Tecnologías Industriales | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Mandatory | 4th | 1st |
| Teaching language | English | | | |
| Department | | | | |
| Coordinator | Gómez Rodríguez, Miguel Ángel | | | |
| Lecturers | Gómez Rodríguez, Miguel Ángel | | | |
| E-mail | miguelgr@uvigo.es | | | |
| Web | | | | |
| General description | In this subject, it is expected that the student acquire the essential knowledges that allow them to understand the operation of the thermal machines and the processes that take place in their interior, as well as that know the main types of machines and installations and their components. This knowledge results basic for the analysis of the operation, design and construction of the thermal machines and of their thermal setups, and in general, the industrial applications of the thermal engineering. The subject is focused on energy efficiency as well as environmental and social aspects. These are applied to systems using thermal cycles: power cycles (gas and steam) and in refrigeration and heat pump cycles, as well as the use of different renewable fuels. | | | |

Skills

Code

| | |
|-----|--|
| B4 | CG4 Ability to solve problems through initiative, decision-making, creativity, critical reasoning, and to communicate and transmit knowledge, skills and abilities in the field of industrial engineering. |
| B5 | CG5 Knowledge to carry out measurements, calculations, assessments, appraisals, surveys, studies, reports, work plans and other similar works. |
| B6 | CG6 Capacity for handling specifications, regulations and mandatory standards. |
| B7 | CG7 Ability to analyze and assess the social and environmental impact of the technical solutions. |
| B11 | CG11 Knowledge, understanding and ability to apply the legislation relating to industrial installations. |
| C7 | CE7 Knowledge of applied thermodynamics and heat transfer. Basic principles and their application to solving engineering problems. |
| D2 | CT2 Problem solving. |
| D7 | CT7 Ability to organize and plan. |
| D9 | CT9 Application of knowledge. |
| D10 | CT10 Self learning and work. |
| D17 | CT17 Working as a team. |
| D20 | CT20 Ability to communicate with people not expert in the field. |

Learning outcomes

| Expected results from this subject | Training and Learning Results | | |
|---|-------------------------------|----|-----|
| Ability to know, understand, use and design energy systems by applying the principles and fundamentals of thermodynamics and thermostatic and fundamentals of thermodynamics and energy transmission. | B4 | C7 | D2 |
| | B5 | | D9 |
| Understanding the fundamentals of combustion | B4 | C7 | D2 |
| | B5 | | D7 |
| | B7 | | D9 |
| Understanding the fundamentals of heat engines | B4 | C7 | D2 |
| | B5 | | D7 |
| | B7 | | D9 |
| Understanding the fundamentals of a thermal power plant operation | B4 | C7 | D2 |
| | B5 | | D9 |
| | B6 | | D10 |
| | B11 | | D17 |
| | | | D20 |

Contents

Topic

| | |
|---------------------------------|---|
| INTRODUCTION | 1. Energy issues. Society and energy use 2. Energy production and consumption |
| HEAT EXCHANGERS | 1. Classification of the heat exchangers 2. Calculation of the main parameters 3. Dimensioning 4. Method of the mean logarithmic temperature 5. Method E-NTU |
| COMBUSTION | 1. Introduction 2. Types of combustion 3. Minimum or theoretical air 4. Excess combustion air 5. Combustion fumes 6. Incomplete combustion 7. Combustion diagrams 8. Combustion efficiency |
| HUMID AIR | 1. Introduction 2. Moisture indices 3. Enthalpy of moist air 4. Dew point 5. Adiabatic saturation temperature 6. Wet bulb temperature 7. Psychrometric: Moist air diagrams 8. Mixing of two or more humid airs 9. Mixing of an air mass with water, steam and/or heat 10. Air conditioning processes |
| THERMAL MACHINES | 1. Thermal machines. General 2. Rankine cycle 3. Rankine cycle with regeneration 4. Gas turbines 5. Burners 6. Boilers: definition and typology 7. Energy efficiency 8. Design of heat and water systems in buildings |
| POWER PLANTS TECHNOLOGY | 1. Steam thermal power plant technology 2. Combined cycle power plant technology 3. Nuclear power plant technology 4. Cogeneration |
| AIR-CONDITIONING INSTALLATIONS | 1. Introduction 2. Refrigeration cycle 3. Heat pump 4. Heat pump components 5. Operating characteristics 6. Design of air-conditioning systems 7. Energy efficiency |
| INTRODUCTION TO THERMAL ENGINES | 1. Classification of internal combustion engines 2. Operation of reciprocating internal combustion engines 3. Parts of reciprocating internal combustion engines 4. Nomenclature and basic parameters 5. Theoretical cycles 6. Real cycles |

| Planning | | | |
|---------------------------------|-------------|-----------------------------|-------------|
| | Class hours | Hours outside the classroom | Total hours |
| Lecturing | 20 | 21 | 41 |
| Laboratory practical | 4.5 | 0 | 4.5 |
| Problem solving | 8 | 14.5 | 22.5 |
| Practices through ICT | 2 | 0 | 2 |
| Studies excursion | 9 | 0 | 9 |
| Mentored work | 3 | 64 | 67 |
| Problem and/or exercise solving | 1 | 0 | 1 |
| Essay questions exam | 3 | 0 | 3 |

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

| Methodologies | |
|----------------------|-------------|
| | Description |
| | |

| | |
|-----------------------|---|
| Lecturing | Classical lectures on the blackboard supported by slides, videos and any other material that the lecturer considers useful to make the any material that the teacher considers useful to make the subject matter of the course understandable |
| Laboratory practical | Performance of applied laboratory practices. The activities will consist of disassembling thermal engines, measuring thermal engines, measurement of emissions... |
| Problem solving | Exercises solving and case studies necessary for the preparation of theory classes |
| Practices through ICT | Solving exercises with the support of computer programmes |
| Studies excursion | Visits to installations to learn about the industrial level equipment explained in the lectures |
| Mentored work | Individual and/or group supervised work. This activity includes the presentation presentation of this work to the group and its subsequent evaluation |

Personalized assistance

| Methodologies | Description |
|---------------------------------|---|
| Lecturing | Doubts statement during tutorial hours. The student will raise, during the time dedicated to the tutorials, the doubts concerning the contents developed in the subject, and/or exercises or problems that arise concerning the application of the contents. |
| Laboratory practical | Raising doubts during practice hours. The student will raise, during the time dedicated to the doubts related to the concepts and development of the aforementioned practical sessions |
| Problem solving | Raising doubts during tutorial hours. The student will raise, during the time dedicated to tutorials, the doubts concerning the contents that are developed in the subject, and/or exercises or problems that arise relating to the application of the contents |
| Mentored work | The student will raise doubts during tutorials or in the classes dedicated to the preparation of the work regarding its preparation and the preparation and development of the work |
| Tests | Description |
| Problem and/or exercise solving | |
| Essay questions exam | |

Assessment

| | Description | Qualification | Training and Learning Results | | |
|---------------------------------|--|---------------|-------------------------------|----|-----|
| Mentored work | Delivery of the reports of the work carried out and oral presentation of the same. Resolution of problems raised during the course. | 10 | B4 | C7 | D2 |
| | | | B5 | | D7 |
| | | | B6 | | D9 |
| | | | B7 | | D10 |
| | | | B11 | | D17 |
| | | | | | D20 |
| Problem and/or exercise solving | Partial exams taken along the course during class hours. | 20 | B4 | C7 | D2 |
| | | | B5 | | D7 |
| | | | B6 | | D9 |
| | | | B7 | | D10 |
| | | | B11 | | D17 |
| | | | | | D20 |
| Essay questions exam | Final exam that will collect all the contents taught during the course. The exam will consist of problem solving and questions where both theoretical and practical content will be evaluated. | 70 | B4 | C7 | D2 |
| | | | B5 | | D7 |
| | | | B6 | | D9 |
| | | | B7 | | D10 |
| | | | B11 | | D17 |
| | | | | | D20 |

Other comments on the Evaluation

Ethical commitment: The learner is expected to display appropriate ethical behaviour. If unethical behaviour (copying, plagiarism, unauthorised unethical behaviour (copying, plagiarism, unauthorised use of electronic devices, etc.), the student is considered to be ineligible to pass the course. student does not meet the necessary requirements to pass the subject. In this case the overall grade for the current academic year will be a fail (0.0). academic year will be a fail (0.0). The use of any electronic device will not be allowed during the assessment tests unless expressly.

evaluation tests unless expressly authorised. Bringing an unauthorised electronic device into the exam room will be considered as a reason for failing the exam. will be considered as a reason for not passing the subject in the current academic year and the overall grade will be a fail (0.0).

Sources of information

Basic Bibliography

Çengel Yunus A., Boles Michael A, **Thermodynamics: an engineering approach**, 7th ed, McGraw-Hil, 2011

Çengel, Yunus A., **Heat and mass transfer: a practical approach**, 4th ed, McGraw-Hill, 2011

Moran M.J.; Shapiro H.N., **Fundamentals of thermodynamics**, 8th ed. Wiley,

Incropera, F.P. et al, **Principles of heat and mass transfer**, 7th ed., international student version, Hoboken, N.J. : John Wiley,,

Complementary Bibliography

Heywood, J.B., **Internal combustion engines fundamentals**, McGraw-Hill,

Recommendations

Subjects that it is recommended to have taken before

Physics: Physics 1/V12G360V01102

Physics: Physics 2/V12G360V01202

Mathematics: Calculus 1/V12G360V01104

Mathematics: Calculus 2 and differential equations/V12G360V01204

Thermodynamics and heat transfer/V12G360V01405

IDENTIFYING DATA

Electrical systems

| | | | | |
|---------------------|--|-----------|------|------------|
| Subject | Electrical systems | | | |
| Code | V12G363V01705 | | | |
| Study programme | Grado en Ingeniería en Tecnologías Industriales | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Mandatory | 4th | 1st |
| Teaching language | | | | |
| Department | | | | |
| Coordinator | Villanueva Torres, Daniel | | | |
| Lecturers | Villanueva Torres, Daniel | | | |
| E-mail | dvillanueva@uvigo.es | | | |
| Web | http://moovi.uvigo.gal/ | | | |
| General description | (*)Analizar, deseñar e simula-lo funcionamento dos sistemas eléctricos. Coñecer e interpreta la normativa utilizada pra calcular instalaciones eléctricas industriaes. | | | |

Skills

Code

| | |
|-----|---|
| B3 | CG3 Knowledge of basic and technological subjects that enable students to learn new methods and theories, and to adapt to new situations. |
| C21 | CE21 Knowledge of electric systems of power and their applications |
| D2 | CT2 Problem solving. |
| D6 | CT6 Application of computer science in the field of study. |
| D10 | CT10 Self learning and work. |
| D14 | CT14 Creativity. |
| D16 | CT16 Critical thinking. |
| D17 | CT17 Working as a team. |

Learning outcomes

Expected results from this subject

Training and Learning Results

| | |
|---|--------------------------------------|
| New | B3 D6 D10 D14 D16 D17 |
| (*)Documentación, elaboración, presentación y defensa del proyecto de una instalación | C21 D2 D6 D10 D17 |

Contents

Topic

| | |
|---|---|
| Systems of Electrical Energy | Introduction to the systems of electrical energy. The electrical sector Spanish. Operation of the electrical system Spanish: balance between production and consumption. Centres of Control of Electrical Network of Spain. Maps of network. Zones of distribution in Spain and small distributors. Quality of the Electrical Service. Indexes of quality of the Service. |
| Networks of Distribution in Low Tension | Elements of the aerial networks of *BT. Execution of the networks on façade and on supports. Subterranean networks of *BT. Put to earth and continuity of the neutral. Criteria of dimensioning of the wires of *BT. Tackled: general box of protection and line *repartidora. Forecast of loads and factors of simultaneity. |

| | |
|---|--|
| Elements of the Systems of Electrical Energy. | Introduction to the general description of the systems. *Aparamenta Electrical. Parameters of the electrical lines: resistance, inductance and *capacitancia. Model of the electrical line. Model of transformer of power. Model of the alternator. Preparation of the model of an electrical system in values by unit. |
| Centres of Transformation for Distribution | Diagrams and constitution of Centres of transformation. Systems of protection. Put to earth of the Centres. Switches, *seccionadores and fusible. *Pararrayos. Interconnection *pararrayos-*trafo. Picture of *BT: interconnections *trafo-picture of *BT. Protection against the environmental aggression. |
| Study of the Operation of the System: Flow of Loads | Introduction. Radial networks and *malladas. Solution to the flow of loads: method of Gauss-*Seidel. Control and operation of the system: structure, controls of frequency and of tension, tertiary control. |
| Protection of the Systems of Power. | Characteristics of the currents of *cortocircuito: method of calculation. (JOIN-IN 60909). Analysis of the *cortocircuitos *trifásicos balanced and unbalanced (JOIN-IN-21239). Criteria of protection of the electrical system Spanish. Elements of protection against overload and *cortocircuitos: automatic and fusible switches. *Sobretensiones: Origin and mechanism of propagation. Coordination of the isolation: protection against the *sobretensiones (JOIN-IN 60071-1-2). |
| Industrial installations in Drop and Half tension. | Elements of the installations: symbology, electrical diagrams, electrical wires, devices of control and protection, electrical pictures, fusible, *contactores and relays. Compensation of the reactive energy: harmonic and filters |
| Luminothcnics And Installations of Illumination. | Foundations of luminothecnics. Elements of the installations of lighted up. Efficiency of the luminous sources. Harmonic and lighted up |

Planning

| | Class hours | Hours outside the classroom | Total hours |
|--------------------------|-------------|-----------------------------|-------------|
| Lecturing | 30 | 38 | 68 |
| Problem solving | 4 | 12 | 16 |
| Laboratory practical | 4 | 12 | 16 |
| Mentored work | 4 | 30 | 34 |
| Objective questions exam | 2 | 2 | 4 |
| Essay questions exam | 2 | 2 | 4 |
| Laboratory practice | 2 | 2 | 4 |
| Essay | 2 | 2 | 4 |

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

Methodologies

| | Description |
|----------------------|--|
| Lecturing | Exhibition of the cores of the subjects, followed of the convenient explanation to favour his understanding. Motivation of the interest by the knowledge of the matter. |
| Problem solving | Understanding of the models applied to justify the behaviour of the elements of the Electrical System. Application of the suitable procedures to evaluate his performance. |
| Laboratory practical | Practical application of the concepts learnt in theory. Know the elements and the procedures that employ in real electrical installations. |
| Mentored work | Deepening of the knowledge of the legal rule that affects to the design of the technical application. Documentation of solution adopted and justification of his opportunity for the security of the Surroundings: environment, users and installations. |

Personalized assistance

| Methodologies | Description |
|-----------------|--|
| Lecturing | Attention to questions and doubts posed by the student in the development of the classes |
| Problem solving | Attention to questions and doubts posed by the student in the development of the classes |
| Mentored work | Attention to questions and doubts posed by the student in the development of the classes |

| | |
|--------------------------|---|
| Laboratory practical | Attention to questions and doubts posed by the student in the development of the classes |
| Tests | Description |
| Objective questions exam | Attention to questions and doubts posed by the student regarding the development of the proof of evaluation |
| Essay questions exam | Attention to questions and doubts posed by the student regarding the development of the proof of evaluation |
| Essay | Attention to questions and doubts posed by the student regarding the development of the proof of evaluation |
| Laboratory practice | Attention to questions and doubts posed by the student regarding the development of the proof of evaluation |

| Assessment | | Description | Qualification | Training and Learning Results | |
|--------------------------|---|-------------|---------------|-------------------------------|--|
| Lecturing | Teaching of theoretical contents | | 0 | | |
| Problem solving | Examples and cases type | | 0 | | |
| Laboratory practical | Practical application of theoretical concepts | | 0 | | |
| Mentored work | (*)Exemplos de traballos e/ou proxectos a *reaizar | | 0 | | |
| Objective questions exam | Answer to the questionnaires to evaluate the knowledges of the matter. | 20 | B3 C21 | D2 D10 | |
| Essay questions exam | Justification and documentation of the cases proposed. | 40 | B3 C21 | D6 D10 | |
| Laboratory practice | Delivery of memories of practices and/or results of the same | 20 | B3 C21 | D16 D17 | |
| Essay | Documentation and justification of the central cores of the project. Preparation of diagrams and figures. Clarity of the editorial of the text. Sources of documentation used. | 20 | B3 C21 | D2 D6 D10 D14 D16 D17 | |

Other comments on the Evaluation

To surpass the subject, it is necessary to obtain a mark upper or the same to 50% and that any of the four parts was evaluated underneath of the 30 % of the maximum mark of each part. In the case that a student do not reach the minumum in any of the parts, his/her final mark would be fail (4.0). The students that renounce to his/her continuous assessment, will have the opportunity to pass the subject in a final exam, with the same parts and with the same weights as for the rest of students. The evaluations of each one of the parts will be kept along the same academic course, but this will not be true for the following ones. Ethics commitment: it is expected that the student has a suitable behaviour. In the case a non-proper behaviour is detected (copy, plagiarism, unauthorised use of electronic devices, and others) it would be considered that the student will not have the necessary requirements to surpass the subject. In this case, the mark in the current course will be a fail (0.0).

Sources of information

Basic Bibliography

Barrero, Fermín, **Sistemas de Energía Eléctrica**, 2006,
Gómez Expósito y otros, **Análisis y Operación de Sistemas de Energía Eléctrica**, 2002,
D.P. Kothari e I.J. Nagrath,, **Sistemas Eléctricos de Potencia**, 2008,
Stevenson, Willian y Grainger John J., **Análisis de sistemas eléctricos de potencia**, 2004,

Complementary Bibliography

Cuadernos Técnicos, **Reglamento Electrotécnico para BT**, 2008,
Cuadernos Técnicos, **Aparatos de protección y maniobra. La instalación eléctrica**, 2010,
Manual Técnico 189, **Maniobra y protección de las baterías de condensadores de MT**, 2002,
Unión-Fenosa Distribución, **CENTRO DE TRANSFORMACIÓN INTEMPERIE CTI**, 2010,
UNESA, **METODO DE CALCULO Y PROYECTO DE INSTALACIONES DE PUESTA A TIERRA PARA CENTROS DE TRANSFORMACIÓN CONECTADOS A REDES DE TERCERA CATEGORÍA**, 1989,
COMITE DE DISTRIBUCIÓN, **GUÍA TÉCNICA SOBRE CÁLCULO, DISEÑO MEDIDA DE LAS INSTALACIONES DE PUESTA A TIERRA EN REDES DE DISTRIBUCIÓN**, 1985,
MT 2.33.35, **DISEÑO DE PUESTAS A TIERRA EN APOYOS DE LAAT DE TENSION NOMINAL IGUAL O INFERIOR A 20 kV**, 2010,

IT.0110.ES.RE.PTP, PROYECTO TIPO LÍNEAS ELÉCTRICAS AÉREAS DE BAJA TENSIÓN, 2011,

Distribución, PROYECTO TIPO LÍNEAS ELÉCTRICAS AÉREAS HASTA 20kV, 2010,

MT 2.41.22, RED AEREA TRENZADA DE BAJA TENSION, 2009,

MT 2.21.60, LÍNEA AÉREA DE MEDIA TENSIÓN Simple circuito con conductor de aluminio acero, 2010,

Recommendations

Subjects that continue the syllabus

Electrical components in vehicles/V12G360V01902

Final Year Dissertation/V12G360V01991

Subjects that it is recommended to have taken before

Basics of circuit analysis and electrical machines/V12G360V01302

Applied electrotechnics/V12G360V01501

Electrical machines/V12G360V01605

IDENTIFYING DATA

Control e automatización industrial

| | | | | |
|---------------------|--|-----------|------|------------|
| Subject | Control e automatización industrial | | | |
| Code | V12G363V01801 | | | |
| Study programme | Grao en Enxeñaría en Tecnoloxías Industriais | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Mandatory | 4 | 2c |
| Teaching language | Castelán | | | |
| Department | Enxeñaría de sistemas e automática | | | |
| Coordinator | Manzanedo García, Antonio | | | |
| Lecturers | Manzanedo García, Antonio | | | |
| E-mail | amanza@uvigo.es | | | |
| Web | | | | |
| General description | Nesta materia preséntanse os conceptos básicos do control dixital en sistemas industriais así como as técnicas de análises, deseño e integración de proxectos de automatización. | | | |

Competencias

| | | | |
|------|---|--|--|
| Code | | | |
| B3 | CG3 Coñecemento en materias básicas e tecnolóxicas, que os capacite para a aprendizaxe de novos métodos e teorías, e os dote de versatilidade para adaptarse a novas situacóns. | | |
| C24 | CE24 Coñecementos de regulación automática e técnicas de control, e a súa aplicación á automatización industrial. | | |
| D9 | CT9 Aplicar coñecementos. | | |
| D16 | CT16 Razoamento crítico. | | |
| D17 | CT17 Traballo en equipo. | | |

Resultados de aprendizaxe

| Expected results from this subject | Training and Learning Results | |
|--|-------------------------------|-----------|
| Coñecementos xerais sobre o control dixital de sistemas dinámicos, das principais ferramentas de simulación de sistemas *muestreados | B3 | |
| Capacidade para deseñar sistemas de regulación e control dixital. | C24 | D9 |
| Habilidade para a concibir, desenvolver e *modelar sistemas automáticos. | C24 | D9 D16 |
| Capacidade de analizar as necesidades dun proxecto de automatización e fixar as súas especificacións. | D9 D16 D17 | |
| Capacidade de *dimensionar e seleccionar un autómata *programable industrial para unha aplicación específica de automatización así como determinar o tipo e características dos sensores e *actuadores necesarios. | C24 | D9 D16 |
| Capacidade de traducir un modelo de funcionamento a un programa de autómata. | C24 | D9 |
| Ser capaz de integrar distintas tecnoloxías (electrónicas, eléctricas, *neumáticas, etc.) nunha única B3 automatización. | C24 | D9 D17 |

Contidos

Topic

| | |
|--|---|
| TEMA 1.- Sistemas de control dixital. | 1.1 Esquemas de control por computador. 1.2 Secuencias e sistemas discretos. 1.3 Transformada Z. 1.4 Función de transferencia en z. 1.5 Ecuacóns en diferenzas. |
| TEMA 2.- Análise de sistemas muestreados de control. | 2.1 Mostraxe. 2.2 Reconstrucción. 2.3 Sistemas muestreados. 2.4 Estabilidade. 2.5 Análise de resposta transitoria. 2.6 Análise de resposta permanente. |
| TEMA 3.- Síntese de reguladores digitales. | 3.1 Discretización de reguladores continuos. 3.2 Reguladores PID discretos. |

| | |
|---|---|
| TEMA 4.- Autómatas Programables Industriais (PLCs) | 4.1 Principio de funcionamento. 4.2 Memoria de Entradas e Memoria de Saídas. 4.3 Ciclo de funcionamiento do autómata. Tempo de ciclo. 4.4 Programación estructurada. Tipos de módulos de programa. |
| TEMA 5.- Linguaxes normalizadas para a programación de autómatas. | 5.1 Programación de autómatas co Standard IEC 61131. 5.2 Tipos de Datos Numéricos. Limitacións. Conversión. 5.3 Programación avanzada en Diagrama de Funcións e Diagrama de Contactos. Ampliación do conxunto de instrucións coñecidas. |
| TEMA 6.- Supervisión e Control de Procesos Industriais. | 6.1 Tratamento de sinais analóxicos de E/S no autómata. 6.2 Modelado de sistemas de supervisión e/ou control. 6.3 Do modelo funcional ao programa de autómata. 6.4 Integración de Tecnoloxías. |
| P1. Matlab e Simulink para Sistemas Discretos. | Repasso e ampliación do programa Matlab e Simulink para a análise e deseño de sistemas de control. |
| P2. Introdución aos Sistemas Dixitais. | Procedementos de Mostraxe e Reconstrucción. Influencia do período de mostraxe. |
| P3. Análise Dinámica de Sistemas Dixitais. | Obtención da resposta temporal dun sistema discreto. Implantación de Ecuacións en Diferenzas para a simulación de sistemas. |
| P4. Síntese de Reguladores Discretos. | Discretización de reguladores continuos: comparación dos diversos métodos de discretización. Implantación dun PID discreto. |
| P5. Tratamento de sinais analóxicos no Autómata. | Realización dun programa sinxelo de autómata para comprobar o tratamento e manexo de sinais analóxicos de E/S nun Autómata Programable. |
| P6. Supervisión de Procesos con sinais analóxicos. | Modelado e implantación da Supervisión dun proceso sinxelo que teña varios sinais analóxicos de entrada. |
| P7. Supervisión de Procesos con sinais analóxicos. | Modelado e implantación da Supervisión dun proceso más complexo con varios sinais analóxicos de entrada, distintas zonas de traballo e alarmas. |
| P8. Supervisión e Control de Procesos con sinais analóxicos. | Modelado e implantación da Supervisión e Control de procesos no que estean implicadas sinais analóxicos, tanto de entrada como de saída coas súas Leis de Control. |

Planificación

| | Class hours | Hours outside the classroom | Total hours |
|---------------------------------------|-------------|-----------------------------|-------------|
| Actividades introductorias | 1 | 0 | 1 |
| Lección maxistral | 22 | 22 | 44 |
| Resolución de problemas | 10 | 20 | 30 |
| Prácticas de laboratorio | 18 | 27 | 45 |
| Exame de preguntas de desenvolvemento | 4 | 26 | 30 |

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

Metodoloxía docente

| | Description |
|----------------------------|---|
| Actividades introductorias | Presentación de a materia a os alumnos: competencias, contidos, planificación, metodoloxía, atención personalizada, avaliación e bibliografía. |
| Lección maxistral | Desenvolveranse en os horarios fixados por a Escola. Consistirá en unha exposición e desenvolvemento por parte de o profesor de os temas que constitúen o contido de a materia. Durante o seu desenvolvemento alentaráse a participación activa de o alumno. Será necesario que logo o alumno dedique un tempo aproximadamente igual a a duración de a sesión para asimilar e sentar os conceptos explicados e que lle servirá como preparación para a seguinte sesión. |
| Resolución de problemas | Durante as sesións de aula, cando resulte oportuno, procederáse a a resolución de problemas e/ou exercicios que faciliten a comprensión de os contidos de a materia, ou que sirvan para desenvolver e aplicar os contidos apresos. O alumnado deberá resolver exercicios similares para adquirir as capacidades necesarias. |
| Prácticas de laboratorio | Actividades de aplicación de os coñecementos adquiridos en as clases de teoría e situacións concretas que poidan ser desenvolvidas/simuladas en o laboratorio de a asignatura. |

Atención personalizada

| Methodologies | Description |
|-------------------------|---|
| Lección maxistral | En as clases de aula en que se imparta teoría se fomentara a participación de o alumnado, podendo interromper a exposición si algún punto non quedou suficientemente claro. |
| Resolución de problemas | En as clases de aula en as que se resolván exercicios se fomentara especialmente a participación de o alumnado, cando non comprenda algún paso, ou suxerindo melloras e solucións alternativas. |

| | |
|---------------------------------------|--|
| Prácticas de laboratorio | En as clases de laboratorio farase un seguimiento máis próximo de os grupos de prácticas, axudando a os que vaian un pouco más lentos e suscitando novos retos ou melloras en o seu desenvolvemento a os más avantaxados. |
| Actividades introductorias | A primeira clase de a asignatura ten moita importancia, e debe ser o suficientemente aclaratoria e reveladora para o alumnado de o que vai aprender en a asignatura e a onde se pretende chegar ao final de a mesma. |
| Tests | Description |
| Exame de preguntas de desenvolvemento | Aquí os alumnos deberán demostrar os coñecementos adquiridos en a asignatura, resolvendo basicamente exercicios de o tipo que se desenvolveron en o aula e que eles mesmos implantaron en o laboratorio. Insistirse en a importancia de a solución correcta, pero tamén en a xustificación de o proceso de chegar a a mesma. |

| Avaliación | Description | Qualification | Training and Learning Results |
|---------------------------------------|---|---------------|-------------------------------|
| Prácticas de laboratorio | Valorarase cada práctica de laboratorio entre 0 e 10 puntos, en función do cumprimento dos obxectivos fixados no enunciado da mesma e da preparación previa e actitude do alumnado. Cada práctica terá unha *ponderación distinta sobre a nota final de prácticas. Así mesmo, controlarase e valorará o aproveitamento das prácticas por parte do alumnado. Nalgunha das prácticas poderase esixir a entrega dos resultados da mesma. | 30 | B3 C24 D9 D16 D17 |
| Exame de preguntas de desenvolvemento | Exame final dos contidos da materia, que incluirá cuestións teóricas, problemas e exercicios. | 70 | B3 C24 D9 D16 |

Other comments on the Evaluation

PRÁCTICAS:

- A asistencia a todas as sesións de prácticas é Obrigatoria, excepto para os alumnos cuxa renuncia a a Avaliación Continua sexa oficialmente admitida.
- Realizarase unha Avaliación Continua de o traballo de o alumnado en as sesións de prácticas a o longo de o cuatrimestre. Si un alumno non prepara adecuadamente as prácticas e/ou descoñece os coñecementos básicos explicados en clase para a realización de a mesma, obterá directamente a cualificación de suspenso con a mínima nota en dita práctica.
- Si a o longo de as sesións de prácticas reglamentadas o traballo de o alumno é insuficiente e non consegue o Aprobado en prácticas, terá as prácticas Suspensas para a 1ª convocatoria.
- Si supera o exame escrito en a 2ª convocatoria o alumno deberá examinarse de prácticas si non as ten aprobadas de a 1ªconvocatoria.
- Tamén deberán examinarse de prácticas, en a mesma convocatoria en que superen o exame escrito, os alumnos cuxa renuncia a a Avaliación Continua sexa oficialmente admitida.

CUALIFICACIÓN:

- Para a consideración de Presentados "" ou "Non presentados" a unha convocatoria terase únicamente en conta a participación en a proba escrita.
- En as probas escritas poderase establecer unha puntuación mínima en un conxunto de preguntas/exercicios para superar o mesmo.
- Para aprobar a materia débense superar ambas partes, tanto o programa de prácticas (obtendo como mínimo o 33% de a puntuación asignada a as prácticas) como a proba escrita (50% de a puntuación asignada), obténdose en principio a nota total segundo a porcentaxe 30%-70% indicado anteriormente.
- En o caso de os Suspensos por non alcanzar algún de os mínimos establecidos ou non aprobar o exame escrito ou as prácticas, a nota final que figurará en o acta obterase de a expresión **0.7*(Nota Prácticas +0.7*(Nota Exame Escrito))** de tal forma que nunca poderá superar os 4.5 puntos.

Compromiso ético:

Espérase que o alumno presente un comportamento ético adecuado. En caso de detectar un comportamento non ético (por exemplo copia ou plagio, utilización de aparellos electrónicos non autorizados, e outros), considerarase que o alumno non

reúne os requisitos necesarios para superar a materia. Ademais solicitarase a aplicación de o Reglamento Disciplinario de a Escola a o alumno en cuestión.

Bibliografía. Fontes de información

Basic Bibliography

Complementary Bibliography

K. Ogata, **Sistemas de Control en Tiempo Discreto**, 2ª edición, Prentice-Hall, 1996

Guía usuario STEP7, SIEMENS,

Diagrama de Funciones (FUP) para S7-300 y S7-400, SIEMENS,

Diagrama de Contactos (KOP) para S7-300 y S7-400, SIEMENS,

Recomendacións

Subjects that it is recommended to have taken before

Fundamentos de automática/V12G360V01304

Other comments

Requisitos: Para matricularse en esta materia é necesario superar ou ben haber cursado todas as materias de os cursos inferiores a o curso en que está situada esta materia.

En caso de discrepancias, prevalecerá a versión en castelán de esta guía.

IDENTIFYING DATA

Fundamentos de administración de empresas

| | | | | |
|---------------------|---|-----------|------|------------|
| Subject | Fundamentos de administración de empresas | | | |
| Code | V12G363V01802 | | | |
| Study programme | Grao en Enxeñaría en Tecnoloxías Industriais | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Mandatory | 4 | 2c |
| Teaching language | Castelán | | | |
| Department | Organización de empresas e márketing | | | |
| Coordinator | Urgal González, Begoña | | | |
| Lecturers | Urgal González, Begoña | | | |
| E-mail | burgal@uvigo.es | | | |
| Web | http://moovi.uvigo.gal/ | | | |
| General description | O obxectivo desta materia é dar a coñecer os aspectos fundamentais da función de administración da empresa, incidindo na importancia do sistema de información económico-financeiro para analizar a situación patrimonial e competitiva da empresa, de maneira que sirva de apoio á toma de decisións empresariais. | | | |

Competencias

| | | | |
|------|--|--|--|
| Code | | | |
| B9 | CG9 Capacidad de organización e planificación no ámbito da empresa, e outras institucións e organizacións. | | |
| D5 | CT5 Xestión da información. | | |
| D8 | CT8 Toma de decisións. | | |
| D9 | CT9 Aplicar coñecementos. | | |

Resultados de aprendizaxe

| Expected results from this subject | Training and Learning Results | |
|--|-------------------------------|----------------|
| <input type="checkbox"/> Coñecer a base sobre a que se apoia a análise económica financeiro da empresa. | B9 | D5 |
| <input type="checkbox"/> Coñecer as ferramentas que se utilizan na análise económica financeira. | | D8 |
| <input type="checkbox"/> Coñecer os aspectos básicos de xestión económica financeira. | | D9 |
| Coñecemento sobre os fundamentos da empresa e das ferramentas específicas para a súa análise financeira. | B9 | D5 D8 D9 |
| Coñecemento sobre os fundamentos da administración e dirección de empresas e os procesos de xestión | B9 | D5 D8 D9 |

Contidos

| | |
|--------|---|
| Topic | |
| TEMA 1 | A EMPRESA E A DIRECCIÓN DE EMPRESAS |
| TEMA 2 | A PLANIFICACIÓN E O CONTROL |
| TEMA 3 | A ORGANIZACIÓN E A DIRECCIÓN DE PERSOAS |
| TEMA 4 | A TOMA DE DECISIÓNNS NA EMPRESA |
| TEMA 5 | A INFORMACIÓN CORPORATIVA |
| TEMA 6 | A ANÁLISE ECONÓMICA E FINANCEIRA |
| TEMA 7 | A EVOLUCIÓN DA EMPRESA |

Planificación

| | Class hours | Hours outside the classroom | Total hours |
|---------------------------------------|-------------|-----------------------------|-------------|
| Lección magistral | 32.5 | 64.5 | 97 |
| Prácticas de laboratorio | 18 | 18 | 36 |
| Exame de preguntas obxectivas | 2 | 4 | 6 |
| Exame de preguntas de desenvolvemento | 3 | 8 | 11 |

*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 por parte do profesor dos contidos sobre a materia obxecto de estudo, bases teóricas e casos de estudio e exercicios que sirvan de complemento. |
| Prácticas de laboratorio | Actividades de aplicación dos coñecementos a situacíons concretas e de adquisición de habilidades básicas e procedimentais relacionadas coa materia obxecto de estudo. |

Atención personalizada

| Methodologies | Description |
|--------------------------|--|
| Lección maxistral | Exposición por parte do profesor dos contidos sobre a materia obxecto de estudo, bases teóricas e casos de estudio e exercicios que sirvan de complemento. |
| Prácticas de laboratorio | Actividades de aplicación dos coñecementos a situacíons concretas e de adquisición de habilidades básicas e procedimentais relacionadas coa materia obxecto de estudo. |

Avaluación

| | Description | Qualification | Training and Learning Results |
|---------------------------------------|--|---------------|-------------------------------|
| Prácticas de laboratorio | Resolución de problemas e/ou exercicios mediante a aplicación de rutinas, procedementos e fórmulas a partir da información dispoñible. | 20 | B9 D5 D8 D9 |
| Exame de preguntas obxectivas | Proba tipo test de escolha múltiple sobre contidos teóricos e prácticos. | 20 | B9 D5 D8 D9 |
| Exame de preguntas de desenvolvemento | Proba con cuestiós teóricas e prácticas. | 60 | B9 D5 D8 D9 |

Other comments on the Evaluation

1. AVALIACIÓN CONTINUA

A avaliación continua é o sistema de avaliação principal na materia. Ésta consta dos seguintes elementos:

- **Proba de avaliação intermedia.** Esta proba será tipo test, desenvolverase no horario do bloque de teoría, nunha data establecida ao comezo da docencia, e o seu contido será teórico e práctico. Ésta suporá o **20% da cualificación final** da materia. Esta proba non é recuperable, e dicir, se un/unha alumno/a non pode realizala na data estipulada, a profesora non ten a obriga de repetila.
- **Prácticas.** O cumprimento das tarefas desenvolvidas durante as prácticas suporá o **20% da cualificación final** da materia. Cada práctica realizada por o/a alumno/a será avaliada, sendo a cualificación total de prácticas, a media aritmética das notas obtidas nestas. As prácticas non son recuperables, polo tanto, se non se asiste a unha práctica, a nota nesa práctica será cero.
- **Exame final.** O exame que se desenvolverá na data oficial marcada na planificación docente do curso completará o **60% restante da cualificación final**. IMPORTANTE: É imprescindible neste exame obter unha puntuación mínima de 4, nunha escala de 0 a 10, para superar a materia. Este exame consta de dúas partes, unha parte de teoría que será tipo test e unha parte práctica que incluirá unha serie de exercicios para desenvolver.

2. AVALIACIÓN NON CONTINUA

No caso dos/das alumnos/as que renuncien expresamente á avaliación continua, realizarase un único exame na data oficial marcada na planificación docente do curso. Este exame dará a posibilidade de obter o 100% da cualificación. Este exame constará de dúas partes, unha parte de teoría que será tipo test e unha parte práctica que incluirá unha serie de exercicios para desenvolver. IMPORTANTE: É condición necesaria, aínda que non suficiente, para superar a materia, obter na parte de teoría unha puntuación mínima de 5, nunha escala do 0 a 10.

3. RECUPERACIÓN DE XULLO

O exame de recuperación de xullo será similar ao exame final. Os/as alumnos/as que optaran pola avaliação continua poderán elexir que a cualificación na materia sexa o 100% da puntuación obtida neste exame. Para iso, o/a alumno/a deberá comunicarollo á profesora polo menos cunha semana de antelación ao exame.

4. COMPROMISO ÉTICO

Esperase que o/a alumno/a presente un comportamento ético adecuado. No caso de detectar un comportamento non ético (copia, plaxio, utilización de aparatos electrónicos non autorizados, e outros) considerarase que o/a alumno/a non reúne os requisitos necesarios para superar a materia. Neste caso a cualificación global no presente curso académico será de

suspento (0.0).

Bibliografía. Fontes de información

Basic Bibliography

Weihrich, M. et al., **ADMINISTRACIÓN**, McGraw Hill, 2022

Moyano Fuentes, J. et al., **ADMINISTRACIÓN DE EMPRESAS. UN ENFOQUE TEÓRICO-PRÁCTICO**, Prentice Hall, 2011

Iborra Juan, M. et al., **FUNDAMENTOS DE DIRECCIÓN DE EMPRESAS**, Thomson, 2007

Complementary Bibliography

Cuervo García, A., **INTRODUCCION A LA ADMINISTRACION DE EMPRESAS**, Civitas, 2008

Bueno Campos, E., **CURSO BÁSICO DE ECONOMÍA DE LA EMPRESA. UN ENFOQUE ORGANIZATIVO**, Pirámide, 2004

Recomendacóns

Subjects that it is recommended to have taken before

Empresa: Introducción á xestión empresarial/V12G360V01201

Fundamentos de organización de empresas/V12G360V01305

Other comments

Para matricularse nesta materia é necesario ter superadas ou ben estar matriculado de todas as materias dos cursos inferiores ao curso no que está emprazada esta materia.

En caso de discrepancias, prevalecerá a versión en castelán desta guía.

IDENTIFYING DATA

Compoñentes eléctricos en vehículos

| | | | | |
|---------------------|---|----------|------|------------|
| Subject | Compoñentes eléctricos en vehículos | | | |
| Code | V12G363V01902 | | | |
| Study programme | Grao en Enxeñaría en Tecnoloxías Industriais | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Optional | 4 | 2c |
| Teaching language | Castelán | | | |
| Department | Enxeñaría eléctrica | | | |
| Coordinator | López Fernández, Xosé Manuel | | | |
| Lecturers | López Fernández, Xosé Manuel | | | |
| E-mail | xmlopez@uvigo.es | | | |
| Web | http://moovi.uvigo.gal/ | | | |
| General description | | | | |

Competencias

Code

- B3 CG3 Coñecemento en materias básicas e tecnolóxicas, que os capacite para a aprendizaxe de novos métodos e teorías, e os dote de versatilidade para adaptarse a novas situacóns.
- D3 CT3 Comunicación oral e escrita de coñecementos na lingua propia.
- D5 CT5 Xestión da información.
- D10 CT10 Aprendizaxe e traballo autónomos.
- D17 CT17 Traballo en equipo.

Resultados de aprendizaxe

| Expected results from this subject | Training and Learning Results |
|---|-------------------------------|
| Coñecer el desenvolvemento histórico e retos futuros de la rede eléctrica de abordo utilizada nos vehículos (*Kfz *Bornetz) | B3 D3 D5 D10 D17 |
| Coñecer as variantes de rede eléctrica de abordo co aumento de tensión. | B3 D3 D5 D10 D17 |
| Coñecer propiedades, funcionamento e compoñentes que proceden de a rede eléctrica de abordo tradicional en vehículos. | B3 D3 D5 D10 D17 |

Contidos

Topic

| | |
|-----------------------------------|---|
| Introducción. | Introducción. Tipos de vehículo. Historia do vehículo eléctrico. Perspectivas de futuro. |
| Esquemas eléctricos en vehículos. | Introducción. Instalación eléctrica. Esquemas eléctricos. Localización dos compoñentes eléctricos no esquema eléctrico. Principais circuitos que compoñen o esquema. |
| Compoñentes eléctricos de abordo. | Introducción. Sistemas eléctricos principais. Sistemas eléctricos auxiliares. Accionamiento. Tracción. Dispositivos auxiliares. Equipos de abordo. Sensores. |

| | |
|--|---|
| Tracción en vehículos eléctricos. | Introdución. Requisitos para a tracción eléctrica. Motor asíncrono. Motor síncrono. Motor de reluctancia. Motor de imáns permanentes. Control e accionamento. Aplicacións. |
| Sistemas de control e comunicación. | Introdución. Sistemas de comunicación: Elementos; Configuracións; Buses Sistemas de control: Estáticos; Dinámicos; Seguridade; Motor |
| Sistemas de almacenamento de enerxía. | Introdución. Baterías. Células de combustión. Supercondensadores. Volante de inercia Tendencias. Integración na red eléctrica |
| Sistemas de recarga e infraestrutura de soporte. | Introdución. Modos de recarga. Tipos de conectores. Infraestructura de soporte. Tipos de redes de alimentación. Enerxías alternativas. Arquitectura de un xestor de carga. Redes intelixentes. |
| Prácticas de laboratorio | Achegamento aos diferentes compoñentes eléctricos, análises e identificación dos mesmos. |

Planificación

| | Class hours | Hours outside the classroom | Total hours |
|-------------------|-------------|-----------------------------|-------------|
| Lección maxistral | 12 | 36 | 48 |
| Saídas de estudo | 10 | 10 | 20 |
| Traballo tutelado | 10 | 30 | 40 |
| Presentación | 10 | 32 | 42 |

*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 núcleos dos temas, seguida da explicación conveniente para favorecer a súa comprensión. Motivación do interese polo coñecemento da materia. |
| Saídas de estudo | Coñecemento dos procesos de fabricación de compoñentes relacionados coa materia e a súa diferenciación dentro do sector. |
| Traballo tutelado | Profundización no contido detallado da materia adoptando un enfoque estruturado e de rigor. Promover o debate e a confrontación de ideas. |
| Presentación | Exercitar recursos de análises e sínteses dos traballos tutelados elaborados. Promover a adopción de aptitudes autocríticas e a aceptación de enfoques contrarios. |

Atención personalizada

| Methodologies | Description |
|-------------------|-------------|
| Saídas de estudo | |
| Traballo tutelado | |
| Presentación | |

Avaluación

| Description | Qualification | Training and Learning Results |
|-------------|---------------|-------------------------------|
| | | |

| | | | | |
|-------------------|---|----|----|------------------------|
| Traballo tutelado | Valoración dos traballos individuais e en equipo, materializados nunha memoria. | 60 | B3 | D3 D5 D10 D17 |
| Presentación | Presentación individual dos resultados dos traballos tutelados, onde se puntuará: Motivación polo tema. Claridade da exposición. Medios utilizados. Resposta ás dúbihdas e suxestíons presentadas. Claridade de conceptos Precisión da información Achechas Resultados Conclusíons | 40 | B3 | D3 D5 D10 D17 |

Other comments on the Evaluation

El alumno/a podrá escoger entre una de las dos opciones, Opción A (Evaluación Final) o Opción B (Evaluación continua), para su evaluación, según se detalla a continuación. Opción A A esta Opción A podrá optar cualquier alumno/a matriculado/a en la asignatura. La evaluación de los conocimientos adquiridos por el alumno/a se hará de forma individual, y sin la utilización de ningún tipo de fuente de información, en un único examen escrito que englobará toda la materia recogida en el Temario relativa al Aula, Laboratorio y Salidas de estudios o Prácticas de campo. Los exámenes coincidirán con las convocatorias oficiales correspondientes. Para superar la asignatura, será necesario obtener una puntuación igual o superior al 50% de la puntuación asignada. Opción B A esta Opción B podrán optar sólo los alumnos/as que participen de forma presencial en todos los ejercicios y actividades que se propongan en el Aula, para realizar tanto de forma individual como en equipo, y que además asistan a todas y cada una de las actividades de Laboratorio y Salidas de estudio o Prácticas de campo programadas. Dichas actividades consistirán en: Trabajos tutelados individuales y en equipo, evaluados a través de una memoria escrita, con un peso de 60%. Presentaciones individuales y en equipo de los resultados de los trabajos tutelados, con un peso de 40%. Para superar la asignatura, es condición necesaria, pero no suficiente, obtener como mínimo el 30% de la nota máxima asignada a cada una de las partes, tanto en Trabajos tutelados (mínimo 2%), como en Presentaciones (mínimo 1,20%). La materia estará superada cuando la puntuación total (Trabajos tutelados + Presentaciones) resulta una nota final mínima del 50%. En aquellos casos en los que a pesar de no superar el 30% de la nota máxima asignada de alguna de las partes Trabajos tutelados y/o Presentaciones, resulte una nota igual o mayor al 50% requerido, la nota final se traducirá en un 30%, lo que significará un suspenso.

Compromiso ético: Espérase que o alumno presente un comportamento ético adecuado. No caso de detectar un comportamento non ético (copia, plaxio, utilización de aparellos electrónicos non autorizado, e outros) considérase que o alumno non reúne os requisitos necesarios para superar a materia. Neste caso a cualificación global no actual curso académico será de suspenso (0.0). Non se permitirá a utilización de ningún dispositivo electrónico durante as probas de avaliación salvo autorización expresa. O feito de introducir un dispositivo electrónico non autorizado na aula de exame será considerado motivo de non superación da materia no presente curso académico e a cualificación global será de suspenso (0.0).

Bibliografía. Fontes de información

Basic Bibliography

TOM DENTON, **AUTOMOBILE ELECTRICAL AND ELECTRONIC SYSTEMS**, 0415725771, Fifth Edition, Taylor & Francis Ltd, 2017

Eli Emadi, **Advanced Electric Drive Vehicles**, 2015, CRC Press Taylor & Francis Group, Bosch, **Automotive Handbook**, 8th Edition

Johneric LEACH, **Automotive 48-volt Technology**, 978-0-7680-8318-7, ‎ SAE International, 2016

K. T. Chau, **ELECTRIC VEHICLE MACHINES AND DRIVES DESIGN, ANALYSIS AND APPLICATION**, 2015, Wiley,

Kevin Jost, **48-Volt Developments**, 978-0768081923, SAE International, 2015

William B. Ribbens, **Understanding Automotive Electronics. An Engineering Perspective**, Elsevier Inc., 2017

Complementary Bibliography

Sánchez Fernández, Enrique, **Circuitos Eléctricos Auxiliares del Vehículo**, 2012,

Bruno Scrosati, J. Garche, W. Tillmetz, **Advances in Battery Technologies for Electric Vehicles**, Elsevier Ltd., 2015

Nicolas Navet, F. Simonot-Lion, **Automotive Embedded Systems Handbook**, CRC Press Taylor & Francis Group, 2009

Esteban José Domínguez y Julián Ferrer, **Circuitos eléctricos auxiliares del vehículo**, 2012,

José Domínguez, Esteban, **Sistemas de Carga y arranque**, 2011,

Recomendacións

Subjects that continue the syllabus

Traballo de Fin de Grao/V12G360V01991

Subjects that it is recommended to have taken before

Fundamentos de teoría de circuitos e máquinas eléctricas/V12G360V01302

Electrotecnia aplicada/V12G360V01501

Other comments

Para matricularse nesta materia é necesario superar ou ben estar matriculado de todas as materias dos cursos inferiores ao curso en que está situada esta materia.

En caso de discrepancia, prevalecerá a versión en castelán desta guía.

IDENTIFYING DATA**Technical english 1**

| | | | | |
|---------------------|---|----------|------|------------|
| Subject | Technical english 1 | | | |
| Code | V12G363V01903 | | | |
| Study programme | Grado en Ingeniería en Tecnologías Industriales | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Optional | 4th | 2nd |
| Teaching language | English | | | |
| Department | | | | |
| Coordinator | García de la Puerta, Marta | | | |
| Lecturers | García de la Puerta, Marta | | | |
| E-mail | mpuerta@uvigo.es | | | |
| Web | http://moovi.uvigo.gal/ | | | |
| General description | This course aims at providing students with a systematic adequacy to develop the appropriate skills for communicating in Technical English at level A2 according to the Common European Framework of Reference for Languages (CEFR). As far as possible, students will be monitored so as to accommodate to each individual needs. | | | |

Skills

| | | | |
|------|---|--|--|
| Code | | | |
| B10 | CG10 Ability to work in a multidisciplinary and multilingual environment. | | |
| D1 | CT1 Analysis and synthesis. | | |
| D4 | CT4 Oral and written proficiency in a foreign language. | | |
| D7 | CT7 Ability to organize and plan. | | |
| D10 | CT10 Self learning and work. | | |
| D17 | CT17 Working as a team. | | |
| D18 | CT18 Working in an international context. | | |

Learning outcomes

| Expected results from this subject | Training and Learning Results | |
|---|-------------------------------|-------------------------------------|
| To encourage students to use the English language within the engineering context, and the benefits and usefulness of the English language when applying their grammatical, lexical, and cultural knowledge. | B10 | D1 D4 D7 D10 D17 D18 |
| To improve students' sense of linguistic awareness of English as a second language, the grammatical and lexical mechanisms and types of expressions. | B10 | D1 D4 D7 D10 D17 D18 |
| Improving students' listening and reading skills, as well as their speaking and writing skills. | B10 | D1 D4 D7 D10 D17 D18 |
| To upgrade students' grammatical and lexical notions of the English language, and the comprehension of basic Technical English structures. | B10 | D1 D4 D7 D10 D17 D18 |
| Promoting students' critical autonomy for the comprehension and understanding of texts, dialogues and oral presentations. | B10 | D1 D4 D7 D10 D17 D18 |

Contents

Topic

UNIT 1: NUMBERS AND TRENDS

Skills

- Writing, reading, and presenting facts and numbers correctly in a professional setting.
- Understanding symbols and abbreviations.
- Presenting data: Interpreting and describing graphs, charts, and diagrams.

Language

- Expressing numbers and calculations.
- Expressing measurement and technical specifications.
- Saying temperatures.
- Saying dates, websites and email addresses.
- Language for talking about trends.
- Adjectives and adverbs.
- Prepositions.
- Describing timelines.

UNIT 2: DESIGN AND INNOVATION: DESCRIBING PRODUCTS AND TECHNOLOGIES

Skills

- Describing uses, appearance, and definitions.
- Giving a short presentation: Structuring a presentation, exploring effective presentation strategies.

Language

- Language of description (e.g., It's really + adj./ It can + verb/ It looks like, it is shaped like /It is in the shape of …); defining relative clauses, reduced relative clauses.
- Adjectives and qualities, order of adjectives.
- Comparing and contrasting; superlative adjectives.
- Nouns and adjectives connected with geometry and properties.
- Reason and purpose
- Conditionals.
- Language for presenting: Key words and phrases for introducing, and concluding your presentation, signposting language for linking ideas; language for dealing with questions; persuasive language.

UNIT 3: GIVING INSTRUCTIONS AND DESCRIBING A MANUFACTURING PROCESS

Skills

- Describing a process; explaining a process using a diagram; discussing the stages of production.
- Writing clear instructions and warnings.

Language

- The Passive Voice: present simple passive structures.
- Verbs for manufacturing operations.
- Imperatives for instructions and warnings.
- Language for sequencing instructions and processes (sequence words).
- Adverbials of time (once, while, before and after)
- Prepositions.

4. INSPECTION AND QUALITY CONTROL: REPORT WRITING

Skills

- Writing a short report: general guidelines (structure, format, and style).
- Writing a short report about a problem.

Language

- Possibility and Probability
- Past simple and Present Perfect.
- Time expressions.

5. JOB SEARCH: PREPARING FOR A JOB INTERVIEWSkills

- Identifying your personal strengths, key skills and experience.
- Writing a short CV.
- Talking about your CV.
- Writing a cover letter.
- Preparing a job interview: asking and answering interview questions.
- Learning strategies to build applicant's confidence.

Language

- Phrases for demonstrating personal strengths and weaknesses.
- Phrases to give details of your personal characteristics, qualifications, transferable skills, professional experience, etc.
- Action verbs; positive adjectives, positive expressions.
- Softening negative information and highlighting positive information.
- Avoiding spelling mistakes.
- Revision of past form of verbs, and prepositions.
- Useful language for opening, main body and closing cover letters.

Planning

| | Class hours | Hours outside the classroom | Total hours |
|--|-------------|-----------------------------|-------------|
| Introductory activities | 1 | 0 | 1 |
| Lecturing | 8 | 15 | 23 |
| Autonomous problem solving | 8 | 10 | 18 |
| ICT supported practices (Repeated, Dont Use) | 5 | 8 | 13 |
| Mentored work | 4 | 16 | 20 |
| Problem and/or exercise solving | 6 | 10 | 16 |
| Objective questions exam | 6 | 10 | 16 |
| Essay | 4 | 15 | 19 |
| Oral exam | 8 | 16 | 24 |

*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 | Activities directed at presenting the subject, taking contact with the students and gathering information in relation to their previous knowledges of the subject. |
| Lecturing | Explanation of the linguistic contents and its application (Use of English) in the learning process and the acquisition of the contained theoretical contents of the subject. |
| Autonomous problem solving | Activities focused on dealing with exercises related to the subject. Students develop the skills and the fulfillment of exercises related with the linguistic skills (Use of English) in Technical English and the communicative skills; especially the oral expression (Speaking). |
| ICT supported practices (Repeated, Dont Use) | The practice activities in connection to the four communicative skills: oral understanding (Listening), oral expression (Speaking), reading comprehension (Reading), and written expression (Writing), as well as the linguistic skill (Use of English) in Technical English. These activities are done individually or in group. |
| Mentored work | The analysis and resolution of practical exercises in relation to grammar and vocabulary combined with the communicative skills. Students autonomously perform tasks within and outside the classroom as homework; especially the communicative task of written expression (Writing). |

Personalized assistance

| Methodologies | Description |
|----------------------------|--|
| Introductory activities | General guidance to students on the subject concerning goals and how to achieve them. Exploring motivations and interests of the students. Indications on assignments and exercises to be done during the course, dates of assignment deliveries and the examination dates and how to achieve goals on the subject. Indicating that no tutorial will be done on the telephone or internet (electronic post, Skype, etc.). In case of any doubt, students will have to contact directly with the professor in the classroom or during tutorial hours. |
| Mentored work | Activities carried out in the classroom and during tutorials in order to supervise the learning process of the entrusted tasks and in relation to the communicative skill of written expression (Writing) and the linguistic skill (Use of English) in the English language. |
| Autonomous problem solving | This activity is directed to boost the realization of the diverse exercises related with the communicative skills and the linguistic skill in the application of the theoretical concepts of the language in practice. Detecting the difficulties in the learning process and lessening the different levels of the English language of each student with the rest of the participants in the course. |

Lecturing The personalized attention in lecturing aims at the correct comprehension and the encouragement given to students in the classroom and during tutorials during the learning process of the theoretical concepts of the subject; as well as making indications on the practice of exercises to be carried out and giving advice about the performance so as to successfully achieve a pass in this subject.

| Tests | Description |
|--------------|--|
| Oral exam | The aim of the personalized attention of the oral examination centers in the preparation, encouragement and the supervision of the oral expression (Speaking) in the classroom during the course and previous to the oral examination. The purpose of this activity is to encourage students to express not only with relevance and quality in relation to engineering and its specific vocabulary but also with linguistic correctness. |

| Assessment | | Description | Qualification | Training and Learning Results |
|---------------------------------|---|--------------------|----------------------|--------------------------------------|
| Problem and/or exercise solving | Evaluation of the theoretical concept of the Technical English language and its application. Performance of practical exercises in relation to the linguistic skill (Use of English). | 20 | B10 | D4 D10 D18 |
| Objective questions exam | Evaluations of communicative skill of oral understanding (Listening) with contents related to engineering (16%). Evaluations of the communicative skill of reading comprehension (Reading) with contents related to engineering (16%). | 32 | B10 | D1 D10 D18 |
| Essay | Evaluations of the communicative skill of the written expression (Writing). | 16 | B10 | D1 D4 D7 D10 D18 |
| Oral exam | Evaluations of the communicative skill of oral expression (Speaking) in relation to the linguistic skill and vocabulary in the field of engineering. | 32 | B10 | D1 D4 D7 D10 D17 D18 |

Other comments on the Evaluation

Particular considerations

There are two assessment systems: continuous or final. The selection of a system excludes the other.

1.1. Continuous assessment

To qualify for the system of continuous evaluation, students are required to attend 80% of the total lecture hours with academic progress and participation. Students not reaching that percentage will lose this option. The assignments and tests done during the course will be worth 100 % of the final assessment for those students choosing the continuous evaluation. The non-completion of the assignments requested during the course will be counted as a zero (0.0). The assignments must be delivered or submitted by the deadlines and dates set in advance.

1.2. Final assessment (non-attendants)

Students choosing the final examination will have to take a final overall test that will take place on the official date established by the School of Industrial Engineering. To this end, students should consult the school's website, where the examination date and time are specified.

2. Subject's final grade

2.1. Continuous assessment

The final mark for this subject is calculated taking into consideration all the skills practised during the course. Therefore, each one of them is given the following weight in the final grade:

Listening: 16%

Speaking: 32%

Reading: 16%

Writing: 16%

On the other hand, the practical exercises related to the grammatical and lexical contents and to the communicative skills, and the application of linguistic contents (Use of English) will have a weight of 20% of the mark obtained. Therefore, both parts (theory and practice) will add up to 100%, being 5 (five) the required mark to pass the subject.

To pass the course through continuous assessment, it is necessary to obtain an average grade of 5 points with a minimum of 4 (out of 10) in each of the parts. If this is not the case, the final average grade of the subject will be truncated with a maximum grade of 4.5 (out of 10), even if the arithmetic average of the tests is higher.

To completely pass the course, students who obtained a mark below 4 in any of the parts on the first edition of records will have to resit the failed part(s) in an exam in July of the current academic year. If the course is not passed in the second call, students will have to resit the exam of the whole course in future calls, except for the next assessment call in September.

Continuous assessment will consider not only the relevance and appropriateness of the content of the answers, but also their linguistic correctness.

Partial or total plagiarism in any of the assignments or activities will result in an automatic fail of the subject. To claim ignorance of what plagiarism is, will not exempt students of their responsibility in this regard.

2.2. Final Assessment (non-attendants)

The final assessment is calculated as follows:

Listening: 16%

Speaking: 32%

Reading: 16%

Writing 16%

On the other hand, the practical exercises related to the grammatical and lexical contents and to the communicative skills, and the application of linguistic contents (Use of English) will have a weight of 20% of the mark obtained. Therefore, both parts (theory and practice) will add up to 100%, being 5 (five) the required mark to pass the subject.

To pass the course, it is necessary to obtain an average grade of 5 points with a minimum of 4 (out of 10) in each of the parts. If this is not the case, the final average grade of the subject will be truncated with a maximum grade of 4.5 (out of 10), even if the arithmetic average of the tests is higher.

Regarding July's test, to completely pass the course, final assessment students who obtained a mark below 4 in any of the parts on the first edition of records will have to resit the exam of the whole course in future calls, including all the skills and linguistic contents of the subject.

Final assessment will consider not only the relevance and appropriateness of the content of the answers, but also their linguistic correctness.

Partial or total plagiarism in any of the assignments or activities will result in an automatic fail of the subject. To claim ignorance of what plagiarism is, will not exempt students of their responsibility in this regard.

3. Additional considerations

3.1. During the examinations no dictionaries, notes or electronic devices (mobile phones, tablets, PCs, etc.) will be allowed.

3.2. It is students' responsibility to check all the resources in MooVi and/or their emails, as well as to be aware of examination or submission dates.

3.3. All the above-mentioned comments also pertain to Erasmus students. In the event of not being able to access MooVi, students must contact the professor to solve the problem.

3.4. Students are requested to have an adequate ethical behaviour. In case of detecting an unethical behaviour (coping, plagiarism, use of not authorized electronic devices, and others), it will be considered that the student does not meet the requirements to pass the subject. In this case, the overall grade in the current academic year will be a fail (0.0).

Basic Bibliography

Beigbeder Atienza, Federico, **Diccionario Técnico Inglés/Español; Español/Inglés**, Díaz de Santos,
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Murphy, Raymond, **English Grammar in Use 4th with Answers and CD-ROM**, Cambridge University Press,
Picket, Nell Ann; Lester, Ann A. & Staples Katherine E., **Technical English: Writing, Reading and Speaking**, Longman,

Complementary Bibliography

www.agendaweb.org,
www.bbc.co.uk/worldservice/learningenglish/,
www.edufind.com/english/grammar,
www.voanews.com/specialenglish,
iate.europa.eu, **Technical English Dictionary**,
www.howjsay.org, **A free online Talking English Pronunciation Dictionary**,

Recommendations

Other comments

We recommend students, who wish to take part in this course, to have a prior A1 level in English so as to reach the A2 level, according to the Common European Framework of Reference for Languages of the Council of Europe.

Requisites:

To register in this subject it is necessary to have passed or to be registered for all the subjects of the lower-division courses to the course where this subject is placed.

We also recommend continuous assessment due to the methodology used to practice and consolidate the learning process of the subject contents. Therefore, the active participation of students is essential to pass the Technical English subject requisites.

It is advisable to check the School's lectures timetable so as to avert imcompatibility of attendance with any other subject. Therefore students will not be permitted to sit for continuous evaluation if there is overlap.

In order to avoid damaging computers, students will not be allowed to take drinks or food into the classroom. If the ingestion of liquid or food is necessary, students must show an official medical prescription.

IDENTIFYING DATA**Technical english 2**

| | | | | |
|---------------------|---|----------|------|------------|
| Subject | Technical english 2 | | | |
| Code | V12G363V01904 | | | |
| Study programme | Grado en Ingeniería en Tecnologías Industriales | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Optional | 4th | 2nd |
| Teaching language | English | | | |
| Department | | | | |
| Coordinator | García de la Puerta, Marta | | | |
| Lecturers | García de la Puerta, Marta | | | |
| E-mail | mpuerta@uvigo.es | | | |
| Web | | | | |
| General description | This course aims at providing students with a systematic adequacy to develop the appropriate skills for communicating in Technical English at level B1 according to the Common European Framework of Reference for Languages (CEFR). As far as possible, contents will be adapted to the level of each student. | | | |

Skills

| | | | | |
|------|---|--|--|--|
| Code | | | | |
| B10 | CG10 Ability to work in a multidisciplinary and multilingual environment. | | | |
| D1 | CT1 Analysis and synthesis. | | | |
| D4 | CT4 Oral and written proficiency in a foreign language. | | | |
| D7 | CT7 Ability to organize and plan. | | | |
| D9 | CT9 Application of knowledge. | | | |
| D10 | CT10 Self learning and work. | | | |
| D17 | CT17 Working as a team. | | | |
| D18 | CT18 Working in an international context. | | | |

Learning outcomes

| Expected results from this subject | Training and Learning Results | | |
|---|-------------------------------|-----|-----|
| To improve students' sense of linguistic awareness of English as a second language, the grammatical and lexical mechanisms and types of expressions. | B10 | D1 | D4 |
| | | D7 | D9 |
| | | D10 | D17 |
| | | D18 | |
| Improving students' listening and reading skills, as well as their speaking and writing skills in Technical English at intermediate level (B1). | B10 | D1 | D4 |
| | | D7 | D9 |
| | | D10 | D17 |
| | | D18 | |
| To upgrade students' grammatical and lexical notions of the English language, and the comprehension of basic Technical English structures at B1 level. | B10 | D1 | D4 |
| | | D7 | D9 |
| | | D10 | D17 |
| | | D18 | |
| To encourage students to use the English language within the engineering context, and the benefits and usefulness of the English language when applying their grammatical, lexical, and cultural knowledge. | B10 | D1 | D4 |
| | | D7 | D9 |
| | | D10 | D17 |
| | | D18 | |

| | | |
|--|-----|-----|
| Promoting students' critical autonomy for the comprehension and understanding of dialogues and texts written in Technical English. | B10 | D1 |
| | | D4 |
| | | D7 |
| | | D9 |
| | | D10 |
| | | D17 |
| | | D18 |

Contents

Topic

| | |
|--|--|
| UNIT 1. Facts and figures: Presenting data | UNIT 1 Skills - Writing, reading, and presenting facts and figures in a professional setting. - Understanding symbols and abbreviations. - Describing dimensions and specifications; phrases related to length, width, thickness, etc. - Describing and referring to visual aids. - Locating required information in a table of technical data. |
| UNIT 2. Professional Presentations: Presenting with Impact | UNIT 2 Skills - Delivering impactful presentations. - Structuring a presentation. - Illustrating the importance of body language and voice power to communicate your message clearly and persuasively. |
| UNIT 3. Technical Descriptions | SKILLS - Understanding and describing process diagrams, phases and procedures. - Describing technical functions and applications and explaining how technology works - Describing specific materials; categorising materials and specifying and describing properties - Describing component shapes and features; explaining manufacturing techniques - Describing health and safety precautions and emphasising the importance of precautions. Language focus - Verbs for describing stages of a process. - The passive form: Present simple passive structures. - Time Connectors. - Verbs for describing movement; verbs and adjectives to describe advantages; adverbs for adding emphasis. - Cause-effect (lead to, result in, etc.) - Negative prefixes (in-, un-, dis-, etc.). - Relative clauses: Defining vs non-defining relative clauses; shortened relative clauses. - Mixed conditionals, first vs. second conditional. - Would/ Could - Words for describing mechanisms, machining, properties of materials. |

UNIT 4. Applying for a Job

Skills

- Doing a self-evaluation of your strengths and weaknesses.
- Writing different types of CV.
- Becoming acquainted with cover and application letters.
- Preparing for job interviews.
- Demonstrating the best body language for job interviews.

Language focus

- Phrases for demonstrating strengths and weaknesses.
- Useful language for talking about yourself, and demonstrating your skills and experience.
- Action verbs; positive adjectives, positive expressions.
- Softening negatives and turning negatives into positives.
- Avoiding spelling mistakes.
- Phrases for opening and closing a letter of application.

UNIT 5. Writing Emails

Skills

- Writing short emails with appropriate formatting.
- Recognizing and producing formal and informal language in emails.
- Making your writing structured; writing effective openings and closings
- Handling style, tone and voice.

Language focus

- Common email expressions.
- Writing style.
- Creating a warm, professional tone.
- Avoiding spelling mistakes.

Planning

| | Class hours | Hours outside the classroom | Total hours |
|--|-------------|-----------------------------|-------------|
| Introductory activities | 1 | 0 | 1 |
| Mentored work | 4 | 16 | 20 |
| Autonomous problem solving | 8 | 10 | 18 |
| ICT supported practices (Repeated, Dont Use) | 5 | 8 | 13 |
| Lecturing | 8 | 15 | 23 |
| Problem and/or exercise solving | 6 | 10 | 16 |
| Essay | 4 | 15 | 19 |
| Objective questions exam | 3 | 5 | 8 |
| Oral exam | 8 | 16 | 24 |
| Objective questions exam | 3 | 5 | 8 |

*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 | Activities aimed at presenting the subject, getting in touch with students and gathering information about their previous knowledge on the topic. |
| Mentored work | Analysis and resolution of practical exercises related to the grammatical and lexical contents, and to the communication skills. The students must develop these activities in an autonomous way, specially those homework activities concerning Writing skills. |
| Autonomous problem solving | Activities in which problems are presented and/or exercises related to the subject. The student must develop the analysis and resolution of problems and/or activities concerning the four communicative skills at an individual level, as well as the technical English linguistic skill (Use of English); specially those ones concerning Speaking. |
| ICT supported practices (Repeated, Dont Use) | Practice of the four communicative skills: listening, speaking, reading and writing, as well as the technical English linguistic skill (Use of English) at an individual or group level. |
| Lecturing | Explanation of linguistic contents and their application (Use of English) for the learning and acquisition of the theoretical contents of the subject. |

Personalized assistance

| Methodologies | Description |
|---------------|-------------|
| | |

| | |
|----------------------------|---|
| Introductory activities | The objective of the introductory activities is to provide general guidance on the subject; to promote learning strategies; to make general notes about the work and exercises, deadlines for the submission of work and the exam dates; and to give advice on how to pass the subject. It is important to know that no tutorials will be done on the telephone or internet (email, Skype, etc.). In case of any doubt or comment, students should contact directly with the professor in the classroom or during tutorial hours. |
| Autonomous problem solving | This activity seeks to help students with the practical exercises related to the communicative skills and the linguistic skills and their application for the learning and acquisition of the theoretical contents of the subject. |
| Mentored work | Practice of the different exercises in relation to the communicative skills and linguistic skills in order to apply English theoretical concepts. |
| Lecturing | The personalised attention for the master class is focused on the attention of students in the classroom and during tutorial hours. It focuses on the correct comprehension and promotion of the learning of the subject's theoretical concepts, as well as on providing guidance on work and practical exercises and on giving advice on how to pass the subject. |

| Tests | Description |
|-----------|--|
| Oral exam | The objective of the personalised attention of the oral exam is focused on the preparation, promotion and supervision of the oral expression (Speaking) in the classroom during the course and before the exam. This activity seeks to help the students not only to express themselves with relevance and appropriateness using the topics and vocabulary from the field of engineering, but also with linguistic correction. |

| Assessment | | Description | Qualification | Training and Learning Results |
|---------------------------------|--|-------------|---------------|-------------------------------------|
| Problem and/or exercise solving | Evaluation of theoretical concepts and their application. Resolution of practical exercises related to the linguistic skill (Use of English) of technical English. | 20 | B10 | D7 D10 D18 |
| Essay | Evaluation of the writing skill. | 16 | B10 | D1 D4 D7 D9 D10 D18 |
| Objective questions exam | Evaluation of the listening skill with engineering-related contents. | 16 | B10 | D4 D9 D10 D18 |
| Oral exam | Evaluation of the speaking skill with engineering-related vocabulary and topics. | 32 | B10 | D1 D4 D7 D10 D17 D18 |
| Objective questions exam | Evaluation of the reading skill with engineering-related topics and vocabulary. | 16 | B10 | D1 D4 D7 D10 D17 D18 |

Other comments on the Evaluation

Particular considerations

There are two assessment systems: continuous or final. The selection of a system excludes the other.

1.1. Continuous assessment

To qualify for the system of continuous evaluation, students are required to attend 80% of the total lecture hours with academic progress and participation. Students not reaching that percentage will lose this option. The assignments and tests done during the course will be worth 100 % of the final assessment for those students choosing the continuous evaluation. The non-completion of the assignments requested during the course will be counted as a zero (0.0). The assignments must be delivered or submitted by the deadlines and dates set in advance.

1.2. Final assessment (non-attendants)

Students choosing the final examination will have to take a final overall test that will take place on the official date established by the School of Industrial Engineering. To this end, students should consult the school's website, where the examination date and time are specified.

2. Subject's final grade

2.1. Continuous assessment

The final mark for this subject is calculated taking into consideration all the skills practised during the course. Therefore, each one of them is given the following weight in the final grade:

Listening: 16%

Speaking: 32%

Reading: 16%

Writing: 16%

On the other hand, the practical exercises related to the grammatical and lexical contents and to the communicative skills, and the application of linguistic contents (Use of English) will have a weight of 20% of the mark obtained. Therefore, both parts (theory and practice) will add up to 100%, being 5 (five) the required mark to pass the subject.

To pass the course through continuous assessment, it is necessary to obtain an average grade of 5 points with a minimum of 4 (out of 10) in each of the parts. If this is not the case, the final average grade of the subject will be truncated with a maximum grade of 4.5 (out of 10), even if the arithmetic average of the tests is higher.

To completely pass the course, students who obtained a mark below 4 in any of the parts on the first edition of records will have to resit the failed part(s) in an exam in July of the current academic year. If the course is not passed in the second call, students will have to resit the exam of the whole course in future calls, except for the next assessment call in September.

Continuous assessment will consider not only the relevance and appropriateness of the content of the answers, but also their linguistic correctness.

Partial or total plagiarism in any of the assignments or activities will result in an automatic fail of the subject. To claim ignorance of what plagiarism is, will not exempt students of their responsibility in this regard.

2.2. Final Assessment (non-attendants)

The final assessment is calculated as follows:

Listening: 16%

Speaking: 32%

Reading: 16%

Writing 16%

On the other hand, the practical exercises related to the grammatical and lexical contents and to the communicative skills, and the application of linguistic contents (Use of English) will have a weight of 20% of the mark obtained. Therefore, both parts (theory and practice) will add up to 100%, being 5 (five) the required mark to pass the subject.

To pass the course, it is necessary to obtain an average grade of 5 points with a minimum of 4 (out of 10) in each of the parts. If this is not the case, the final average grade of the subject will be truncated with a maximum grade of 4.5 (out of 10), even if the arithmetic average of the tests is higher.

Regarding July's test, to completely pass the course, final assessment students who obtained a mark below 4 in any of the parts on the first edition of records will have to resit the exam of the whole course in future calls, including all the skills and linguistic contents of the subject.

Final assessment will consider not only the relevance and appropriateness of the content of the answers, but also their linguistic correctness.

Partial or total plagiarism in any of the assignments or activities will result in an automatic fail of the subject. To claim ignorance of what plagiarism is, will not exempt students of their responsibility in this regard.

3. Additional considerations

- 3.1. During the examinations no dictionaries, notes or electronic devices (mobile phones, tablets, PCs, etc.) will be allowed.
- 3.2. It is students' responsibility to check all the resources in MooVi and/or their emails, as well as to be aware of examination or submission dates.
- 3.3. All the above-mentioned comments also pertain to Erasmus students. In the event of not being able to access MooVi, students must contact the professor to solve the problem.
- 3.4. Students are requested to have an adequate ethical behaviour. In case of detecting an unethical behaviour (coping, plagiarism, use of not authorized electronic devices, and others), it will be considered that the student does not meet the requirements to pass the subject. In this case, the overall grade in the current academic year will be a fail (0.0).

Sources of information

Basic Bibliography

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Collazo, Javier, **Diccionario Collazo Inglés-Español de Informática, Computación y otras Materias**, McGraw-Hill,
Hornby, Albert Sidney, **Oxford Advanced Learner's Dictionary**, Oxford University Press,
Jones, Daniel, **Cambridge English Pronouncing Dictionary**, Cambridge University Press,
Hancock, Mark, **English Pronunciation in Use: Intermediate**, Cambridge University Press,
Murphy, Raymond, **English Grammar in Use: A Self-Study Reference and Practice Book for Intermediate Students**, Cambridge University Press,
Picket, Nell Ann; Laster, Ann A. & Staples Katherine E., **Technical English: Writing, Reading and Speaking**, Pearson Limited Education,

Complementary Bibliography

www.agendaweb.org,
www.bbc.co.uk/worldservice/learningenglish/,
www.edufind.com/english/grammar,
www.voanews.com/specialenglish,
www.mit.edu, **Massachusetts Institute of Technology**,
www.iate.eu, **Eu's Multilingual Technical and Scientific Dictionary**,

Recommendations

Other comments

We recommend students to have some knowledge of English. This course will start from an A2 level and it will reach B1 level, according to the European Framework of Reference for Languages of the Council of Europe.

Requisites:

To register in this subject, it is necessary to have passed or to be registered for all the subjects of the lower courses.

We also recommend continuous assessment due to the methodology used to practise and consolidate the contents of the subject. Therefore, the active participation of students is essential to pass the Technical English subject.

It is advisable to check and compare this subject's timetable with the School's lectures timetables so as to avoid incompatibilities. Students will not be allowed to choose continuous assessment if there is an overlap with other subjects.

In order to avoid damaging the room's computer equipment, students will not be allowed to take drinks or food into the classroom. If the ingestion of liquids or food is due to medical reasons, students must show an official medical prescription.

Sending of emails or the using of mobile phones during the lessons means that the students will be expelled.

The student who does not comply with the information in the previous paragraph will not only be expelled, but s/he will also lose the opportunity to sit for continuous assessment.

In case of discrepancy, the Spanish version of this teaching guide will prevail.

IDENTIFYING DATA

Methodology for the preparation, presentation and management of technical projects

| | | | | |
|---------------------|--|----------|------|------------|
| Subject | Methodology for the preparation, presentation and management of technical projects | | | |
| Code | V12G363V01905 | | | |
| Study programme | Grado en Ingeniería en Tecnologías Industriales | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Optional | 4th | 2nd |
| Teaching language | Spanish Galician English | | | |
| Department | | | | |
| Coordinator | Alonso Rodríguez, José Antonio Cerqueiro Pequeño, Jorge | | | |
| Lecturers | Alonso Rodríguez, José Antonio Cerqueiro Pequeño, Jorge González Cespón, José Luis | | | |
| E-mail | jcerquei@uvigo.es jaalonso@uvigo.es | | | |
| Web | http://moovi.uvigo.gal/ | | | |
| General description | The aim of this course is to prepare the students to handle the methods, techniques and tools that are needed for the elaboration and management of technical documents in the industrial field of Engineering. | | | |
| | It will also be sought to develop skills in the handling of information and communication technologies related to the professional field of the student's degree. | | | |
| | Furthermore, the student skills to communicate properly the knowledge, procedures and results in the Industrial Engineering field will be strengthened. | | | |
| | An essentially practical approach will be used, based in the solution of specific application exercises -with guidance of the subject's lecturer- that will require to apply the theoretical contents of the course. | | | |

Skills

Code

| | |
|-----|---|
| B3 | CG3 Knowledge of basic and technological subjects that enable students to learn new methods and theories, and to adapt to new situations. |
| C18 | CE18 Knowledge and skills to organize and manage projects. Know the organizational structure and functions of a project office. |
| D2 | CT2 Problem solving. |
| D3 | CT3 Oral and written proficiency in the own language. |
| D5 | CT5 Information Management. |
| D6 | CT6 Application of computer science in the field of study. |
| D7 | CT7 Ability to organize and plan. |
| D8 | CT8 Decision making. |
| D9 | CT9 Application of knowledge. |
| D10 | CT10 Self learning and work. |
| D11 | CT11 Planning changes to improve overall systems. |
| D13 | CT13 Adaptability to new situations. |
| D14 | CT14 Creativity. |
| D15 | CT15 Objectification, identification and organization. |
| D17 | CT17 Working as a team. |
| D18 | CT18 Working in an international context. |
| D20 | CT20 Ability to communicate with people not expert in the field. |

Learning outcomes

Expected results from this subject

Training and Learning Results

| | | | |
|--|----|-----|-----|
| Utilization of methodologies, technics and tools for the organization and management of all technical documents other than engineering projects. | B3 | C18 | D2 |
| | | | D7 |
| | | | D8 |
| | | | D9 |
| | | | D10 |
| | | | D14 |
| | | | D15 |
| | | | D17 |
| Skills in the utilization of information systems and in the communications in the industrial scope. | | D5 | |
| | | D6 | |
| | | D9 | |
| | | D11 | |
| | | D17 | |
| Skills to communicate properly the knowledge, procedures, results, abilities in the field of Engineering in Industry. | | D3 | |
| | | D13 | |
| | | D17 | |
| | | D18 | |
| | | D20 | |

Contents

Topic

| | |
|---|---|
| 1. Types of usual documents in the distinct fields of the professional engineering activities. | 1.1. Technical documents: Characteristics and components. 1.2. Types of technical documents according to their contents. 1.3. Types of technical documents according to their recipients and objectives. |
| 2. Methodology for writing and presenting technical documentation: assessments, valuations, expert reports, studies, reports, dossiers and other similar technical works. | 2.1. General aspects in elaborating and presenting technical documentation. 2.2. Elaboration of technical reports. 2.3. Elaboration of technical studies. 2.4. Elaboration of assessments, expert reports and valuations. 2.5. Elaboration of dossiers and other technical works. 2.6. Technical work in concurrent and/or collaborative engineering environments. |
| 3. Techniques for research, analysis, evaluation and selection of technological information. | 3.1. Typology of technological information. 3.2. Sources of technological information. 3.3. Information and communications systems. 3.4. Techniques for information research. 3.5. Methods for analyzing information. 3.6. Evaluation and selection of information. |
| 4. Laws and regulations about documentation. | 4.1. Applicable laws to technical documentation according to its specific field. 4.2. Other applicable regulations. |
| 5. Processing of technical documentation. | 5.1. Processing at Government Offices of technical documentation. 5.2. Legitimization and responsibilities in the processing of documentation before Government's Offices. 5.3. Processing of documentation: Concepts, procedures and specifics. |
| 6. Presentation and verbal defence of technical documents. | 6.1. Regulations in the elaboration of technical presentations. 6.2. Preparation for the verbal defence of technical documents. 6.3. Techniques and specific tools for the performance of public presentations. |

Planning

| | Class hours | Hours outside the classroom | Total hours |
|---------------------------------|-------------|-----------------------------|-------------|
| Lecturing | 29.5 | 44.25 | 73.75 |
| Laboratory practical | 29.5 | 44.25 | 73.75 |
| Laboratory practice | 1.3 | 0 | 1.3 |
| Problem and/or exercise solving | 1.2 | 0 | 1.2 |

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

Methodologies

| | Description |
|-----------|--|
| Lecturing | Presentation by the lecturer of the contents of the topic to be studied, the theoretical bases and/or guidelines of a specific work, exercise or project to be developed by the student. |

| | |
|----------------------|---|
| Laboratory practical | Activities that require applying theoretical knowledge to specific situations in order to acquire basic and procedural skills related to the topic that is being studied. These activities will be developed in special spaces with specific equipment (laboratories, computer rooms, etc.). |
|----------------------|---|

Personalized assistance

Methodologies Description

| | |
|----------------------|---|
| Laboratory practical | Activities oriented to the application of knowledge to specific situations, and to acquire basic and procedural skills related to the field of study. Rooms equipped with specific materials and resources will be used for these classes. An appropriate follow-up will be performed on student's work to verify that the best practices shown in theory classes are applied, and that the procedural recommendations provided by the lecturer are followed. For all the teaching modalities considered in the Contingency Plan, the tutorial sessions can be carried out using IT tools (email, video-call, FAITIC forums, etc.) according to the modality of prior concertation of the virtual place, date and time. |
|----------------------|---|

Assessment

| | Description | Qualification | Training and Learning Results | |
|---------------------------------|---|---------------|-------------------------------|---|
| Laboratory practical | Interdisciplinary exercises and problems -as close to real cases as possible- will be solved in groups of students, with lecturer orientation and enforcing active participation by the students. | 55 | B3 | C18 D2 D3 D5 D7 D8 D9 D10 D13 D14 D15 D17 D18 D20 |
| Laboratory practice | Making of practical tests and exercises related to the subject's contents, in the scope of the personalised attention to students. | 20 | B3 | C18 D2 D3 D5 D7 D8 D9 D10 D13 D14 D15 D17 D18 D20 |
| Problem and/or exercise solving | Groups of short answer questions related to the subject's contents, to check that the students have understood and assimilated the theoretical and practical contents. | 25 | B3 | C18 D2 D3 D7 D8 D9 D11 D14 D15 |

Other comments on the Evaluation

Assessment of student's work - individually and/or in groups, either face-to-face or non-presential - will be carried out by the lecturer by weighting appropriately the different marks obtained in the activities that were proposed along this course.

Students may opt to follow this course either in the 'Continuous Evaluation' or in the 'Non-Continuous Evaluation' modalities. In both cases the grading of the course will be made according to a numerical system, using values from 0,0 to 10,0 points according to the current laws that are applicable (R.D. 1125/2003 of 5th September, BOE Nr. 224 of 18th September). A minimum overall mark of 5,0 is required to pass this course.

For the First Announcement or Edition.

a) 'Continuous Evaluation' modality:

The final mark for the course will be calculated by combining the individual marks awarded in the assessment of the works proposed and elaborated in the practical classes (60% weight) along the term, with the mark awarded for the final test performed in the date stated by the School's Ruling (40% weight).

These marks will assess the behaviour and the implication of the student both in class and in the realisation of the different programmed activities, plus the fulfillment of the deadlines for submitting the works that were proposed, and/or the presentation and defence of those works, etc.

Students not reaching the minimum value of 3,5 points out of 10 that are required for every section, they will either need to perform also the assessment in the Second Announcement date, or to elaborate additional works or practical exercises to achieve the learning goals that were established for the concerned sections.

b) 'Non-Continuous Evaluation' modality:

There is a two weeks time term after the starting date of the course for the concerned students to justify with documents that it is not possible for them to follow the regular process of continuous evaluation.

In order to pass this course, students renouncing to continuous evaluation will be obliged to perform a final test covering the whole contents of the course, both theoretical and practical, including short questions, reasoning questions, problem solving and development of practical cases. The mark awarded to the student assessment will be the final mark for the course.

A minimum mark of 5,0 points out of 10,0 possible will be required to pass the course.

For the Second Announcement or Edition.

Students who did not pass the course in the First Announcement, but that could have passed some specific parts of the theory or practical blocks, will be allowed to be assessed only regarding the failed parts, keeping the marks formerly awarded for the parts already passed, and applying the same assessment criteria to them.

Students wishing to improve their qualification, or students that failed the course on the First Announcement, will need to assist to the Second Announcement, where they will be assessed about the whole contents of the course, both theoretical and practical, including short questions, reasoning questions, problem solving and development of practical cases. Students are required to reach a minimum mark of 5,0 points out of 10,0 possible to pass the course.

Ethical commitment:

It is expected an adequate ethical behaviour of the student. In case of detecting unethical behaviour (copying, plagiarism, unauthorized use of electronic devices, etc.) shall be deemed that the student does not meet the requirements for passing the subject. In this case, the overall rating in the current academic year will be Fail (0.0).

The use of any electronic device for the assessment tests is not allowed unless explicitly authorized. The fact of introducing unauthorized electronic device in the examination room will be considered reason for not passing the subject in the current academic year and will hold overall rating (0.0).

Sources of information

Basic Bibliography

Aguado, David, **HABILIDADES PARA EL TRABAJO EN EQUIPO: PROGRAMA DE ENTRENAMIENTO**, 1^a, Ediciones Universidad Autónoma de Madrid, 2008

Alvarez Marañón, Gonzalo, **EL ARTE DE PRESENTAR: CÓMO PLANIFICAR, ESTRUCTURAR, DISEÑAR Y EXPONER PRESENTACIONES**, 1^a, Gestión 2000, 2012

Lannon, John M. and Gurak, Laura J., **TECHNICAL COMMUNICATION**, 13th, Pearson, 2013

Pringle, Alan S. and O'Keefe, Sarah S., **TECHNICAL WRITING 101: A REAL-WORLD GUIDE TO PLANNING AND WRITING TECHNICAL CONTENT**, 1st, Scriptorium Publishing Services, 2009

Complementary Bibliography

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Budinski, Kenneth G., **ENGINEER'S GUIDE TO TECHNICAL WRITING**, 1st, ASM International, 2001

Pease, Allan, **ESCRIBIR BIEN ES FÁCIL: GUÍA PARA LA BUENA REDACCIÓN DE LA CORRESPONDENCIA**, 1^a, Amat, 2007

BIBLIOGRAFÍA COMPLEMENTARIA: -----,

Balzola, Martín, **PREPARACIÓN DE PROYECTOS E INFORMES TÉCNICOS**, 2^a, Balzola, 1996

Boeglin Naumovic, Martha, **LEER Y REDACTAR EN LA UNIVERSIDAD: DEL CAOS DE LAS IDEAS AL TEXTO ESTRUCTURADO**, 1^a, MAD, 2007

Calavera, J., **MANUAL PARA LA REDACCIÓN DE INFORMES TÉCNICOS EN CONSTRUCCIÓN: INFORMES, DICTÁMENES, ARBITRAJES**, 2^a, Intemac, 2009

Córcoles Cubero, Ana Isabel, **CÓMO REALIZAR BUENOS INFORMES: SORPREnda CON INFORMES CLAROS, DIRECTOS Y CONCISOS**, 1^a, Fundacion Confemetal, 2007

García Carbonell, Roberto, **PRESENTACIONES EFECTIVAS EN PÚBLICO: IDEAS, PROYECTOS, INFORMES, PLANES, OBJETIVOS, PONENCIAS, COMUNICACIONES**, 1^a, Edaf, 2006

Himstreet, William C., **GUÍA PRÁCTICA PARA LA REDACCIÓN DE CARTAS E INFORMES EN LA EMPRESA**, 1^a, Deusto, 2000

Sánchez Pérez, José, **FUNDAMENTOS DE TRABAJO EN EQUIPO PARA EQUIPOS DE TRABAJO**, 1^a, McGraw-Hill, 2006

Williams, Robin, **THE NON-DESIGNER'S PRESENTATION BOOK**, 1st, Peachpit Press, 2009

Recommendations

Subjects that it is recommended to have taken before

Graphic expression: Fundamentals of engineering graphics/V12G320V01101

Technical Office/V12G320V01704

Other comments

Previously to the realisation of the final assesments, students should check in the FAITIC platform to know whether it is necessary for them to carry any particular documentation, materials, etc. into the exam room to perform the tests.

It is necessary that the student registered in this course, either has passed all courses of the former years, or is registered in the courses he's not passed yet.

IDENTIFYING DATA

Programación avanzada para a enxeñaría

| | | | | |
|---------------------|--|----------|------|------------|
| Subject | Programación avanzada para a enxeñaría | | | |
| Code | V12G363V01906 | | | |
| Study programme | Grao en Enxeñaría en Tecnoloxías Industriais | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Optional | 4 | 2c |
| Teaching language | Castelán | | | |
| Department | Enxeñaría de sistemas e automática | | | |
| Coordinator | Camaño Portela, José Luís | | | |
| Lecturers | Camaño Portela, José Luís López Fernández, Joaquín | | | |
| E-mail | cama@uvigo.es | | | |
| Web | http://moovi.uvigo.gal/ | | | |
| General description | Aplicación práctica de técnicas actuais para a programación de aplicacíons industriais para *computadores e dispositivos móbiles. Programación orientada a obxectos en Xava para sistemas *Windows e *Android. | | | |

Competencias

| | | |
|------|-----|---|
| Code | B3 | CG3 Coñecemento en materias básicas e tecnolóxicas, que os capacite para a aprendizaxe de novos métodos e teorías, e os dote de versatilidade para adaptarse a novas situacións. |
| | B4 | CG4 Capacidade para resolver problemas con iniciativa, toma de decisións, creatividade, razonamento crítico e de comunicar e transmitir coñecementos, habilidades e destrezas no campo da enxeñaría industrial. |
| | C3 | CE3 Coñecementos básicos sobre o uso e programación dos ordenadores, sistemas operativos, bases de datos e programas informáticos con aplicación en enxeñaría. |
| | D2 | CT2 Resolución de problemas. |
| | D5 | CT5 Xestión da información. |
| | D6 | CT6 Aplicación da informática no ámbito de estudio. |
| | D7 | CT7 Capacidade de organizar e planificar. |
| | D17 | CT17 Traballo en equipo. |

Resultados de aprendizaxe

| Expected results from this subject | Training and Learning Results | | | |
|---|-------------------------------|----|-----|--|
| Coñecementos informáticos avanzados aplicables ao exercicio profesional dos futuros enxeñeiros, con especial énfase nas súas aplicacións á resolución de problemas no ámbito da Enxeñaría | B3 | C3 | D2 | |
| | B4 | | D5 | |
| | | | D6 | |
| | | | D7 | |
| | | | D17 | |
| Coñecer os fundamentos informáticos de diferentes paradigmas de programación (estruturada, modular, orientada a obxectos), as súas posibilidades, características e aplicabilidade á resolución de problemas no ámbito da Enxeñaría | B3 | C3 | D2 | |
| | B4 | | D5 | |
| | | | D6 | |
| | | | D7 | |
| | | | D17 | |
| Capacidade para utilizar linguaxes e contornas de programación e para programar algoritmos, rutas e aplicacións de complexidade media para a resolución de problemas e o tratamento de datos no ámbito da Enxeñaría | B3 | C3 | D2 | |
| | B4 | | D5 | |
| | | | D6 | |
| | | | D7 | |
| | | | D17 | |
| Coñecer os fundamentos do proceso de desenvolvemento de software e as súas diferentes etapas | B3 | C3 | D2 | |
| | B4 | | D5 | |
| | | | D6 | |
| | | | D7 | |
| | | | D17 | |
| Capacidade para desenvolver interfaces gráficas de usuario | B3 | C3 | D2 | |
| | B4 | | D5 | |
| | | | D6 | |
| | | | D7 | |
| | | | D17 | |

Contidos

Topic

| | |
|--|--|
| Programación orientada obxectos en Java | Linguaxe Java. Clases, obxectos e referencias. Tipos de datos, instrucións, operadores. Matrices e coleccións. Herdanza, interfaces, polimorfismo. Tratamento de excepcións. Programación de gráficos mediante JavaFX. |
| Creación de aplicacóns para dispositivos móbiles | Sistemas Android. Ferramentas de desenvolvemento de aplicacóns. Interfaces de usuario para dispositivos móbiles. Acceso a bases de datos. Manexo de sensores e cámara. Procesado de imaxe. Comunicación inalámbrica con dispositivos industriais. Acceso a bases de datos. |

Planificación

| | Class hours | Hours outside the classroom | Total hours |
|--|-------------|-----------------------------|-------------|
| Prácticas de laboratorio | 18 | 9 | 27 |
| Resolución de problemas | 20 | 40 | 60 |
| Lección magistral | 12.5 | 25 | 37.5 |
| Informe de prácticas, prácticum e prácticas externas | 8.5 | 17 | 25.5 |

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

Metodoloxía docente

| | Description |
|--------------------------|--|
| Prácticas de laboratorio | Desenvolvemento de aplicacións industriais para control, monitorización e automatización de plantas industriais, en sistemas Windows e Android |
| Resolución de problemas | Posta en práctica dos coñecementos adquiridos na materia mediante a súa aplicación á resolución de problemas habituais na enxeñaría |
| Lección magistral | Introdución e descripción dos diferentes conceptos e técnicas relacionados coa materia |

Atención personalizada

| | Description |
|--|---|
| Lección magistral | Atención personalizada ás dúbidas do alumnado |
| Prácticas de laboratorio | Atención personalizada ás dúbidas do alumnado |
| Resolución de problemas | Atención personalizada ás dúbidas do alumnado |
| Tests | Description |
| Informe de prácticas, prácticum e prácticas externas | Atención personalizada ás dúbidas do alumnado |

Avaliación

| | Description | Qualification | Training and Learning Results | | | |
|--|---|---------------|-------------------------------|----|-----|--|
| Prácticas de laboratorio | Avaliarase as solucións achegadas polo alumno na resolución das diferentes prácticas de laboratorio propostas | 40 | B3 | C3 | D2 | |
| | | | B4 | | D5 | |
| | | | | | D6 | |
| | | | | | D7 | |
| | | | | | D17 | |
| Resolución de problemas | Cualificarse a aplicación dos coñecementos adquiridos na resolución de tarefas de enxeñaría específicas | 30 | B3 | C3 | D2 | |
| | | | B4 | | D5 | |
| | | | | | D6 | |
| | | | | | D7 | |
| | | | | | D17 | |
| Lección magistral | Avaliarase a participación activa do alumno nas diferentes actividades formativas | 10 | B3 | C3 | D2 | |
| | | | B4 | | D5 | |
| | | | | | D6 | |
| | | | | | D7 | |
| | | | | | D17 | |
| Informe de prácticas, prácticum e prácticas externas | Calidade dos informes das diferentes prácticas propostas e das solucións achegadas | 20 | B3 | C3 | D2 | |
| | | | B4 | | D5 | |
| | | | | | D6 | |
| | | | | | D7 | |
| | | | | | D17 | |

Other comments on the Evaluation

Compromiso ético: Espérase que o alumno presente un comportamento ético adecuado. No caso de detectar un comportamento non ético (copia, plaxio, utilización de aparellos electrónicos non autorizados, e outros) considérase que o alumno non reúne os requisitos necesarios para superar a materia. Neste caso a cualificación global no presente curso

académico será de suspenso (0.0).

A evaluación nesta materia ten un compoñente moi alto de evaluación continua durante a realización das diferentes actividades académicas desenvolvidas durante o curso. No caso de convocatorias diferentes da convocatoria de maio, a evaluación realizarase no laboratorio, mediante o desenvolvemento práctico dunha aplicación similar ás desenvolvidas durante o curso.

Bibliografía. Fontes de información

Basic Bibliography

B.C. Zapata, **Android Studio application development**, 2013,

K. Sharan, **Beginning Java 8 fundamentals**, 2014,

I.F. Darwin, **Java cookbook**, 2014,

L.M. Lee, **Android application development coockbook**, 2013,

Complementary Bibliography

N. Smyth, **Android Studio Development Essentials**,

http://www.techotopia.com/index.php/Android_Studio_Development_Essentials,

N. Smyth, **Android 4 app development essentials**,

http://www.techotopia.com/index.php/Android_4_App_Development_Essentials,

G. Allen, **Beginning Android 4**, 2012,

M. Aydin, **Android 4: new features for application development**, 2012,

J. Bryant, **Java 7 for absolute beginners**, 2012,

M. Burton, D. Felke, **Android application development for dummies**, 2012,

J. Friesen, **Learn Java for Android development**, 2013,

M.T. Goodrich, R. Tamassia, M.H. Goldwasser, **Data structures & algorithms in Java**, 2014,

J. Graba, **An introduction to network programming with Java**, 3rd edition, 2013,

I. Horton, **Beginnning Java 7 Edition**, 2011,

J. Howse, **Android application programming with OpenCV**, 2013,

W. Jackson, **Android Apps for absolute beginners**, 2012,

L. Jordan, P. Greyling, **Practical Android Projects**, 2011,

Y.D. Liang, **Introduction to Java programming**, 2011,

R. Matthews, **Beginning Android tablet programming**, 2011,

P. Mehta, **Learn OpenGL ES**, 2013,

G. Milette, A. Stroud, **Professional Android sensor programming**, 2012,

J. Morris, **Android user interface development**, 2011,

R. Schwartz, etc, **The Android developer's cookbook**, 2013,

R.G. Urma, M. Fusco, A. Mycroft, **Java 8 in action**, 2015,

Recomendacións

Subjects that it is recommended to have taken before

Informática: Informática para a enxeñaría/V12G320V01203

IDENTIFYING DATA

Seguridade e hixiene industrial

| | | | | |
|---------------------|--|----------|------|------------|
| Subject | Seguridade e hixiene industrial | | | |
| Code | V12G363V01907 | | | |
| Study programme | Grao en Enxeñaría en Tecnoloxías Industriais | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Optional | 4 | 2c |
| Teaching language | Castelán | | | |
| Department | Enxeñaría química | | | |
| Coordinator | González de Prado, Begoña | | | |
| Lecturers | Díez Sarabia, Aida María González de Prado, Begoña | | | |
| E-mail | bgp@uvigo.es | | | |
| Web | | | | |
| General description | Nesta materia abórdanse os aspectos más destacados das técnicas xerais e específicas da Seguridade do Traballo, as diferentes ramas da Hixiene do Traballo, a Ergonomía como disciplina centrada no sistema persoamáquina, a influencia dos factores psicosociais sobre a saúde do traballador, así como a lexislación elaborada sobre todos estes aspectos. | | | |

Competencias

| | | | |
|------|---|--|--|
| Code | | | |
| B4 | CG4 Capacidade para resolver problemas con iniciativa, toma de decisións, creatividade, razonamento crítico e de comunicar e transmitir coñecementos, habilidades e destrezas no campo da enxeñaría industrial. | | |
| B6 | CG6 Capacidade para o manexo de especificacións, regulamentos e normas de obrigado cumprimento. | | |
| B7 | CG7 Capacidade para analizar e valorar o impacto social e ambiental das solucións técnicas. | | |
| B11 | CG11 Coñecemento, comprensión e capacidade para aplicar a lexislación relativa a instalacións industriais. | | |
| D2 | CT2 Resolución de problemas. | | |
| D5 | CT5 Xestión da información. | | |
| D7 | CT7 Capacidade de organizar e planificar. | | |
| D8 | CT8 Toma de decisións. | | |
| D9 | CT9 Aplicar coñecementos. | | |
| D10 | CT10 Aprendizaxe e traballo autónomos. | | |
| D14 | CT14 Creatividade. | | |
| D17 | CT17 Traballo en equipo. | | |
| D20 | CT20 Capacidade para comunicarse con persoas non expertas na materia. | | |

Resultados de aprendizaxe

| Expected results from this subject | Training and Learning Results |
|---|---------------------------------------|
| CG1 Capacidade para a redacción, firma e desenvolvemento de proxectos no ámbito da enxeñaría industrial, que teñan por obxecto, segundo a especialidade, a construcción, reforma, reparación, conservación, demolición, fabricación, instalación, montaxe ou explotación de: estruturas, equipos mecánicos, instalacións enerxéticas, instalacións eléctricas e electrónicas, instalacións e plantas industriais, e procesos de fabricación e automatización. | B6 B11 D5 |
| CG2 Capacidade para a dirección das actividades obxecto dos proxectos de enxeñaría descritos na competencia CG1. | B11 D5 D9 D10 |
| CG4 Capacidade para resolver problemas con iniciativa, toma de decisións, creatividade, razonamento crítico e capacidade para comunicar e transmitir coñecementos, habilidades e destrezas no campo da enxeñaría industrial. | B4 B7 D2 D5 D9 D10 D14 D17 D20 |
| CG11 Coñecemento, comprensión e capacidade para aplicar a lexislación necesaria no exercicio da profesión de Enxeñeiro Técnico Industrial. | B6 B7 B11 D2 D7 D8 D9 D10 D14 D17 D20 |

| | | |
|------------------------|----|-----|
| CT1 Análise e síntese. | B4 | D2 |
| | B7 | D5 |
| | | D7 |
| | | D8 |
| | | D9 |
| | | D14 |
| | | D17 |
| | | D20 |

Contidos

Topic

| | |
|---|--|
| TEMA 1.- Introdución á Seguridade e Hixiene do Traballo | 1.1.- Terminoloxía básica 1.2.- Saúde e traballo 1.3.- Factores de risco 1.4.- Incidencia dos factores de risco sobre a saúde 1.5.- Técnicas de actuación fronte aos danos derivados do traballo |
| TEMA 2.- Evolución histórica e lexislación | 2.1.- Evolución histórica 2.2.- Evolución en España 2.3.- A Seguridade e Hixiene do Traballo na lexislación española 2.4.- Responsabilidades e sancións |
| TEMA 3.- Seguridade do Traballo | 3.1.- O accidente de traballo 3.2.- Seguridade do traballo 3.3.- Causas dos accidentes 3.4.- Análise estatística dos accidentes 3.5.- Xustificación da prevención |
| TEMA 4.- Técnicas de seguridade. Avaliación de riscos | 4.1.- Técnicas de seguridade 4.2.- Obxectivos da avaliación de riscos 4.3.- Avaliación xeral 4.4.- Avaliación das condicións de traballo 4.5.- Técnicas analíticas posteriores ao accidente 4.6.- Técnicas analíticas anteriores ao accidente |
| TEMA 5.- Normalización | 5.1.- Vantaxes, requisitos e características das normas 5.2.- Normas de seguridade 5.3.- Procedemento de elaboración 5.4.- Orde e limpeza |
| TEMA 6.- Sinalización de seguridade | 6.1.- Características e normativa 6.2.- Clases de sinalización 6.3.- Sinalización en forma de panel |
| TEMA 7.- Equipos de protección | 7.1.- Individual 7.2.- Integral 7.3.- Colectiva |
| TEMA 8.- Técnicas específicas de seguridade | 8.1.- Máquinas 8.2.- Incendios e explosións 8.3.- Contactos eléctricos 8.4.- Manutención manual e mecánica 8.5.- Industria mecánica 8.6.- Produtos químicos 8.7.- Mantemento |
| TEMA 9.- Hixiene do Traballo | 9.1.- Ambiente industrial 9.2.- Hixiene do traballo e terminoloxía 9.3.- Hixiene teórica e valores límites ambientais 9.4.- Hixiene analítica 9.5.- Hixiene de campo e enquisa hixiénica 9.6.- Hixiene operativa |
| TEMA 10.- Axentes físicos ambientais | 10.1.- Ruído e vibracións 10.2.- Iluminación 10.3.- Radiacións *ionizantes e non *ionizantes 10.4.- Tensión térmica |
| TEMA 11.- Protección fronte a riscos hixiénicos | 11.1.- Vías respiratorias 11.2.- Oídos 11.3.- Ollos |
| TEMA 12.- Riscos hixiénicos da industria química | 12.1.- Procesos inorgánicos 12.2.- Procesos orgánicos 12.3.- Accidentes graves |
| TEMA 13.- Seguridade nos lugares de traballo | 13.1.- A seguridade no proxecto 13.2.- Mapas de riscos |

| | |
|---|--|
| TEMA 14.- Ergonomía | 14.1.- Concepto 14.2.- Aplicación da ergonomía á seguridade 14.3.- Carga física e fatiga muscular 14.4.- Carga e fatiga mental |
| TEMA 15.- Psicosocioloxía aplicada á prevención | 15.1.- Factores psicosociais 15.2.- Consecuencias dos factores psicosociais sobre a saúde 15.3.- Avaliación dos factores psicosociais 15.4.- Intervención psicosocial |

Planificación

| | Class hours | Hours outside the classroom | Total hours |
|-------------------------------|-------------|-----------------------------|-------------|
| Lección maxistral | 26 | 49 | 75 |
| Resolución de problemas | 24 | 22 | 46 |
| Exame de preguntas obxectivas | 4 | 25 | 29 |

*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 oral e directa, por parte do profesor, dos coñecementos fundamentais correspondentes aos temas da materia. |
| Resolución de problemas | O profesor expón aos alumnos unha serie de problemas para que os traballen e resolván en clase en pequenos grupos. |

Atención personalizada

| Methodologies | Description |
|-------------------------|--|
| Resolución de problemas | Darase a coñecer os alumnos, a principio de curso, os horarios de tutorías nos que se resolverán as duvidas que existan con respecto á teoría, problemas e traballos |

Avaliación

| | Description | Qualification | Training and Learning Results |
|-------------------------------|--|---------------|--|
| Resolución de problemas | Proporarse ao alumno unha seria de problemas que terá que resolver | 40 | B4 D2 B6 D5 B7 D8 D9 D10 D14 D17 |
| Exame de preguntas obxectivas | A finalidade desta proba de resposta múltiple, que figura no calendario de exames da Escola, é avaliar o nivel de coñecementos alcanzado polos alumnos | 60 | B11 D5 D7 D8 D9 D10 |

Other comments on the Evaluation

Con respecto ao exame de XULLO (2ª convocatoria), se manterá a cualificación obtida polo alumno nos controis e presentacións / exposicións realizados durante o período docente. Iso significa que o alumno únicamente realizará pruebas tipo test do devandito exame. Cando a Escola libere a un alumno do proceso de evaluación continua, a súa cualificación será o 100% da nota obtida en pruebas tipo test anteriormente citada. Compromiso éticoEspérase que o alumno presente un comportamiento ético adecuado. En caso de detectar un comportamiento non ético (copia, plaxio, utilización de aparellos electrónicos non autorizados, por exemplo), considerarase que *el alumno non reúne os requisitos necesarios para superar a materia.

Bibliografía. Fontes de información

Basic Bibliography

Mateo Floría, P. y otros, **Manual para el Técnico en Prevención de Riesgos Laborales**, 9ª,

Cortés Díaz, J. M., **Técnicas de Prevención de Riesgos Laborales: Seguridad e Higiene del Trabajo**, 9ª,

Complementary Bibliography

Menéndez Díez, F. y otros, **Formación Superior en Prevención de Riesgos Laborales**, 4ª,

Gómez Etxebarria, G., **Prontuario de Prevención de Riesgos Laborales**,

Recomendacións

Other comments

Para matricularse nesta materia é necesario superar ou ben matricularse de todas as materias dos cursos inferiores ao curso en que está situada esta materia.

En caso de discrepancias, prevalecerá a versión en castelán desta guía.

IDENTIFYING DATA**Laser technology**

| | | | | |
|---------------------|--|----------|------|------------|
| Subject | Laser technology | | | |
| Code | V12G363V01908 | | | |
| Study programme | Grado en Ingeniería en Tecnologías Industriales | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Optional | 4th | 2nd |
| Teaching language | Spanish English | | | |
| Department | | | | |
| Coordinator | Pou Saracho, Juan María | | | |
| Lecturers | Boutinguiza Larosi, Mohamed Pou Saracho, Juan María | | | |
| E-mail | jpou@uvigo.es | | | |
| Web | | | | |
| General description | (*)Introduction to laser technology and its applications for undergraduate students of the industrial field. | | | |

Skills

| | | | |
|------|---|--|--|
| Code | | | |
| B10 | CG10 Ability to work in a multidisciplinary and multilingual environment. | | |
| D10 | CT10 Self learning and work. | | |

Learning outcomes

| Expected results from this subject | Training and Learning Results | |
|--|-------------------------------|-----|
| - Know the physical principles in which it bases the operation of a laser and his parts. | B10 | D10 |
| - Know the main properties of a laser and relate them with the potential applications. | | |
| - Know the different types of lasers differentiating his specific characteristics. | | |
| - Know the main applications of the technology laser in the industry. | | |

Contents

| | |
|---|---|
| Topic | |
| Chapter 1.- INTRODUCTION | 1. Electromagnetic waves in the vacuum and in the matter. 2. Laser radiation. 3. Properties of the laser radiation. |
| Chapter 2.- BASICS | 1. Photons and energy level diagrams. 2. Spontaneous emission of electromagnetic radiation. 3. Population inversion. 4. Stimulated emission. 5. Amplification. |
| Chapter 3. COMPONENTS OF A LASER | 1. Active medium 2. Excitation mechanisms. 3. Feedback mechanisms. 4. Optical cavity. 5. Exit device. |
| Chapter 4. TYPES OF LASER | 1. Gas lasers 2. Solid-state lasers 3. Diode lasers. 4. Other lasers. |
| Chapter 5. OPTICAL COMPONENTS AND SYSTEMS | 1. Spherical lenses. 2. optical centre of a lens. 3. Thin lenses. Ray tracing. 4. Thin lenses coupling. 5. Mirrors. 6. Filters. 7. Optical fibers. |
| Chapter 6. INDUSTRIAL APPLICATIONS | 1. Introduction to laser materials processing 2. Introduction to laser cutting and drilling. 3. Introduction to laser welding. 4. Introduction to laser marking. 5. Introduction to laser surface treatments. |

| Planning | Class hours | Hours outside the classroom | Total hours |
|---|-------------|-----------------------------|-------------|
| Laboratory practical | 18 | 30.6 | 48.6 |
| Lecturing | 32.5 | 65 | 97.5 |
| Essay questions exam | 1.7 | 0 | 1.7 |
| Report of practices, practicum and external practices | 1.9 | 0 | 1.9 |
| Problem and/or exercise solving | 0.3 | 0 | 0.3 |

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

| Methodologies | Description |
|----------------------|---|
| Laboratory practical | Activities of application of the knowledge to specific situations and of acquisition of basic and practical skills related to the matter object of study. They will be developed in the laboratories of industrial applications of the lasers of the EEI. |
| Lecturing | Exhibition on the part of the teacher of the contents on the matter object of study. Exhibition of real cases of application of the laser technology in the industry. |

| Personalized assistance | Methodologies | Description |
|--------------------------------|----------------------|--------------------|
| | Laboratory practical | |

| Assessment | Description | Qualification | Training and Learning Results |
|---|---|---------------|-------------------------------|
| Essay questions exam | The examination will consist of five questions of equal value. Four of them will correspond to the contents of theory and the fifth one to the contents seen in the laboratory practices. | 70 | B10 D10 |
| Report of practices, practicum and external practices | The evaluation of the laboratory practices will be carried out by means of the qualification of the corresponding practice reports. | 20 | B10 D10 |
| Problem and/or exercise solving | During the course there will be carried out a test of follow-up of the subject that will consist of two questions of equal value. | 10 | B10 D10 |

Other comments on the Evaluation
If some student was resigning officially the continuous assessment that is carried out by means of the test of follow-up of the subject, the final note would be calculated by the following formula: (0.8 x Exam qualification) + (0.2 x Practices qualification). It is mandatory to carry out the laboratory practices in order to pass the subject. It is mandatory to attend 75% of the theory lessons to pass the subject.

Ethical commitment: it is expected an adequate ethical behaviour of the student. In case of detecting unethical behaviour (copying, plagiarism, unauthorized use of electronic devices, etc.) shall be deemed that the student does not meet the requirements for passing the subject. In this case, the overall rating in the current academic year will be Fail (0.0).

The use of any electronic device for the assessment tests is not allowed unless explicitly authorized. The fact of introducing unauthorized electronic device in the examination room will be considered reason for not passing the subject in the current academic year and will hold overall rating (0.0).

| Sources of information |
|--|
| Basic Bibliography |
| Jeff Hecht, UNDERSTANDING LASERS: AN ENTRY-LEVEL GUIDE , IEEE, 2008 |
| W.Steen, J. Mazumder, LASER MATERIALS PROCESSING , Springer, 2010 |
| Complementary Bibliography |

| Recommendations |
|------------------------|
|------------------------|

Other comments
Requirements: To register for this module the student must have passed or be registered for all the modules of the previous

year.

In case of discrepancies, the spanish version (castellano) will prevail.

IDENTIFYING DATA**Internships: Internships in companies**

| | | | | |
|-------------------|--|--------------------|-------------|-------------------|
| Subject | Internships: Internships in companies | | | |
| Code | V12G363V01981 | | | |
| Study programme | Grado en Ingeniería en Tecnologías Industriales | | | |
| Descriptors | ECTS Credits 6 | Choose Optional | Year 4th | Quadmester 2nd |
| Teaching language | Spanish Galician | | | |
| Department | | | | |
| Coordinator | Eguizábal Gándara, Luis Eduardo | | | |
| Lecturers | Eguizábal Gándara, Luis Eduardo | | | |
| E-mail | eguizaba@uvigo.es | | | |

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

IDENTIFYING DATA

Traballo de Fin de Grao

| | | | | |
|---------------------|---|---------------------|-----------|------------------|
| Subject | Traballo de Fin de Grao | | | |
| Code | V12G363V01991 | | | |
| Study programme | Grao en Enxeñaría en Tecnoloxías Industriais | | | |
| Descriptors | ECTS Credits 12 | Choose Mandatory | Year 4 | Quadmester 2c |
| Teaching language | Castelán Galego Inglés | | | |
| Department | Deseño na enxeñaría Física aplicada | | | |
| Coordinator | Cerqueiro Pequeño, Jorge Trillo Yáñez, María Cristina | | | |
| Lecturers | Cerqueiro Pequeño, Jorge Trillo Yáñez, María Cristina | | | |
| E-mail | jcerquei@uvigo.es mctrillo@uvigo.es | | | |
| Web | | | | |
| General description | O Traballo de Fin de Grao (TFG) é un traballo orixinal e persoal que cada estudiante realizará de forma autónoma baixo tutorización docente, e debe permitirlle mostrar de forma integrada a adquisición dos contidos formativos e as competencias asociadas ao título. A súa definición e contidos están explicados de forma más extensa no Regulamento do Traballo Fin de Grao aprobado pola Xunta de Escola da Escola de Enxeñaría Industrial o 21 de xullo de 2015. | | | |

Competencias

| | |
|------|--|
| Code | |
| B1 | CG1 Capacidad para deseñar, desenvolver, implantar, xestionar e mellorar produtos e procesos nos distintos ámbitos industriais, por medio de técnicas analíticas, computacionais ou experimentais apropiadas. |
| B2 | CG2 Capacidad para dirixir actividades relacionadas coa competencia CG1. |
| B3 | CG3 Coñecemento en materias básicas e tecnolóxicas, que os capacite para a aprendizaxe de novos métodos e teorías, e os dote de versatilidade para adaptarse a novas situacíons. |
| B4 | CG4 Capacidad para resolver problemas con iniciativa, toma de decisións, creatividade, razonamento crítico e de comunicar e transmitir coñecementos, habilidades e destrezas no campo da enxeñaría industrial. |
| B10 | CG10 Capacidad para traballar nun medio multilingüe e multidisciplinar. |
| B12 | CG12 Capacidad para a integración das competencias CG1 a CG11 nos traballos e proxectos relacionados coas Tecnoloxías Industriais. |
| D4 | CT4 Comunicación oral e escrita de coñecementos en lingua estranxeira. |
| D12 | CT12 Habilidades de investigación. |
| D13 | CT13 Adaptación a novas situacíons. |

Resultados de aprendizaxe

| Expected results from this subject | Training and Learning Results |
|--|---|
| Procura, ordenación e estructuración de información sobre calquera tema. | B1 D12 B2 B3 B4 B10 B12 |
| Elaboración dunha memoria na que se recollan, entre outros, os seguintes aspectos: antecedentes, problemática ou estado da arte, obxectivos, fases do proxecto, desenvolvemento do proxecto, conclusóns e liñas futuras. | B1 D4 B2 D12 B3 D13 B4 B10 B12 |
| Deseño de equipos, prototipos, programas de simulación, etc, segundo especificacións. | B1 D12 B2 B3 B4 B10 B12 |

Contidos

Topic

| | |
|--|--|
| Proxectos clásicos de enxeñería | Poden versar, por exemplo, sobre o deseño e mesmo a fabricación dun prototipo, a enxeñaría dunha instalación de producción, ou a implantación dun sistema en calquera campo industrial. Polo xeral, neles desenvólvese sempre a parte documental da memoria (cos seus apartados de cálculos, especificacións, estudos de viabilidade, seguridade, etc. que se precisen en cada caso), planos, prego de condicións e orzamento e, nalgúns casos, tamén se contempla os estudos propios da fase de execución material do proxecto. |
| Estudos técnicos, organizativos e económicos | Consistentes na realización de estudos relativos a equipos, sistemas, servizos, etc., relacionados cos campos propios da titulación, que traten un ou máis aspectos relativos ao deseño, planificación, producción, xestión, explotación e calquera outro propio do campo da enxeñaría, relacionando cando cumpla alternativas técnicas con avaliaciós económicas e discusión e valoración dos resultados. |
| Traballos teórico-experimentais | De natureza teórica, computacional ou experimental, que constitúan unha contribución á técnica nos diversos campos da enxeñaría incluíndo, cando cumpla, avaliación económica e discusión e valoración dos resultados. |

Planificación

| | Class hours | Hours outside the classroom | Total hours |
|----------------------------|-------------|-----------------------------|-------------|
| Actividades introductorias | 5 | 25 | 30 |
| Traballo tutelado | 15 | 210 | 225 |
| Presentación | 1 | 14 | 15 |

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

Metodoloxía docente

| | Description |
|----------------------------|--|
| Actividades introductorias | O alumno realizará, de forma autónoma, unha procura bibliográfica, lectura, procesamento e elaboración de documentación. |
| Traballo tutelado | O estudiante, de maneira individual, elabora unha memoria segundo as indicacións do Regulamento do Traballo Fin de Grao da EEI. |
| Presentación | O alumnado debe preparar e defender o traballo realizado diante dun tribunal de avaliación segundo as indicacións do Regulamento do Traballo Fin de Grao da EEI. |

Atención personalizada

Methodologies Description

| | |
|-------------------|---|
| Traballo tutelado | Cada alumno terá un tutor e/ou un co-tutor encargados de guiarlle, e que lle marcarán as directrices oportunas para realizar o TFG. |
|-------------------|---|

Avaliación

| | Description | Qualification | Training and Learning Results |
|-------------------|---|---------------|---|
| Traballo tutelado | A cualificación da memoria do Traballo Fin de Grao levará a cabo segundo o especificado no Regulamento do Traballo Fin de Grao da Escola de Enxeñería Industrial. | 70 | B1 D4 B2 D12 B3 D13 B4 B10 B12 |
| Presentación | A defensa do Traballo Fin de Grao levará a cabo segundo o especificado no Regulamento do Traballo Fin de Grao da Escola de Enxeñería Industrial. | 30 | B1 D4 B2 D12 B3 D13 B4 B10 B12 |

Other comments on the Evaluation

Bibliografía. Fontes de información

Basic Bibliography**Complementary Bibliography**

Recomendacións

Other comments

Compromiso ético: Espérase que o alumno presente un comportamento ético adecuado. No caso de detectar un comportamento non ético (copia, plaxio ou outros) considerarase que a cualificación global no presente curso académico será de suspenso (0.0).

Requisitos: Para matricularse no Traballo Fin de Grao é necesario superar ou ben estar matriculado de todas as materias dos cursos inferiores ao curso no que está situado o TFG.

Información importante: No momento da defensa do TFG, o alumno deberá ter todas as materias restantes do título superadas, tal como establece o artigo 7.7 do Regulamento para a realización do Traballo Fin de Grao da Universidade de Vigo.

A orixinalidade da memoria será obxecto de estudo mediante unha aplicación informática de detección de plaxios.

IDENTIFYING DATA

Prácticas en empresa/asignatura optativa

| | | | | |
|---------------------|--|------------------------|------|------------|
| Subject | Prácticas en empresa/asignatura optativa | | | |
| Code | V12G363V01999 | | | |
| Study programme | Grao en Enxeñaría de Tecnoloxías Industriais | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Optional | 4 | 2c |
| Teaching language | Castelán Galego | | | |
| | Department | Tecnoloxía electrónica | | |
| Coordinator | Eguizábal Gándara, Luis Eduardo | | | |
| Lecturers | Eguizábal Gándara, Luis Eduardo | | | |
| E-mail | eguizaba@uvigo.es | | | |
| Web | http://eei.uvigo.es | | | |
| General description | Mediante a realización de prácticas en empresa o alumno poderá aplicar os coñecementos e as competencias adquiridas durante os seus estudos, o que permitirá complementar e reforzar a súa formación e facilitar a súa incorporación ao mercado laboral. | | | |

Competencias

| | |
|------|--|
| Code | |
| B1 | CG1 Capacidad para deseñar, desenvolver, implantar, xestionar e mellorar produtos e procesos nos distintos ámbitos industriais, por medio de técnicas analíticas, computacionais ou experimentais apropriadas. |
| B2 | CG2 Capacidad para dirixir actividades relacionadas coa competencia CG1. |
| B3 | CG3 Coñecemento en materias básicas e tecnolóxicas, que os capacite para a aprendizaxe de novos métodos e teorías, e os dote de versatilidade para adaptarse a novas situacóns. |
| B4 | CG4 Capacidad para resolver problemas con iniciativa, toma de decisións, creatividade, razonamento crítico e de comunicar e transmitir coñecementos, habilidades e destrezas no campo da enxeñaría industrial. |

Resultados de aprendizaxe

| Expected results from this subject | Training and Learning Results |
|---|-------------------------------|
| Capacidade para adaptarse ás situacións reais da profesión. | B1 B2 B3 B4 |
| Integración en grupos de traballo multidisciplinares. | B2 B3 B4 |
| Responsabilidade e traballo autónomo. | B1 B2 B3 B4 |

Contidos

Topic

| | |
|---|--|
| Integración nun grupo de traballo nunha empresa. | O alumno integrarase no contexto organizativo dunha empresa, téndose que coordinar cos diferentes membros do grupo de traballo ao que sexa asignado. |
| Realización de actividades ligadas ao desempeño da profesión. | Ao alumno encomendaráselle unha serie de tarefas relacionadas cos coñecementos e coas competencias dos seus estudos. |

Planificación

| | Class hours | Hours outside the classroom | Total hours |
|--|-------------|-----------------------------|-------------|
| Prácticum, Prácticas externas e clínicas | 0 | 150 | 150 |

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

Metodoloxía docente

| Description |
|-------------|
| |

| | |
|--|---|
| Prácticum, Practicas externas e clínicas | O alumno integrarase nun grupo de traballo nunha empresa onde terá a oportunidade de poñer en práctica os coñecementos e as competencias adquiridas durante os seus estudos, e así complementar e reforzar a súa formación. |
|--|---|

Atención personalizada

| Methodologies | Description |
|--|--|
| Prácticum, Practicas externas e clínicas | O alumno dispoñerá dun titor na empresa onde fará as súas prácticas e dun titor académico. |

Avaliación

| | Description | Qualification | Training and Learning Results |
|--|--|---------------|-------------------------------|
| Prácticum, Practicas externas e clínicas | Os estudiantes en prácticas deberán manter un contacto continuado non só co seu titor na empresa, senón tamén co seu titor académico. | 100 | B1 B2 |
| | Ao concluir as prácticas, os alumnos deberán entregar ao seu titor académico unha memoria final e o informe en documento oficial D6-Informe do estudiante. | | B3 B4 |
| | Na avaliación terase en conta a valoración do desempeño do alumno realizada polo titor na empresa, o seguimento realizado polo titor académico e os informes entregados polo alumno. | | |

Other comments on the Evaluation

Adicionalmente ao xa exposto nesta guía docente é preciso facer as seguintes aclaracións:

- 1º. Esta materia rexererase polo establecido no Regulamento de Prácticas en Empresa da EEI (http://eei.uvigo.es/opencms/export/sites/eei/eei_gl/documentos/escola/Normativa/practicas_empresa.pdf).
- 2º. A Escola fará pública a oferta de prácticas en empresa curriculares entre as que o alumnado, que cumpla os requisitos descritos no artigo 6 do citado regulamento, deberá facer a súa escola dentro do prazo fixado ao efecto. O procedemento de realización de prácticas en empresa curriculares está establecido no artigo 7 do regulamento.
- 3º. A duración das prácticas pode chegar a ser ata de un máximo de 240 horas, para que o alumno saque o maior proveito da súa estadía na empresa. Será a empresa na súa oferta de prácticas a que estipulará a duración das mesmas.

Bibliografía. Fontes de información

Basic Bibliography

Complementary Bibliography

Recomendacións