Universidad del País Vasco Euskal Herriko Unibertsitatea

ENGLISH FRIENDLY COURSES (EFC) 2023-2024
CAMPUS OF GIPUZKOA

Donostia: https://www.ehu.eus/en/web/gipuzkoako-ingeniaritza-eskola/visiting-students-donostia
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Eibar: https://www.ehu.eus/en/web/gipuzkoako-ingeniaritza-eskola/visiting-students-eibar
Contact: euti-ei.internacional@ehu.eus

In addition to the general offer of courses taught in English, some Centers offer for incoming students English Friendly Courses (EFC): subjects taught in Spanish or Basque, in which the syllabus summary; lecturer tutoring, examinations and/or papers are available in English.

English Friendly Courses taught in SPANISH:

FACULTY OF ENGINEERING – GIPUZKOA. DONOSTIA (263)

	COURSE	SEMESTER[1]	CREDITS	SCHEDULE[2]	LINK TO SYLLABUS
Bachelor´s Degree in Mechanical Engineering					
25984	Mecánica Aplicada	Annual	9	A	⇨
26053	Sistemas Neumáticos y Oleohidráulicos	2nd	6	A	⇨
Bachelor´s Degree in Industrial Electronics and Automated Engineering					
25999	Industria Informática	1st	6	M	⇨
Bachelor´s Degree in Civil Engineering					
26569	Geología	2nd	7,5	M	⇨

FACULTY OF ENGINEERING – GIPUZKOA. EIBAR DEPARTMENT (264)

	COURSE	SEMESTER	CREDITS	SCHEDULE	LINK TO SYLLABUS
Bachelor's Degree In Renewable Energy Engineering					
25986	Sistemas de Gestión Integrada	1st	6	M	⇨
26570	Informática	1st	6	M	⇨
27850	Cálculo	1st	6	M	⇨
27859	Estática y Resistencia de Materiales	1st	6	M/A	⇨
27866	Energía Geotérmica y Solar Térmica	1st	6	M/A	⇨

[1] SEMESTER: Annual: September 2023 to May 2024
1st: September 2023 to January 2024
2nd : January 2024 to May 2024

[2] SCHEDULE: Morning (M)/ Afternoon (A): begins at 13.30.

Universidad del País Vasco Euskal Herriko Unibertsitatea

FACULTY OF ENGINEERING – GIPUZKOA. EIBAR DEPARTMENT (264)					
	COURSE	SEMESTER	CREDITS	SCHEDULE	LINK TO SYLLABUS
27871	Regulación Automática y Control	1st	6	M	
27875	Eficiencia Energética	1st	6	M	
28093	Normativa para Marcado CE en equipos Eléctricos y Electrónicos	1st	6	M	
25989	Organización, Gestión y Administración de Empresas	2nd	6	M	
27861	Matemática Estadística	2nd	6	M	
27862	Transferencia de Calor	2nd	6	M	
27869	Instalaciones Eléctricas en Energías Renovables	2nd	6	M	
27877	Energía Solar Termoeléctrica	2nd	6	M/A	

English Friendly Courses taught in BASQUE:

FACULTY OF ENGINEERING – GIPUZKOA. DONOSTIA (263)					
	COURSE	SEMESTER[3]	CREDITS	SCHEDULE[4]	LINK TO SYLLABUS
Bachelor´s Degree in Mechanical Engineering					
26534	Fisika Aplikatua	Annual	9	M	➡
25985	Ekoizpen eta Fabrikazio Sistemak	2nd	6	A	➡
Bachelor´s Degree in Civil Engineering					
26569	Geologia	2nd	7,5	M	

FACULTY OF ENGINEERING – GIPUZKOA. EIBAR DEPARTMENT (264)					
	COURSE	SEMESTER	CREDITS	SCHEDULE	LINK TO SYLLABUS
Bachelor's Degree In Renewable Energy Engineering					
25986	Kudeaketa Osorako Sistemak	1st	6	M	➡
26509	Aljebra	1st	6	M	➡
26570	Informatika	1st	6	M	➡
27850	Kalkulua	1st	6	M	➡
27859	Estatika eta Materialen Erresistentzia	1st	6	M/A	➡
27866	Energia Geotermikoa eta Eguzki Energia Termikoa	1st	6	M	➡
27871	Erregulazio Automatikoa eta Kontrola	1st	6	M	➡
27875	Eraginkortasun Energetikoa	1st	6	M	➡
25989	Enpresen Antolakuntza, Kudeaketa eta Administrazioa	2nd	6	M	➡
27849	Analisi Matematikoa eta Numerikoa	2nd	6	M	➡
27861	Matematika Estatistikoa	2nd	6	M	➡
27862	Bero Transferentzua	2nd	6	M	➡

[3] SEMESTER: Annual: September 2023 to May 2024
1st: September 2023 to January 2024
2nd : January 2024 to May 2024

[4] SCHEDULE: Morning (M)/ Afternoon (A): begins at 13.30.

COURSE GUIDE 2023/24

Faculty 263 - Faculty of Engineering - Gipuzkoa **Cycle** .

Degree GIEIAU20 - Bachelor's Degree in Industrial Electronics and Automation Engine **Year** Third year

COURSE

25999 - Industrial Information Technology **Credits, ECTS:** 6

COURSE DESCRIPTION

Industrial Information Technology is a fairly wide term that involve any computer system applied in industrial environments. Since the area is so wide, the course is constrained to the use of computers to control and monitor industrial systems in general, bearing in mind the issues of designing proper Human-Machine Interfaces for those systems, of taking care of the Data Acquisition and signal generation needed for these purposes, of making communications possible between computers of the industrial plant and, finally, being able to program industrial (and not industrial) computers.

The main tool the student will use to learn about this subject is LabVIEW, a graphical programming language specially designed by and for engineers.

It is strongly recommended that the students have passed basic computer science courses (such as 25977) as well as control and automation courses (26511) before starting the present course.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

(Check the official documents of the degree)

(TEEOI10) Industrial Information Technology and communications

(C3) Basic technology
(C4) Problem solving
(C5) Measuring and reporting
(C10) Multilingual / Multidisciplinary work environments
(C13) Scientific methodology

And the expected learning results are these:

- To be able to interpret technical documents
- To design Control and Supervisory systems
- To analyse industrial systems
- To design and implement informatics systems for the industry

We will also tackle some transversal competences, so ask the teachers if you need further information. The UPV/EHU Catalogue of Transversal Competences has not been translated yet, but it is available in Spanish in the following link:

https://www.ehu.eus/documents/1432750/12757375/Cat%C3%A1logo+de+Competencias+trasnversales_cas.pdf

Theoretical and Practical Contents

1.-Industrial IT in our industrial environment
2.-Industrial IT fundamentals
3.-Real Time Systems and IoT
4.-Communications and the Cloud

TEACHING METHODS

The aim of the course is to make the students learn in a gradual way, in order to be able to design and implement industrial applications of some complexity. The methodology to achieve this gradual learning is mainly stressed with the group work, an individual work and a practical test.

It is important to make clear that the goal of the test is not to check if the students are able to employ the programming tool (LabVIEW). The goal is to check if the student is able to analyze and design industrial informatics applications (using the proposed tool).

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	30			30					
Horas de Actividad No Presencial del Alumno/a	30			60					

Legend: M: Lecture-based | S: Seminar | GA: Applied classroom-based groups | GL: Applied laboratory-based groups | GO: Applied computer-based groups | GCL: Applied clinical-based groups | TA: Workshop | TI: Industrial workshop | GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Exercises, cases or problem sets 30%
- Teamwork assignments (problem solving, Project design) 50%
- Practical tests 20%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

In a nutshell, the subject has five evaluation items and the student needs to get 50% of the points in each item to pass the course.

The items are the following:

1.- LabVIEW Basics practical test (week 6) 20%
This test will be held in the laboratory during the regular practical sessions. There would be an extra chance to pass this test in the official exam date.

2.- Group work on industrial applications 50%
The details of this work will be explained beforehand.

3.- Report of the laboratory sessions (two days after the official exam date) 30%
The student will report on the work done during the laboratory sessions.

The student must pass all the parts to pass the course.

Students who want to avoid the continuous assessment method or to avoid sitting the exam should follow current regulations. Do not hesitate to contact the coordinator of the course if you have any question about the assessment.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

The considerations of the regular call apply to the extraordinary call too. The only exception is that the deadline of the individual work and the report is four days after the official exam date instead of two days after. The parts passed in the first call are kept for the second call.

MANDATORY MATERIALS

Documents available in eGela. If you have any issue accessing eGela, just ask the teachers.

It is strongly recommended to install LabVIEW 2021 in your own laptop. The UPV/EHU has a student license available (https://www.ehu.eus/liz/niacademic/).

EFC students should read some of the entries of our blog to start understanding our way of thinking and how we work in this course:

https://informatics.industriainformatika.pw/

Some of the examples we work with in the classroom are there, publicly available and in English, as well as in Spanish and Basque.

BIBLIOGRAPHY

Basic bibliography

egela.ehu.eus

Detailed bibliography

- Introduction to data acquisition with LabView. Robert King. McGraw-Hill, New York, 2013.
- LabVIEW programming, data acquisition and analysis. Jeffrey Beyon. Ed. Prentice Hall, 2000.
- Hands-on exercise manual for LabVIEW programming, data acquisition and analysis. Jeffrey Beyon. Ed. Prentice Hall, 2000.
- NI myRIO Project Essentials Guide. Ed Doering. Ed. National Technology and Science Press, USA, 2013.

Journals

Revista Iberoamericana de Automática e Informática Industrial RIAI
ISSN: 1697-7912
https://polipapers.upv.es/index.php/RIAI

Computers & Industrial Engineering
ISSN: 0360-8352
https://www.journals.elsevier.com/computers-and-industrial-engineering

IEEE Transactions on Industrial Informatics
ISSN 1551-3203
https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=9424

Web sites of interest

https://informatica.industriainformatika.pw/

LabVIEW:
https://www.ni.com/
https://labviewwiki.org/wiki/Home

Python:
https://www.python.org/
https://www.kaggle.com/
https://www.pythonanywhere.com/

Industry IoT Consortium:
https://www.iiconsortium.org/

OBSERVATIONS

This course is part of the English Friendly Course (EFC) programme, so foreign students should not have issues following the subject if they command English. The teachers have the right to be flexible with the deadlines and assessment methods for EFC students, because we do not want EFC students to strugle because of language barriers. EFC students are very welcome to our course.

The subject has some strong requirements with regards to the vision and motor skills (use of the mouse, writing). In consequence, any student with permanent or temporary difficulties in this sense should contact the coordinator of the subject.

In this sense, if any student has issues with the lecture notes, handouts, or the language, it is recommended to contact the coordinator of the subject.

Coordinator of the subject for the 2023/24 term: Aitzol Ezeiza

COURSE GUIDE 2023/24

Faculty 263 - Faculty of Engineering - Gipuzkoa **Cycle** .

Degree GMECAN20 - Bachelor`s Degree in Mechanical Engineering **Year** Fourth year

COURSE

26053 - Pneumatic and Hydraulic Systems **Credits, ECTS:** 6

COURSE DESCRIPTION

The subject Pneumatic and Hydraulic Systems pertaining to the fourth course of the Grade of Mechanical Engineering, belongs to the optional subjects module.

Given its purely practical character, the student acquires knowledge related to hydraulics, to apply then later in more specific industrial applications.

The students should have a solid base in subjects like fluid mechanics and automatics, since these form the basis of this subject.

The course provides the students with a pneumatic and hydraulic base, it allows the students to read circuits including different components, thus creating a solid foundation for their professional future.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

GENERAL COMPETENCIES

C.3 Knowledge in basic and technological subjects, which enables them to learn new methods and theories, and gives them versatility to adapt to new situations.

C.4 Ability to solve problems with initiative, decision making, creativity, critical reasoning to communicate and transmit knowledge, skills and abilities in the field of Industrial Engineering in the specialty of mechanics.

C.12 Adopt a responsible attitude, orderly at work and willing to learn considering the challenge that will raise the necessary continuous training.

C.13 Apply the strategies of scientific methodology: analyze a problematic situation qualitative and quantitatively, propose hypotheses and solutions using models of the Industrial Engineering, specialty mechanics.

The more specific competences of the subject are shown below, indicating the degree competences related:

1.To know, understand and apply the basic concepts of fluid mechanics in such a way that it is possible to recognize them in situations raised in the field of Engineering and to solve problems, interpreting their solutions (related to C3, C4, C13).

2. Applying the strategies of scientific methodology in fluid mechanics: analyzing a problematic situation qualitatively and quantitatively, hypothesizing and interpreting solutions (related to C3, C4, C13).

3. Justify the process followed to solve the problem by means of concepts, results and Fluid Mechanics procedures (related to C4).

4. Adopt a responsible attitude, orderly at work and ready for learning, developing resources for the self-employment (related to C12).

The learning outcomes are as follows:

1. Identify the basic elements of the installation.

2. Describe the optimal process for circuit assembly.

3. Assembly of the circuit applying the acquired knowledge.

CONTENIDOS TEÓRICO-PRÁCTICOS

The subject contains three main blocks: Pneumatics, Electro-pneumatics and the programming of the automaton as application of the first two blocks, and finally, hydraulics.

1. Introduction to pneumatics

2. Actuators

3. Valves

4. Auxiliary elements

5. Pneumatic Circuits

6. Electro-pneumatics

7. Automation

8. Introduction to oil hydraulics

TEACHING METHODS

In the magistral modality, brief presentations will be given by the teacher, dedicating the most of the time to circuit resolution. Team work will be encouraged, both by simulating circuits in the computer and assemblying them in the lab. To this end, problems and exercises will be provided. This will make it possible to deepen on the knowledge of the subject. The formulation of questions and open discussion will be encouraged, so that the students acquire skills related to oral communication. A project will be developed throughout the term to reinforce the knowledge acquired in class. The aim is to generate open communication, so that students have the opportunity to become aware of their own learning process, as well as ways to improve it.

The course consists of 4.5 credits, 1.5 theoretical credits and 3 credits of laboratory practice. The subject is taught in one theoretical hour a week and two practical hours.

During the four-month period, students will carry out a project in groups, consisting of a maximum of 5 students. The practices will be carried out after the necessary concepts have been taught in the theoretical classes.

The project that the students will carry out will have three phases:

- Pneumatic project.

- Electro-pneumatic project.

- Application: programming of an automaton.

The student that wants to achieve a clear knowledge of the subject, must perform a continuous work during the course, to absorb and master the concepts.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	15			45					
Horas de Actividad No Presencial del Alumno/a	22,5			67,5					

Legend:
M: Lecture-based | S: Seminar | GA: Applied classroom-based groups
GL: Applied laboratory-based groups | GO: Applied computer-based groups | GCL: Applied clinical-based groups
TA: Workshop | TI: Industrial workshop | GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Oral defence 20%
- Teamwork assignments (problem solving, Project design) 80%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

- Continuous evaluation:

* Pneumatic project (25% of final grade).

* Electro-pneumatic project (30% of final grade).

* Programming of an automaton (25% of the final grade).

* Oral presentation (20% of the final grade).

- Final evaluation:

* It will consist of a test that will have two parts, a first to simulate a circuit on the computer, and a second one, in which an assembly of a circuit in the laboratory and a programming exercise of the automaton will be carried out.

According to article 8 of the Regulations governing the assessment of students in official undergraduate degrees, "The student will have the right to be evaluated through the final evaluation system, independently of who has or has not participated in the continuous evaluation system. To this end, the student shall submit in writing to the teachers - Continuous evaluation:

* Pneumatic project (25% of final grade).

* Electro-pneumatic project (30% of final grade).

* Programming of an automaton (25% of the final grade).

* Oral presentation (20% of the final grade).

- Final evaluation:

* It will consist of a test that will have two parts, a first to simulate a circuit on the computer, and a second one, in which an assembly of a circuit in the laboratory and a programming exercise of the automaton will be carried out.

According to article 8 of the Regulations governing the assessment of students in official undergraduate degrees, "The student will have the right to be evaluated through the final evaluation system, independently of who has or has not participated in the continuous evaluation system. To this end, the student shall submit in writing to the teachers responsible for the subject the renunciation of continuous assessment, for which they will have a period of 9 weeks for the four-month courses and 18 weeks for the annual courses, counting from the beginning of the term or course respectively, according to the academic calendar of the centre. The teaching guide of the subject may set a longer deadline."

In relation to the qualification of the student as NOT PRESENTED, section 2 of article 12 of the "Regulations regulating the evaluation of students in official degree courses", indicates the following:

In the case of continuous assessment, if the weight of the final test is greater than 40% of the grade of the subject, it will suffice not to take the final test for getting the final grade not presented. Otherwise, if the weight of the final test is equal to or less than 40% of the subject's grade, the student may renounce the call in a period that, as a minimum, will be up to one month before the end of the teaching period of the corresponding subject. This waiver must be submitted in writing to the teacher responsible for the subject.

All the evaluation tests will be the same for all the groups of the subject.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Final Exam: Will consist of a test that will have two parts, a first to simulate a circuit on the computer, and a second one, in which an assembly of a circuit in the laboratory and a programming exercise of the automaton will be carried out.

All the evaluation tests will be the same for all the groups of the subject.

MANDATORY MATERIALS

Mongelos, Mª Belen; Almandoz, J. , Gonzalez A. , Pellejero I. - Apuntes de Neumática y Oleohidráulica

BIBLIOGRAFÍA

Basic bibliography

Andrew Parr, Hydraulics and Pneumatics: A Technician's and Engineer's Guide

Detailed bibliography

Md. Abdus Salam, Fundamentals of Pneumatics and Hydraulics

Journals

Web sites of interest

OBSERVATIONS

COURSE GUIDE 2023/24

Faculty 263 - Faculty of Engineering - Gipuzkoa **Cycle** .

Degree GEDIFI20 - Bachelor`s Degree in Building Engineering **Year** First year

COURSE

26534 - Applied Physics **Credits, ECTS:** 9

COURSE DESCRIPTION

Applied Physics is one of the basic subjects in the 1st year of the Degree of Technical Architecture. It is included in the module called Scientific Foundations.

In the field of building engineering, one of the most important questions is the structural stability of the buildings, whose elements suffer different forces and tensions. In this subject, the physical foundations of Statics are studied, with their subsequent application in simple structures. This is compulsory to be able to understand structures that are more complex in the future.

As a prerequisite, it is important the student’s knowledge about basic issues such as unities, orders of magnitude and scale, or the concept of density. Furthermore, the student should be very familiar with the operations with vectors to apply Newton’s equations, sketching force diagrams and solve different questions on basic statics.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Competences of the subject:

C1. Apply the vectorial calculus for the solving of problems of statics of structural systems, be they by analytical methods or graphical methods.

C2. Apply the physical concepts related to internal stresses of the body, analyzing and solving basic problems on triangular structures and beams.

C3. Use simple experimental devices. Discuss and analyze results obtained experimentally, being able to interpret these results in the conceptual context developed in the subject.

In addition to this, the following cross-competences will be developed (these competences, common to different subjects, are worked in the subject of Applied Physics along with the specific competences of the subject).

T1. Problems solving. Employ coherently the procedimental knowledge associated to the scientific methodology for the solving of problematic situations in basic physics; perform quantitative analysis, express hypothesis, prepare alternative strategies, resolve and analyze results.

T2. Working in group. In order to face with mates cooperative tasks in the context of physics: propose strategies, analyze the contributions of others, discuss ideas and execute the corresponding actions.

T3. Written communication: reports. Work with information related to processes of basic physics, analyze and express correctly ideas, using for this different systems of symbols or forms of representation: text, formulae, tables, graphs and diagrams.

CONTENIDOS TEÓRICO-PRÁCTICOS

The chapters that will be developed along the year are the following:

1. Vectorial magnitudes. Operations with vectors
2. Particle statics
3. Forces applied on the rigid body
4. Statics of the rigid body
5. Equivalent force-systems
6. Centres of gravity. Distributed forces
7. Isostatic triangular structures on the plane
8. Internal forces of isostatic beams

Along the year, several practice sessions will be conducted in the lab, in which the concepts of force decomposition, the static or kinetic nature of frictional forces, the axial forces in a triangular structure, as well as the importance of considering and estimating experimental errors will be analyzed experimentally.

TEACHING METHODS

Along the year, several practice sessions will be conducted in the lab, in which the concepts of force decomposition, the static or kinetic nature of frictional forces, the axial forces in a triangular structure, as well as the importance of considering and estimating experimental errors will be analyzed experimentally.

With the proposed methodology, we try to foster the continuous work of the student, in such a way that he/she acquires the competences and assimilates the concepts in a progressive way. We will follow a textbook in the majority of the chapters of the subject. In each chapter, the student will know which points are going to be analyzed in class thanks to guide-sheets, uploaded in the virtual platform eGela. The concepts are explained in class, and after an open problem related to the explained concepts is proposed. The students work on this problem individually or in pairs, and they deliver the task at the end of the class (sometimes it will be homework). The different solving strategies are commented, in addition to the errors that may have been detected. These tasks contribute to the continuous evaluation.

Furthermore, in order that the student have a realistic valuation of his/her own progress, three controls will be stablished along the semester, each of which contributes to the final score. The content of each control as well as its weighting in the evaluation increases gradually. Moreover, the student must attend practice sessions and elaborate the corresponding reports, which also contribute to the final score.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	60		15	15					
Horas de Actividad No Presencial del Alumno/a	75		30	30					

Legend:
M: Lecture-based | S: Seminar | GA: Applied classroom-based groups
GL: Applied laboratory-based groups | GO: Applied computer-based groups | GCL: Applied clinical-based groups
TA: Workshop | TI: Industrial workshop | GCA: Applied fieldwork groups

Evaluation methods

- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 80%
- Exercises, cases or problem sets 10%
- Laboratory practices 10%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

There exist two possibilities to be evaluated: (1) follow the continuous evaluation (2) choose a final exam. The student that wants to withdraw from the examination and choose the final exam must let the professor know by writing before the 11th week of the semester. He/she must fill the corresponding form available in eGela.

In the evaluation, a maximum score of 100 points can be obtained; if the student achieves 50 points and fulfills the requirements mentioned below, he/she will pass the subject. The evaluation will be carried out by means of the following activities:

(1) CONTINUOUS EVALUATION METHOD:

• Evaluation activity: additional tasks, problems, etc. (along the semester)
Points: 10% of the final mark.
Observations: Not to fill the tasks before the fixed date without any justification implies a zero in this task. Part of the tasks will be on-site. This task will be carried out when the professor considers. To pass the subject with a continuous evaluation, a minimum of 10/25 of the tasks is required. Otherwise, the student will fail and he/she will have to attend the extraordinary exam.

• Evaluation activity: laboratory practices (along the semester)
Points: 10% of the final mark
Observations: It is necessary tom pass them. For that, the assistance is compulsory, and the corresponding reports must be delivered correctly (more details in the eGela platform).

• Evaluation activity: 1st control (approximately the first 5 weeks of classes)
Points: 15% of the final mark
Observations: No contents can be compensated after.

• Evaluation activity: 2nd control (approximately the first 10 weeks of classes)
Points: 25% of the final mark

Observations: No contents can be compensated after.

• Evaluation activity: 3rd control (at the final of the semester)
Points: 40% of the final mark
Observations: all the content of the semester. It is necessary to achieve 3.5 out of 10 points to have the rest of the activities taken into account in the continuous evaluation.

NOTES AND REQUISITES:

It is compulsory to pass the laboratory practices to pass the subject. For that, the assistance is also compulsory and all the reports must be delivered correctly. For those who do not pass the laboratory practices, an exam that assess the competences will be carried out in the extraordinary exam.

(2) FINAL EXAM EVALUATION METHOD

In case of doing a final exam the same date of the 3rd control of the continuous evaluation, both exams will be different. The final grade will be obtained as follows:

- 10% laboratory practices (minimum 5 out of 10)
- 90% Individual written exam

In case the student does not attend the exam in the official date, it will be considered as "not presented".

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

- 10% laboratory practices (minimum 5 out of 10)
- 90% Individual written exam

The evaluation is performed by means of a final exam. Those students that have not passed the laboratory practices will have the opportunity to do a practice the same day of the exam (its weight will be 10% of the final mark). All these students will do the practice part in groups, like during the semester.

For the students who have follow the continuous evaluation, it is possible to maintain the grade obtained in the different activities (tasks, controls 1 and 2 and laboratory practices) so that in the extraordinary exam the same criteria and percentages are applied (60% continuous evaluation, 40% control over all the contents). For this, they will have to let the professor know at least 10 days before the official date of the exam.

No es necesario renunciar a la convocatoria extraordinaria si no se quiere que corra convocatoria, basta con no presentarse al examen.

MANDATORY MATERIALS

Material for drawing in the chapter of graphical statistics

BIBLIOGRAFÍA

Basic bibliography

1. Vector mechanics for engineers : statics and dynamics / Ferdinand P. Beer, E. Russell Johnston. McGraw-Hill (1997)
2. Engineering mechanics / J.L. Meriam, L.G. Kraige. John Wiley & Sons (1992 - 1993)
3. Estabilidad e isostaticidad como introducción al análisis de estructuras en Arquitectura, 4. Sánchez Beitia, Ed. Netbiblo (2008).
5. Statics and mechanics of materials / R.C. Hibbeler. Macmillan (1993)

Detailed bibliography

- Estática. J.I. Meriam, Ed. Reverté (1999)

Journals

Web sites of interest

http://ocw.mit.edu/courses/architecture/4-440-basic-structural-design-spring-2009/

http://ocw.mit.edu/courses/mechanical-engineering/2-001-mechanics-materials-i-fall-2006/index.htm

http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-050-solid-mechanics-fall-2004/

OBSERVATIONS

COURSE GUIDE 2023/24

Faculty 264 - Faculty of Engineering - Gipuzkoa. Eibar Department **Cycle** .

Degree GRENOV20 - Bachelor's Degree In Renewable Energy Engineering **Year** Fourth year

COURSE

25986 - Integrated Management Systems **Credits, ECTS:** 6

COURSE DESCRIPTION

Ability to apply the principles and methods of quality, environment and safety, as well as the necessary legislation taking into account the need for continuous training required industrial engineering profession.
Ability to analyze and assess the social and environmental impact of management system sustainability criteria.
Ability to organize and plan the enterprise level.
Ability to communicate and transmit knowledge and to develop procedures.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Integración de los Sistema de Gestión de Calidad, Medio Ambiente y seguridad

Theoretical and Practical Contents

Topic 1 Introduction to management systems
Introduction to the general operation of various types of enterprise management.
Item 2 Quality Management.
Basic principles and quality management models.
Item 3 Environmental Management.
Basic principles and models for environmental management.
Topic 4 Safety and prevention of occupational risks.
Basic Principles and Models Security Management and prevention of occupational risks.
Topic 5 Integrating management systems.
Analysis of the relationships between different types of systems management and integration.

TEACHING METHODS

Gutxieneko asistentzia %80

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	45		15						
Horas de Actividad No Presencial del Alumno/a	75		15						

Legend:
M: Lecture-based
S: Seminar
GA: Applied classroom-based groups
GL: Applied laboratory-based groups
GO: Applied computer-based groups
GCL: Applied clinical-based groups
TA: Workshop
TI: Industrial workshop
GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Oral defence 20%
- Teamwork assignments (problem solving, Project design) 80%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Amaierako notaren %70 lanak eta asistentzia izango da eta %30 azterketa.
Derrigorrezkoa da bi zatiak gainditzea.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

IDEM CONVOCATORIA ORDINARIA

MANDATORY MATERIALS

klaseko apunteak

BIBLIOGRAPHY

Basic bibliography

IÑAKI HERAS, GERMÁN ARANA, MARTÍ CASADESÚS, FRANCISCO JAVIER MERINO (2007): Kalitate-kudeaketaren hastapenak. Euskara errektoreordetzaren sare argitalpena
DE DOMINGO, J. y ARRANZ, A. (1997): Calidad y Mejora continua. Editorial Donostiarra. Donostia-San Sebastián.
MELLADO ROMERA, MARIA DOLORES. (2006): La gestión integrada de la Calidad, el Medioambiente y la Prevención de Riesgo Laborales en la Organizaciones. Editorial Universitaria Ramón Areces.
CASADESÚS FA, M; HERAS SAIZARBITORIA, I; MERINO DÍAZ DE CERIO, I. (2005): Calidad Práctica. Una guía para no perderse en el mundo de la Calidad. Casadesús Fa, M; Heras Saizarbitoria, I; Merino Díaz de Cerio, I. 2005. Editorial Pearson Prentice Hall.

Detailed bibliography

Casos del cluster,CLAVER, MOLINA Y TARÍ. (2005): Gestión de la Calidad y Gestión Medioambiental. Pirámide.
J.I. García Ninet, Coord.: A. Garrigues Giménez, S. Moreno Cáliz (2002): MANUAL DE PREVENCIÓN DE RIESGOS LABORALES (Seguridad, Higiene y Salud en el trabajo). Atelier. Barcelona

Journals

Base de datos Emeralds

Web sites of interest

Ihobe, Euskalit, Osalan

OBSERVATIONS

COURSE GUIDE 2023/24

Faculty 264 - Faculty of Engineering - Gipuzkoa. Eibar Department **Cycle** .

Degree GRENOV20 - Bachelor's Degree In Renewable Energy Engineering **Year** First year

COURSE

25989 - Economy and Business Administration **Credits, ECTS:** 6

COURSE DESCRIPTION

The subject of Business Organisation, Management and Administration is part of the basic training module of the degree course in Renewable Energies Engineering. It is a subject of 6 ECTS in the 2nd term of the first year, 45 hours of lectures and 15 hours of practical work.
The subject aims to study and provide a response to the economic problems posed in companies. The objective of the subject is to gain in-depth knowledge of modern-day organization and administration of companies, with a wide-ranging and updated vision of the complex world of business.

The course is part of the IKDi323-40 project. Contribution of the Renewable Energy Engineer to the achievement of the Sustainable Development Goals.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

G07_ Trabajar en un entorno multilingüe y multidisciplinar
G010 - Organizar y planificar en el ámbito de la empresa, y otras instituciones y organizaciones.
G003. Adquirir conocimientos en materias básicas y específicas, que permitan el aprendizaje de nuevos métodos, teorías y herramientas modernas de ingeniería, proporcionando la suficiente versatilidad para que los/las egresados/as sean capaces de adaptarse a nuevas situaciones en el ejercicio de su profesión.

G011. Desarrollar habilidades de aprendizaje necesarias para llevar a cabo una formación continua, así como para emprender estudios posteriores, con alto grado de autonomía, habilidades cimentadas sobre la base del respeto a los derechos humanos y a la igualdad de oportunidades de todas las personas.

G013 Trabajar eficazmente en grupo integrando capacidades y conocimientos para adoptar decisiones en el ámbito de la ingeniería de Energías Renovables.

FB06 - Adquirir el conocimiento adecuado del concepto de empresa, marco institucional y jurídico de la empresa. Organización y gestión de empresas

CRI05 - Adquirir conocimientos aplicados de Organización de Empresas.

RESULTADOS DEL APRENDIZAJE:

-Conoce la función comercial de la empresa, y aplica los conocimientos a casos concretos
-Conoce y aplica los conocimientos adquiridos en torno a la gestión financiera de la empresa
-Conoce y ha adquirido habilidades para la gestión de personas en el ámbito empresarial: trabajo en equipo y liderazgo
-Conoce los diferentes tipos de empresas y los conceptos de empresa y empresario.

CONTENIDOS TEÓRICO-PRÁCTICOS

Theme 0: Introduction to business. General concepts
Theme 1: Company Fundamentals
Learn about different types of companies and the notion of 'company'
Theme 2: Marketing
Strategic marketing Operational marketing. Exercises: allocation of prices based on cost
Theme 3: Finance I
Sources of financing. Balance sheet, operating account. Financial equilibrium. Investments. Profitability
Theme 4: Teamwork
Phases for obtaining results. Necessary functions. Leadership
Theme 5: Strategy and Production
Evolution of a strategy. External analysis: Porter's 5 forces Internal analysis: Value chain General strategies Specific strategies

TEACHING METHODS

Ahozko adierazpena

Kasuen irakurketa, eztabaida eta bateratze lana egin.
Problemask ebatzi.

Ikasgaia hurrengo proiektuaren barruan dago: IKDi321-21 Energia Berriztagarrien Ingeniariaren ekarpena garapen iraunkorreko helburuak lortzen. Helburua da irakaskuntza birpentsatzea, integratzea eta eraldatzea, jasangarritasunera bideratuz, horretarako lehenego pauso bezala ikasgaian lantzen den 1º tarea iraunkortasunera bideratuko da.

1º TAREA: Entrega epea 21. astea. Ikasleak taldeka interesatzen zaion gai ekonomiko bateri buruzko aurkezpena prestatu behar du. Gaia beti Garapen iraunkorreko helburuekin eduki behar du eralzioa. Ez da txostenik egin behar, aurkezpenaerako ppt edo antzeko programak erabili daitezke.

2. TAREA: Entrega epea 26. astea. Ikasleek 1-2. gaietan ikusitakoarekin, 2. TAREAN e-gelan eskatutakoa prestatu behar dute. Enpresa bat sortu berhar da. Ez da txostenik egin behar, aurkezpenaerako ppt edo antzeko programak erabili daitezke.

3. TAREA: Entrega epea 30. astea. 2. Tarean sortutako enpresan 5. gaian ikasitakoa inplantatu behar dute. Gaia lanaren bitartez jorratu eta ikasiko dute eta ez da azterketan sartuko. Ikasleek autozuzendutako ikaskuntza erabiltzea bultzatzen da.

Beharrezko asistentzia %100. (klase praktikoetara)

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	45		15						
Horas de Actividad No Presencial del Alumno/a	75		15						

Legend:
M: Lecture-based
S: Seminar
GA: Applied classroom-based groups
GL: Applied laboratory-based groups
GO: Applied computer-based groups
GCL: Applied clinical-based groups
TA: Workshop
TI: Industrial workshop
GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 70%
- Exercises, cases or problem sets 5%
- Teamwork assignments (problem solving, Project design) 20%
- Oral presentation of assigned tasks, Reading¿ 5%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Oral presentations (%30), exam (%70)
Reading about cases, discussion and sharing.
Problem-solving.
During the practical work, the student will produce three team projects
Project 1: To be handed in during the 21st week of classes. The team will make an oral presentation of an economic topic it considers to be of interest. A report will not be written, the presentation will be made in PowerPoint or a similar program.
Project 2: To be handed in during 26th week of classes. The team will create a company and develop the points required for the task. Points seen in class in themes 0-1-2. A report will not be written, the presentation will be made done in PowerPoint or a similar program.
Project 3. To be handed in during week 30 of classes. The students will apply what they have learned in theme 5 to the company created in project 2. Instead of studying the theme and having it tested in the exam, the idea is that the students should do it in an applied way in the company created, and apply self-directed learning.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

IDEM CONVOCATORIA ORDINARIA.

MANDATORY MATERIALS

Apuntes de clase

BIBLIOGRAFÍA

Basic bibliography

Lopez de Guereño Zarraga, Aritza (Coor) (2001): "Introducción a la gestión de Empresa". Servicio Editorial de la UPV-EHU, libro electrónico.
Casanovas, Montserrat y Bachs, Jorge (2001): "Management y Finanzas de la empresas promotyoras-constructoras". Editorial Deusto
Amat, O: "Contabilidad y finanzas para no financieros" Editorial Deusto
Ochoa Laburu, C. (1996): "Economía y Organización de Empresas". Ed Donostiar

Detailed bibliography

Agnar Hortal, M y Pérez Gorostegui, E. Teoría y Práctica de la Empresa; Ed. Centro de Estudios Ramón Areces (1997)
Centeno, R. Economía para Ingenieros; Ediciones Pirámide (1999)
Cuervo García, A. Introducción a la Administración de Empresas; Editorial Civitas (1996)
Pérez Carballo Veiga, F.J. Control de la gestión empresarial; Esic Editorial
Blanco Ibarra, F. contabilidad de costes y analítica de gestión para las decisiones estratégicas

Journals

Base de datos emerald

Web sites of interest

OBSERVATIONS

COURSE GUIDE 2023/24

Faculty 264 - Faculty of Engineering - Gipuzkoa. Eibar Department **Cycle** .

Degree GRENOV20 - Bachelor's Degree In Renewable Energy Engineering **Year** First year

COURSE

26509 - Algebra **Credits, ECTS:** 6

COURSE DESCRIPTION

The subject of ALGEBRA is a subject in the first term of the first year and has 6 ECTS credits. The face-to-face classes are divided into four types: lectures (30 hours), classroom practice (8 hours), seminars (7 hours) and computer practice (15 hours). In addition to the classes, students will have to work 45 hours of lectures, 12 hours of classroom practice, 10.5 hours of seminars and 22.5 hours of computer practice.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Basic competences:
CB1-Possess and understand knowledge of mathematics on the basis of general secondary education.
CB2- Apply mathematical terminology and knowledge at work in a professional manner.

Specific competence:
FB01-Solve mathematical problems that may arise in engineering. Apply knowledge of Algebra.

Transversal competences:
G007-Work in a multilingual and multidisciplinary environment.
G011 - Develop learning skills necessary to carry out continuous training, as well as to undertake further studies, with a high degree of autonomy, skills founded on the basis of respect for human rights and equal opportunities for all people.

Learning outcomes of the subject:
- Analyses and expresses ideas correctly making use of mathematical terminology.
- Knows how to discuss and solve a system of linear equations.
- Calculates the matrix associated to a linear application in different bases.
- Distinguishes a diagonalisable matrix from a non-diagonalisable matrix.
- Performs the diagonalisation process.
- Is able to apply acquired knowledge of geometry.

CONTENIDOS TEÓRICO-PRÁCTICOS

Topic 1: Matrices.
Matrices. Types of matrices. Operations. Operations. Properties.

Topic 2: Determinants.
Determinant of a square matrix. Properties. Inverse matrix. Orthogonal matrix. Rank of a matrix.

Topic 3: Systems of linear equations.
Systems of linear equations. Equivalent systems. Classification. Cramer's systems. Rouché-Fröbenius theorem. Homogeneous systems.

Topic 4: Vector spaces. Linear applications.
Structure of vector space. Vector subspace. Bases and dimension of a vector space. Coordinates of a vector. Change of basis matrix Linear applications Kernel and image. Classification. Matrix equation of a linear application. Matrices associated in different bases to the same linear application.

Topic 5: Euclidean and affine Euclidean vector space.
The affine space. Scalar product. Euclidean vector space. Orthogonal and orthonormal bases. Expression of the scalar product and the norm in an orthonormal basis. Euclidean affine space. Vector and mixed product. Applications. Equation of the straight line and plane in space. Relative positions. Bundle of planes containing a given line. Angles and distances.

Topic 6: Diagonalisation
Eigenvalue and eigenvector. Characteristic equation. Calculation of eigenvalues and eigenvectors. Diagonalisation of matrices. Diagonalisation of symmetric matrices.

Topic 7: Conics and quadrics.
Conics and quadrics
Geometric places. Calculation of the reduced equation of a conic. Calculation of the reduced equation of a quadric.

TEACHING METHODS

The subject will follow a methodology characterised by the following aspects:
Preliminary work: students will carry out the tasks indicated by the teacher, in a non-presential manner.

In class: the teacher will propose various training activities. Among others, doubts that have arisen from the previous work will be resolved.

Deliverables and tests: students will hand in the deliverables and take the tests indicated by the teacher and will be given the corresponding feedback.

In terms of assessment, the tools and grading percentages are as follows:

Final exam: 75%. (It can be advanced by up to 15% through various activities.)

Computer practicals: 25%.

Note: It is necessary to obtain at least a 4/10 in both parts, the final exam and computer practicals.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	30	7	8		15				
Horas de Actividad No Presencial del Alumno/a	45	10,5	12		22,5				

Legend:

M: Lecture-based | S: Seminar | GA: Applied classroom-based groups

GL: Applied laboratory-based groups | GO: Applied computer-based groups | GCL: Applied clinical-based groups

TA: Workshop | TI: Industrial workshop | GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 75%
- Exercises, cases or problem sets 25%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Article 8.

In any case, students shall have the right to be assessed by means of the final assessment system, regardless of whether or not they have participated in the continuous or mixed assessment system. To do so, students must submit a written waiver of continuous or mixed assessment to the lecturer responsible for the subject, for which they will have a period of 9 weeks from the beginning of the four-month period, in accordance with the academic calendar of the centre. In this case, the student will be assessed with a single final exam, which will include a theoretical and practical part, and which will comprise 100% of the mark.

Article 12. Waiver of the exam

12.2.- In the case of continuous assessment, if the weight of the final exam is higher than 40% of the grade of the subject, it will be enough not to take the final exam for the final grade of the subject to be no-show or no-show. Otherwise, if the weight of the final exam is equal to or less than 40% of the grade for the subject, students may waive the exam within a period of at least one month before the end of the teaching period for the corresponding subject. This waiver must be submitted in writing to the lecturer responsible for the subject.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Article 9

The assessment of the subjects in the extraordinary exams will be carried out exclusively through the final assessment system.

The final assessment test of the extraordinary call will consist of as many exams and assessment activities as are necessary to be able to assess and measure the defined learning outcomes, in a way that is comparable to how they were assessed in the ordinary call. The positive results obtained by students during the course may be retained.

MANDATORY MATERIALS

Workbook

BIBLIOGRAFÍA

Basic bibliography

J.L. MALAINA Y OTROS. Lecciones de álgebra lineal y geometría. Servicio editorial de la U.P.V.
A. LUZARRAGA. Problemas resueltos de álgebra lineal. Ed. Planograf.
IÑAKI ZURUTUZA. Oinarrizko Aljebra. Elhuyar.
J.L.MALAINA Y A.I.MARTÍN. Fundamentos matemáticos con Mathematica. Servicio editorial de la U.P.V.
M.GOLUBITSKY, M. DELLNITZ (2001). Algebra lineal y ecuaciones diferenciales con uso de Matlab. Madrid. Thomson.

Detailed bibliography

J.V. PROSKURIAKOV. Problemas de álgebra lineal. Ed. Mir.
F.GRANERO. Álgebra y geometría analítica. Ed. Mc. Graw-Hill.
J.ARVESÚ, F. MARCELLÁN, J.SANCHEZ (2005). Problemas resueltos de Algebra Lineal. Madrid, Thomson Paraninfo.

Journals

LA GACETA DE LA REAL SOCIEDAD MATEMATICA ESPAÑOLA.

Web sites of interest

http://www.divulgamat.net
http://www.hiru.com

OBSERVATIONS

COURSE GUIDE 2023/24

Faculty 264 - Faculty of Engineering - Gipuzkoa. Eibar Department **Cycle** .

Degree GRENOV20 - Bachelor's Degree In Renewable Energy Engineering **Year** First year

COURSE

26570 - Computer Science **Credits, ECTS:** 6

COURSE DESCRIPTION

Computers are becoming ubiquitous allowing us
- to make numeric calculations fast, correctly and with the required numerical precision.
- to execute real-time control of complex systems.
- to perform ubiquitous communication and collaboration.

This subject aims to show the possibilities of Computer Science and offer a tool to allow learners to apply them on the Renewable Energies field.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

The academic competences to be gained are:
-to be able to make computer programs
-to reach a user level using engineering software

Theoretical and Practical Contents

Topic 0: Introduction
0.1 Problem resolution
0.2 Efficiency: optimization
0.3 Efficacy: precision, accuracy and error
0.4 Problem model

Topic 1: Software tools
1.1 Hardware, Software and Operating Systems
1.2 Tools for end-users

Topic 2: Programming Methodology
2.1 Programming languages.
2.2 Program design: abstraction, sequencing, and specification.
2.3 Data: variables, constants, operators, expressions and data structures.
2.4 Algorithms and simulation tables.
2.5 Modular and structured programming.

Topic 3: Programming in Matlab
3.1 Data Types
3.2 Control Structures
3.3 Data analysis programs.
3.4 2D and 3D graphics

TEACHING METHODS

During the semester, learners are required to perform some individual pieces of work (20% of the mark), group works (10%) and a final exam (70%). Mark percentages may vary depending on unforeseen events such as constraints arising from the current pandemic.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	15				45				
Horas de Actividad No Presencial del Alumno/a	22,5				67,5				

Legend:
M: Lecture-based | S: Seminar | GA: Applied classroom-based groups
GL: Applied laboratory-based groups | GO: Applied computer-based groups | GCL: Applied clinical-based groups
TA: Workshop | TI: Industrial workshop | GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 70%

- Exercises, cases or problem sets 10%
- Individual assignments 10%
- Teamwork assignments (problem solving, Project design) 10%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Learners not performing required works could do a final test. The mark on the test would be the 100% of the final mark. Learners must ask the teacher in order to opt to this evaluation way.

Final test will be in person. However, specific circumstances can advocate for an online final test.

Only attending to the test implies counting a test call.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Learners not performing required works could do a final test. The mark on the test would be the 100% of the final mark. Learners must ask the teacher in order to opt to this evaluation way.

Final test will be in person. However, specific circumstances can advocate for an online final test.

Only attending to the test implies counting a test call.

MANDATORY MATERIALS

-Course notes
-a Matlab course in the School website:
http://www.sc.ehu.es/sbweb/energias-renovables/MATLAB/intro.html
-A tool for flow-diagrams: http://www.flowgorithm.org/
-MATLAB's website: http://www.mathworks.com

BIBLIOGRAPHY

Basic bibliography

-Oinarrizko programazioa. Azpeitia Lakuntza, Iker; Ibáñez Martínez-Conde, Jesús. 2020. https://webargitalpena.adm.ehu.es/listaproductos.asp?IdProducts=UCPDF202536&titulo=Oinarrizko%20programazioa
-Agenda 2030 y Objetivos de Desarrollo Sostenible:
https://www.ehu.eus/es/web/ikasleen-biltzarra/2030-agenda-eta-garapen-iraunkorraren-helburuak
-Fundamentos de informática y programación para ingeniería : Ejercicios resueltos para C y Matlab. Modesto Castrillón Santana et. al. 2011
-MATLAB: a practical introduction to programming and problem solving. Stormy Attaway. 2012

Detailed bibliography

-Essential Matlab for Engineers and Scientists. Brian D. Hahn and Daniel T. Valentine. 2013
-MATLAB for engineering applications. William J Palm III. 2019
-Introduction to MATLAB & SIMULINK : a project approach. Beucher, Ottmar. Weeks, Michael. 2008.
-Simulation of dynamic systems with MATLAB and SIMULINK. Klee, Harold. 2007
-Applied Numerical Methods with Matlab for Engineers and Scientists. Steven C. Chapra. 2008
-Aprendizaje Basado en Competencias. Aurelio Villa y Manuel Poblete. 2007.

Journals

Web sites of interest

http://www.mooc-list.com

OBSERVATIONS

COURSE GUIDE 2023/24

Faculty 264 - Faculty of Engineering - Gipuzkoa. Eibar Department **Cycle** .

Degree GRENOV20 - Bachelor's Degree In Renewable Energy Engineering **Year** First year

COURSE

27849 - Mathematical and Numerical Analysis **Credits, ECTS:** 6

COURSE DESCRIPTION

The subject of MATHEMATICAL AND NUMERICAL ANALYSIS is a subject of the second semester of the first year and it has 6 ECTS credits. The face-to-face classes are divided into three types: lectures (30 hours), classroom practice (15 hours) and computer practice (15 hours). In addition to the classes, students will have to work 45 hours of lectures, 22.5 hours of classroom practice and 22.5 hours of computer practice.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Basic competences:
CB1-Possess and understand knowledge of mathematics on the basis of general secondary education.
CB2- Apply mathematical terminology and knowledge at work in a professional manner.

Specific competence:
FB01-Solve mathematical problems that may arise in engineering. Apply knowledge of mathematical analysis.

Transversal competence
G007-Work in a multilingual and multidisciplinary environment.
G011- Develop learning skills necessary to carry out continuous training, as well as to undertake further studies, with a high degree of autonomy, skills founded on the basis of respect for human rights and equal opportunities for all people.

Learning outcomes of the subject:
- Analyses and expresses ideas correctly making use of mathematical terminology.
- Identifies the different types of differential equations and solves them.
- Applies the Laplace Transform to solve differential equations.
- Obtains the Fourier development of a periodic function.
- Applies numerical methods to solve overly complex mathematical problems.
- Handles algorithms both on paper and with the help of the computer.

CONTENIDOS TEÓRICO-PRÁCTICOS

Topic 1. Differential equations and partial differential equations.
First order differential equations: separate variables, homogeneous and reducible to homogeneous, exact and reducible to exact, linear, Bernoulli. Linear differential equations with constant coefficients of order 'n'. Euler differential equations.

Topic 2. Laplace transform.
Concept. Properties. Inverse Laplace transform. Application to the solution of differential equations.

Topic 3. Fourier series.
Definition. Properties and applications.

Topic 4. Numerical resolution of non-linear equations.

Topic 5. Numerical integration.

TEACHING METHODS

The subject will follow a methodology characterised by the following aspects:
Preliminary work: students will carry out the tasks indicated by the teacher, in a non-presential manner.
In class: the teacher will propose various training activities. Among others, doubts that have arisen from the previous work will be resolved.
Deliverables and tests: students will hand in the deliverables and take the tests indicated by the teacher and will be given the corresponding feedback.

In terms of assessment, the tools and grading percentages are as follows:
Final exam: 75%. (It can be advanced by up to 15% through various activities.)
Computer practicals: 25%.
Note: It is necessary to obtain at least a 4/10 in both parts, the final exam and computer practicals.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	30		15		15				
Horas de Actividad No Presencial del Alumno/a	45		22,5		22,5				

Legend: M: Lecture-based | S: Seminar | GA: Applied classroom-based groups
GL: Applied laboratory-based groups | GO: Applied computer-based groups | GCL: Applied clinical-based groups
TA: Workshop | TI: Industrial workshop | GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 75%
- Exercises, cases or problem sets 25%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Article 8.
In any case, students shall have the right to be assessed by means of the final assessment system, regardless of whether or not they have participated in the continuous or mixed assessment system. To do so, students must submit a written waiver of continuous or mixed assessment to the lecturer responsible for the subject, for which they will have a period of 9 weeks from the beginning of the four-month period, in accordance with the academic calendar of the centre. In this case, the student will be assessed with a single final exam, which will include a theoretical and practical part, and which will comprise 100% of the mark.

Article 12. Waiver of the exam
12.2.- In the case of continuous assessment, if the weight of the final exam is higher than 40% of the grade of the subject, it will be enough not to take the final exam for the final grade of the subject to be no-show or no-show. Otherwise, if the weight of the final exam is equal to or less than 40% of the grade for the subject, students may waive the exam within a period of at least one month before the end of the teaching period for the corresponding subject. This waiver must be submitted in writing to the lecturer responsible for the subject.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Article 9
The assessment of the subjects in the extraordinary exams will be carried out exclusively through the final assessment system.

The final assessment test of the extraordinary call will consist of as many exams and assessment activities as are necessary to be able to assess and measure the defined learning outcomes, in a way that is comparable to how they were assessed in the ordinary call. The positive results obtained by students during the course may be retained.

MANDATORY MATERIALS

Workbook.
No calculators or electronic devices may be used in exams and/or tests.

BIBLIOGRAFÍA

Basic bibliography

PROBLEMAS Y EJERCICIOS DE ANÁLISIS MATEMÁTICO.- B. Demidovich.- Ed. Paraninfo.
CALCULO DIFERENCIAL E INTEGRAL.- N. Piskunov.- Ed. Montaner y Simón.
KALKULUA. TEORIA ETA ARIKETAK. Elhuyar
INGENIARITZAREN OINARRI MATEMATIKOAK. Eugenio Mijangos. Euskal herriko Unibersitatea
ECUACIONES DIFERENCIALES Y CALCULO INTEGRAL.-E. Martínez Sagarzazu. Ed. Universidad del País Vasco.
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Detailed bibliography

ECUACIONES DIFERENCIALES.- Frank-Ayres.- Ed. Schaum Mc Graw-Hill.
ECUACIONES DIFERENCIALES.- P. Puig Adam.- Ed. Biblioteca Matemática.
PROBLEMAS DE ECUACIONES DIFERENCIALES ORDINARIAS.- a. Kiseliov. M. Krasnov. G. Makarenko

Journals

LA GACETA DE LA REAL SOCIEDAD MATEMÁTICA ESPAÑOLA

Web sites of interest

http://www.divulgamat.net
http://www.hiru.com
http://es.wikipedia.org/wiki/Cálculo_infinitesimal

OBSERVATIONS

COURSE GUIDE 2023/24

Faculty 264 - Faculty of Engineering - Gipuzkoa. Eibar Department **Cycle** .

Degree GRENOV20 - Bachelor's Degree In Renewable Energy Engineering **Year** First year

COURSE

27850 - Calculation **Credits, ECTS:** 6

COURSE DESCRIPTION

The subject of CALCULUS is a subject of the first term of the first course and has 6 ECTS credits. The Presential classes are divided into three types: master classes (30 hours), classroom practices (23 hours) and seminars (7 hours).
In addition to the classes, students will have to work 45 hours of lectures, 34.5 hours of classroom practice and 10.5 hours of seminars.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Basic skills:
CB1-Possess and understand knowledge of mathematics from the base of general secondary education
CB2- Apply terminology and mathematical knowledge in the workplace in a professional way.

Specific competence:
FB01-Solve mathematical problems that may arise in engineering Apply knowledge of calculus.

Transversal competence
G007-Working in a multilingual and multidisciplinary environment
G011-Developing learning skills necessary for continuing education and to undertake further studies, with a high degree of autonomy, skills based on respect for human rights and equal opportunities for all people.

Learning outcomes of the subject:
- Analyze and express ideas correctly using mathematical terminology.
- Knows how to operate with complex numbers in their different forms.
- Carries out the complete study of a real function of a real variable.
- Calculates the primitive of a function and knows how to apply it in technological subjects.
- Knows the concept of partial derivative and calculates the directional derivative in a point.
- Knows the concept of double and triple integral and knows how to apply it to different areas

CONTENIDOS TEÓRICO-PRÁCTICOS

Item 1. The complex number.
Definition and graphic representation. Trigonometric, exponential and polar form. Operations with complex numbers and decomposition of polynomials into factors

Item 2. Real functions of real variable.
Limit and continuity. Applications.

Item 3. Derivability of real functions from real variables.
Derivability and continuity. Successive derivatives. Rule of the chain. Implicit functions. L'hopital rule. Polynomial from Taylor. Applications.

Item 4. Functions of several variables.

Item 5. Derivability of functions of several real variables.
Partial derivatives. Geometric interpretation. Directional derivation. Gradient. Higher order partial derivatives. Derivability of composite functions.

Topic 6. Integral calculation of functions of a variable.
Indefinite integral. Change of variable, integrals by parts, rationals, trigonometrics and irrationals.

Item 7. Defined integral.
Riemann's integral. Barrow's rule. Applications.

Item 8. Multiple integrals.
Iterated integrals. Double and triple integrals. Applications.

TEACHING METHODS

The course will follow a methodology characterized by the following aspects:

Preliminary work: the students will carry out the tasks indicated by the teacher, in a non-presential way.
In class: the teacher will propose various training activities. Among others, they will solve the doubts that have arising from previous work done.
Deliverables and tests: students will deliver the deliverables and perform the tests that the teacher indicates and will be will provide the corresponding feedback.

As for the evaluation, the tools and percentages of qualification are the following:
Deliverables and tests: 30%
Final exam: 70%

Note: it is necessary to obtain at least a 4/10 in each of the two parts indicated in order to pass the course.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	30	7	23						
Horas de Actividad No Presencial del Alumno/a	45	10,5	34,5						

Legend:
M: Lecture-based
S: Seminar
GA: Applied classroom-based groups
GL: Applied laboratory-based groups
GO: Applied computer-based groups
GCL: Applied clinical-based groups
TA: Workshop
TI: Industrial workshop
GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 70%
- Exercises, cases or problem sets 30%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Article 8.
In any case, the students will have the right to be evaluated by means of the final evaluation system, independently whether or not it has participated in the continuous or mixed evaluation system. To do so, students must submit the teachers in charge of the course will be asked to waive the continuous or mixed assessment, and will have of a period of 9 weeks, starting from the beginning of the term, in accordance with the academic calendar of the center. In this case, the student will be evaluated with only one final exam, which will include a theoretical and practical part, and which will comprise 100% of the grade.

Article 12. Waiver of the call
12.2.- In the case of continuous evaluation, if the weight of the final test is greater than 40% of the grade of the If you do not take the final exam, the final grade for the course will be no
submitted or not submitted. Otherwise, if the weight of the final test is equal to or less than 40% of the grade of the subject, students may waive the call within a period of at least one month before the date of the end of the teaching period of the corresponding subject. This resignation must be submitted by written to the teachers responsible for the subject.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Article 9
The evaluation of the subjects in the extraordinary calls will be carried out exclusively through the system of final evaluation.

The final evaluation test of the extraordinary call will consist of as many tests and assessment are necessary to be able to evaluate and measure the defined learning outcomes, in a way that is comparable to as they were evaluated in the ordinary call. Positive results obtained by the students during the course.

MANDATORY MATERIALS

Workbook

Neither a calculator nor any electronic device may be used in the examinations and/or face-to-face tests.

BIBLIOGRAFÍA

Basic bibliography

-Piskunov, N. (1970). Cálculo diferencial e integral. Ediciones Montaner y Simón.
-Granero, F. (1993). Cálculo. Ediciones Mc. Graw Hill.
-Prieto, M. (1970). Cálculo diferencial: funciones de una variable. Index, Madrid.
-Losada M. R. (1972). Cálculo diferencial de varias variables.
-Ayres, F. (1982). Teoria y problemas de cálculo diferencial e integral. McGraw-Hill, Mexico [etc.].
-Ayres, F. (1991). Cálculo diferencial e integral. McGraw-Hill, Madrid.
-Soler, M. (1997). Cálculo diferencial e integral: una y varias variables. Síntesis, Madrid.
-García, F. & Gutiérrez, A. (1994). Cálculo infinitesimal II. Ediciones Pirámide.

Detailed bibliography

PROBLEMAS:

-Demidovich, B. (1993). Problemas y ejercicios de análisis matemático. Ediciones Paraninfo.
-Marín J. A. (1972). Problemas de cálculo diferencial. S.A.E.T.A., Madrid.
-Olmo. V. (1987). Problemas de cálculo diferencial, funciones de varias variables. Universidad Politécnica de Valencia, Valencia.

Journals

LA GACETA DE LA REAL SOCIEDAD MATEMÁTICA ESPAÑOLA

Web sites of interest

http://www.divulgamat.net
http://www.hiru.com
http://es.wikipedia.org/wiki/Cálculo_infinitesimal
http://www.vitutor.com/
https://www.geogebra.org/
https://es.mathworks.com/
https://www.khanacademy.org/

OBSERVATIONS

The subject is part of the following project, IKDi321-21.

COURSE GUIDE 2023/24

Faculty 264 - Faculty of Engineering - Gipuzkoa. Eibar Department **Cycle** .

Degree GRENOV20 - Bachelor's Degree In Renewable Energy Engineering **Year** Second year

COURSE

27859 - Statics & Strength of Materials **Credits, ECTS:** 6

COURSE DESCRIPTION

The subject offers an overview of the mechanical design of parts. It presents the basis of the design of mechanical elements: the safety degree is assessed according to the loads, dimensions and material of the mechanical element. The subject consists of two differentiated parts: 'Statics' and 'Mechanics of Materials'. In Statics, the mechanical element is isolated and the external forces are analysed to obtain a free solid diagram. In Mechanics of Materials, the solid is considered deformable. This allows the study of internal forces (stresses) created by the external forces. Comparing the magnitude of these stresses with the mechanical properties of the material, it the safety coefficient is calculated and, thus, the design of the part is validated. An optimal mechanical design saves materials and resuces, enlarges the usable life cycle and improves social and environmental sustainability.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Competences:
CRI04 - Learn about and use the principles of materials resistance.
G011 - Develop the necessary learning skills to carry out ongoing training with a high level of autonomy.
G012 - Apply strategies found in scientific methodology.
G013 - Work efficiently in groups.

Learning outcomes:
Knows and uses the basic principles of particle statics and rigid solids.
Knows and uses beam and cable elements, the calculation of their main parameters for different types of loads.
Design structures in 2 and 3 dimensions.
Knows and uses the tensile and compression loads.
Knows and uses the bending loads in beams.
Knows and uses the torque loads in axes.
Knows and uses the buckling loads in columns

CONTENIDOS TEÓRICO-PRÁCTICOS

Unit 1. Statics of the particle and the rigid solid.
Unit 2. Beams and cables.
Unit 3. Structures.
Unit 4. Stress and deformation. Material properties characterisation tests.
Unit 5. Axial loads: tensile and compression.
Unit 6. Bending.
Unit 7. Torque.
Unit 8. Buckling.

TEACHING METHODS

In this subject different teaching methodologies are used, being the most common the problem-solving. The participation in the programmed activities ensures the development of the right skills by the students.
The following activities take place over the year:
- Lectures: the conceptual content of the subject is explained, with student participation in occasional debates.
- Seminars: cooperative work is done, using the puzzle of problems in groups. Debate based learning (DBL) is used to understand the influence of mechanical properties of materials on the mechanical behaviour and sustainability of mechanical elements.
- Also in seminars, a guided debate will be prepared and carried out. In this debate, the groups shall prepare the two sides regarding the mechanical design of the elements from the point view of mechanics, materials, and sustainability.
- Practical work in the laboratory: the mechanical properties of a material are measured and the results shared among the groups so reach agreement on conclusions.

«If the sanitary conditions does not allow regular academic activities or/and evaluation in the classroom, the on-line teaching will activate, of which the students will be informed promptly.»

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	45		7	8					
Horas de Actividad No Presencial del Alumno/a	60		20	10					

Legend: M: Lecture-based | S: Seminar | GA: Applied classroom-based groups | GL: Applied laboratory-based groups | GO: Applied computer-based groups | GCL: Applied clinical-based groups | TA: Workshop | TI: Industrial workshop | GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 60%
- Exercises, cases or problem sets 15%
- Teamwork assignments (problem solving, Project design) 25%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Assessment in this subject is combined. The exam must be passed with a minimum mark of 5/10 to pass the subject. It is also necessary to complete satisfactorily the practical work to pass the subject. Aptitude and participation during the year also has an impact on the final grade.
A student who, for justified reasons, cannot participate in the combined assessment system (or, as the case may be, the continuous assessment system) may take a final exam in which the practical part will also be assessed. To do this, he/she will notify the professor responsible for the subject in writing within one month of the data set for the assessment of the subject. In this case, the student will be assessed in a single final exam, which will include the practical part and will account for 100% of the grade.
A student who wishes to withdraw from continuous assessment may do so in writing to the professor who teaches the subject, at least one month before the completion of the teaching period for the subject.
If the student does not present him/herself for the written exam, in any of the calls, she/she will be considered to have withdrawn from said call and will appear as "Not Presented".

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

9th article.
In the extraordinary exam call, a single final exam is the only evaluation system.
The final exam includes both, theoretical and practical parts, it accounts for 100% of the grade.

MANDATORY MATERIALS

Basic references:
Vector Mechanics for Engineers: statics, F. Beer, E. R. Johnston Jr., D. Mazurek McGraw-Hill, 2008
Mechanics of Materials, F. Beer, E. R. Johnston Jr., McGraw-Hill, 2009
Mechanics of Materials (Timoshenko), J. Gere, McGraw-Hill, 2006
Fundamentals of Materials Science and Engineering: An Integrated Approach, W. D. Callister D.G. Rethwisch, 3rd edition, Wiley 2007.

BIBLIOGRAFÍA

Basic bibliography

In-depth bibliography:
Mechanics of Materiales, R.C. Hibbeler, Pearson, 2006
Foundations of Materials Science and Engineering, W. J. Smith, J. Hashemi, McGraw-Hill, 2014
Introduction to the Mechanics of Solids, S.H. Crandall, N.C. Dahl, T.J. Lardner, McGraw-Hill, 1978

Detailed bibliography

Resistencia de Materiales, Timoshenko, James Gere, Editorial ITES, PARANINFO
Mecánica de Sólidos. TJ Lardner - Rarcher, Editorial McGraw-Hill
Mecanica de Materiales, William F. Riley, Wiley
Materials and Sustainable Development, M. F. Ashby, Butterworth-Heinemann, 2015

Journals

Web sites of interest

Ansolaren liburua UEUn:
http://www.buruxkak.org/liburuak_ikusi/205/elastikotasunaren_teoria_eta_materialen_erresistentzia.html
Deformaziogatiko gogortzearen eta tenplearen adibidea:

http://www.roadandtrack.com/car-culture/videos/a31369/heres-how-automotive-coil-springs-are-made/
Elementu finituen metodoa:
https://knowledge.autodesk.com/support/nastran-in-cad/learn-explore/caas/CloudHelp/cloudhelp/2017/ENU/NINCAD-SelfTraining/files/GUID-B63CD966-5467-45A2-BACA-1408418997D0-htm.html
Espagetien haustura-moduak:
https://www.youtube.com/watch?v=ADD7QlQoFFI
http://ocw.mit.edu/OcwWeb/Mechanical-Engineering/index.htm
http://imechanica.org/
http://www.mip.berkeley.edu/physics/bookadx.html
http://memagazine.asme.org/
https://en.unesco.org/sustainabledevelopmentgoals
https://www.datemats.eu/blog/

OBSERVATIONS

COURSE GUIDE 2023/24

Faculty 264 - Faculty of Engineering - Gipuzkoa. Eibar Department **Cycle** .

Degree GRENOV20 - Bachelor's Degree In Renewable Energy Engineering **Year** Second year

COURSE

27861 - Statistical Mathematics **Credits, ECTS:** 6

COURSE DESCRIPTION

The subject of STATISTICAL MATHEMATICS is a subject of the second semester of the second year and it has 6 ECTS. Classroom lessons are divided into three types: lectures (30 hours), classroom practices (15 hours) and computer practices (15 hours). In addition to the lessons, students will have to work 45 hours of lectures, 22.5 hours of classroom practice and 22.5 hours of computer practice.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Basic skills:
CB1-Possess and understand knowledge of mathematics from the base of general secondary education.
CB2- Apply terminology and mathematical knowledge in the workplace in a professional way.

Specific competence:
FB01-Solve mathematical problems that may arise in engineering Apply knowledge of statistics.

Transversal competences:
G007-Working in a multilingual and multidisciplinary environment.
G011-Develop learning skills necessary to carry out continuous training, as well as to undertake. further studies, with a high degree of autonomy, skills based on respect for human rights and equal opportunities for all people.

Learning outcomes of the subject:
- Analyze and express ideas correctly using mathematical terminology.
- Statistically describe a sample by means of tables, graphs and measurements.
- Knows the concepts and applications of probability.
- Analyzes situations and models engineering problems of stochastic nature by means of variables randomly.
- Correctly applies sampling and parameter estimation techniques.
- Applies basic regression models to engineering problems.

CONTENIDOS TEÓRICO-PRÁCTICOS

Unit 1 : Descriptive statistics.
Population and sample. Frequency distributions. Graphical representations and measurements.

Unit 2 : Combinatorial. Basic ideas of probability.
Variations, combinations and permutations. Random experiments. Algebra of events. Absolute and relative frequency of an event. Concept of probability. Axioms. Conditioned probability. Compound probability theorem. Dependent and independent events. Probability of the union of compatible events. Total probability theorem. Bayes' theorem.

Unit 3 : Discrete random variables.
Random variable. Classification. Discrete probability distributions. Probability function and distribution function. Mean and variance. Hypergeometric, binomial, geometric, negative binomial, Poisson and polynomial distribution.

Unit 4 : Continuous random variables.
Density function and distribution function. Mean and variance. Normal Gaussian distribution. Moivre's theorem. Pearson's chi-square distribution, Student's t and F by Fisher-Snedecor. Weibull distribution. Other distributions.

Unit 5 : Sampling and estimation theory.
Introduction. Means and variance of a linear combination of random variables. Central boundary theorem. Population and statistical sampling parameters. Parameter estimation. Fisher's theorem. Confidence interval of the mean and variance of a normal population. Confidence interval for the difference of means of two normal and independent populations. Confidence interval for the difference in means of two normal populations, paired samples. Variance ratio.

Unit 6 : Hypothesis contrast.
Introduction. Types of hypotheses. Type of contrasts. Type I and type II error. Critical region and region of acceptance. Contrasts on the mean and variance of a normal population. Contrasts on the difference of means of two normal and independent populations. Contrasts on the difference of means of two normal populations, paired samples.

Unit 7 : Analysis of variance.
Analysis of variance with one factor of variation and with two independent factors of variation Tables ANOVA and ANOVA II.

Unit 8: Regression and correlation.
Two-dimensional statistical variable. Scatter diagrams. Linear regression. Method of the least squares of Gauss. Correlation. Standard error of the estimation. Non-linear regression: Adjustment of exponential, potential and parabolic curves.

TEACHING METHODS

- Final exam: 75%. (It could be possible advance up to 15% throughout the course through activities)
- Computer training: 25%

A minimum score of 4 marks are required for both the computer training and the final exam.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	30		15		15				
Horas de Actividad No Presencial del Alumno/a	45		22,5		22,5				

Legend:
M: Lecture-based | S: Seminar | GA: Applied classroom-based groups
GL: Applied laboratory-based groups | GO: Applied computer-based groups | GCL: Applied clinical-based groups
TA: Workshop | TI: Industrial workshop | GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 75%
- Exercises, cases or problem sets 25%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

In continuous evaluation the practices will be carried out throughout the four-month period and the written test on the day of the exam.

In the final evaluation the practices and the written test will be done on the day of the exam.

If classroom teaching should be replaced by virtual teaching, and above all, if it is not possible to take the exam in person, the assessment systems will be adapted to the situation. The tests taken so far (if any) will be kept. From then on, all the contents to be assessed will be evaluated by means of different tests and/or written and/or oral activities (papers, tests, exams, interviews...). As far as possible, the selected evaluation system will be maintained but continuous evaluation against the final will be encouraged.

Article 8.
In any case, students will have the right to be evaluated through the final assessment system, regardless of whether or not they have participated in the continuous or mixed assessment system. To do so, students must present a written waiver of continuous or mixed assessment to the teaching staff in charge of the subject, for which they will have a period of 9 weeks, counting from the beginning of the four-month period, in accordance with the school's academic calendar. In this case, the student will be evaluated with a single final exam, which will include a theoretical and practical part, and which will comprise 100% of the mark.

Article 12. Waiver of the call
12.2.- In the case of continuous evaluation, if the weight of the final test is higher than 40% of the grade of the course, it will be enough not to take the final test for the final grade of the course to be not submitted or presented. Otherwise, if the weight of the final test is equal to or less than 40% of the qualification of the subject, the students may waive the call within a period of at least one month before the end of the teaching period of the corresponding subject. This resignation must be presented in writing to the teaching staff responsible for the subject.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Article 9
The evaluation of the subjects in the extraordinary calls will be carried out exclusively through the final evaluation system.

The final assessment test of the extraordinary call will consist of as many tests and assessment activities as necessary to

be able to assess and measure the defined learning outcomes, in a way that is comparable to how they were assessed in the ordinary call. The positive results obtained in each part by the students during the course may be kept.

MANDATORY MATERIALS

Exercises notebook.

In the written test, a calculator and statistical tables may be used.

BIBLIOGRAFÍA

Basic bibliography

Probability and Statistics for Engineering and the Sciences. Jay L. Devore.
- NOVO SANJURJO V. Estadística Teórica y Aplicada. Ed. Sanz y Torres.
- NOVO SANJURJO V. Problemas de cálculo de probabilidades y estadística. Ed. Sanz y Torres

Detailed bibliography

GEORGE C. CANAVOS. Probabilidad y estadística. Aplicaciones y métodos. MacGraw -Hill

JOSE M. CASAS SANCHEZ. Inferencia estadística para economía y administración de empresas.
Ed. Centro de estudios Ramón Areces, S.A.

SIXTO RIOS. Análisis estadístico aplicado. Paraninfo.

KARMELE FERNANDEZ ETA BESTEAK. Estatistika-ariketak. Udako Euskal Unibertsitatea.

Journals

LA GACETA DE LA REAL SOCIEDAD MATEMATICA ESPAÑOLA

Web sites of interest

http://www.divulgamat.net
http://www.hiru.com
http://aulafacil.com/CursoEstadistica/CursoEstadistica.htm

OBSERVATIONS

COURSE GUIDE 2023/24

Faculty 264 - Faculty of Engineering - Gipuzkoa. Eibar Department **Cycle** .

Degree GRENOV20 - Bachelor's Degree In Renewable Energy Engineering **Year** Second year

COURSE

27862 - Heat Transfer **Credits, ECTS:** 6

COURSE DESCRIPTION

In the practice of engineering, have some understanding of the mechanisms of heat transfer is increasingly important. It plays a critical role in the design of renewable energy systems.
The subject develops the fundamental knowledge of the heat and mass transfer. This is a basic science that studies the ratio of thermal energy transfer.
For this subject, students have get solid calculation base (calculation of 1st course and extension of mathematics of 2nd course) and physics (physics and physical expansion of 1º course). Equally, it is convenient to have passed thermodynamics, mechanics of fluids and differential equations (all 2nd year). Although the concepts that belong to these themes are presented and reviewed as they will need.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

- To develop the fundamentals of heat transfer and the technologies linked to heat energy and its conversions in order to be capable to use the concepts in different environments.

- To use properly the heat transfer concepts, by computer (Software: ENGINEERING EQUATION SOLVER (EES)) and analytically for making reports, evaluating different contexts, working strategies and taking decisions.

- To work in team with classmates to deal with different tasks related to heat transfer Technologies: laboratory tests, check results and make reports.

- To work with information about thermal technologies, analyze and communicate fluently the ideas writing and speaking,using for that diverse symbols: text, formulae, tables, graphs and so on.

- To learn how to have a favourable attitude towards energy savings, in order to be able of reminding and checking if the analyzed thermal system is efficient enough or if it is too polluting respect to other actual Technologies and be able to propose improvements.

CONTENIDOS TEÓRICO-PRÁCTICOS

CHAPTER 1.- INTRODUCTION AND BASIC CONCEPTS
CHAPTER 2.- HEAT CONDUCTION EQUATION
CHAPTER 3.- STEADY HEAT CONDUCTION
CHAPTER 4.- TRANSIENT HEAT CONDUCTION
CHAPTER 5.- NUMERICAL METHODS IN HEAT CONDUCTION
CHAPTER 6.- FUNDAMENTALS OF CONVECTION
CHAPTER 7.- EXTERNAL FORCED CONVECTION
CHAPTER 8.- INTERNAL FORCED CONVECTION
CHAPTER 9.- NATURAL CONVECTION
CHAPTER 10.- BOILING AND CONDENSATION
CHAPTER 11.- HEAT EXCHANGERS
CHAPTER 12.- FUNDAMENTALS OF THERMAL RADIATION
CHAPTER 13.- RADIATION HEAT TRANSFER
CHAPTER 14.- MASS TRANSFER

TEACHING METHODS

M (Lecture): a 2 h duration PowerPoint will be exposed every week, one presentation for each chapter. The students must take notes.

GA (Problems): 1 h of problems will be done, every week, on the board for each chapter. The students must take notes and will be asked randomly about how they would do some parts of the problems.

GO (Computer Problems): 7 computer classes will be done (1.5 h each one) using the ESS software to solve different problems. During the first hour of each class the teacher will lead some exercises and in the last half hour the student will have to solve a problem by his own, which will be evaluated. Schedule:

COMPUTER CLASS 1 (week 5): fundamentals of EES software and problems for chapters 3 and 4. This one will not be evaluated.

COMPUTER CLASS 2 (week 6): problems for chapter 5.
COMPUTER CLASS 3 (week 7): problems for chapter 5.
COMPUTER CLASS 4 (week 8): problems for chapter 5.
COMPUTER CLASS 5 (week 9): problems for chapters 6, 7 and 8.
COMPUTER CLASS 6 (week 12): problems for chapters 9, 10 and 11.
COMPUTER CLASS 7 (week 15): problems for chapters 12 and 13.

GL (Laboratory practices): the students must do two laboratory practices, 2.5 h each one: convection and heat exchangers. The student will do a report for each of the laboratory practices and those reports will be evaluated.

NOTE: The semester is 15 weeks long but there are just 14 chapters because probably one week will be lost because of some free days.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	30		15	5	10				
Horas de Actividad No Presencial del Alumno/a	45		30	5	10				

Legend:
M: Lecture-based | S: Seminar | GA: Applied classroom-based groups
GL: Applied laboratory-based groups | GO: Applied computer-based groups | GCL: Applied clinical-based groups
TA: Workshop | TI: Industrial workshop | GCA: Applied fieldwork groups

Evaluation methods

- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 55%
- Multiple choice test 15%
- Exercises, cases or problem sets 30%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

1 - WRITTEN EXAM*:

1st exercise: heat transfer
2nd exercise: heat transfer
3rd exercise: heat transfer

Written exam grade = [(1st exercise)x(2nd exercise)x(3rd exercise)]^1/3 .

Also, three written test, using Socrative tool will be done during the course. In each test, all the class must participate and 80% of the answers will be correct in order to get 5% of the final grade, otherwise will get nothing.

2 - COMPUTER PROBLEMS**: 7 computer problem classes (1.5 h duration each one) will be done using the EES software. In the last three computer classes problems on the
theory exposed on lectures will be solved. In those 3 computer classes the pattern will be the same, in the first hour the teacher will lead the exercises and in the last half hour the student will be evaluated. The exam type will be passed or failed. The student will be given one problem, similar to those made during the first hour, and if the student gets the correct solution will get a 5% of the final grade, otherwise will get nothing. Since there are 3 evaluated computer classes the total weight of them is a 15% of the final grade.

3 - REPORTS FROM LABORATORY PRACTICES**: Two written test from laboratory practices will be done: convection and heat transfer. The value of each of the reports will be the 7.5% of the final grade.

FINAL GRADE:
WRITTEN EXAM (55%) + COMPUTER PROBLEMS (15%) + REPORTS FROM LABORATORY PRACTICES (15%) + WRITTEN TEST WITH SOCRATIVE (15%)
* To pass the subject in the written exam a minimum of 35% must be obtained. The proceedings will show the written exam grade in case the minimum is not obtained.
** If, because of holiday days, any computer class or any laboratory practice is not carried out, their total percentage on the final grade will be the same. This means that the value of the ones carried out will be adjusted in order to maintain the total percentage.

Note: Students than for cause (Art.43 management regulations for the teachings of degree. UPV/EHU) may not participate in joint evaluation system will have access to a final exam which will be also evaluated the practical part. For this purpose,

it shall his desire, as written and justified to the teacher in charge of the subject, within a period that, at a minimum, will be one month before the date set for the evaluation of the subject. In this case, the / the student to be evaluated / a with a single final exam, which will include a practical part, and that shall cover 100% of the note.Article 39 of the same regulation states that the / the student at that desired, may submit his resignation to the call for evaluation, by means of a letter sent to the professor who taught the course, within a period that, at a minimum, will be one month prior to the date of completion of the teaching period of the course.In the event that the / the student that is submitted to the test written in any of the calls, will mean the renunciation of such call for evaluation and will consist as not submitted.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

The extraordinary call is governed under the same criteria that ordinary call.

MANDATORY MATERIALS

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BIBLIOGRAFÍA

Basic bibliography

* INCROPERA, F. P. & DE WITT, D. P. Introduction to Heat Transfer. John Wiley & Sons. New York. (1990).
* Carnahan B., Luther H.A., Wilkes J.O., Applied Numerical Methods.

Detailed bibliography

* CHAPMAN, A. J. Transmisión del Calor. Ed. Interciencia. Madrid. (1974).
* KREITH, F. & BOHN, M. Principios de transferencia de Calor. Thomson. Madrid. (2002).
* Ishachenko V., Osipova V., Sukomel A.,Transmisión del calor
* ASHRAE. Handbook of Fundamentals.
* ASHRAE. Handbook of System and Applications
* Eckert, E.R.G., Drake, R.M.- Análisis of Heat and Mass Transfer. Mc Graw-Hill. (1972).
* Hotel, H.C., Sarofim, A.F.- Radiative Transfer. Mc Graw-Hill Company (1976).
* Jacob, M.- Heat Transfer, Vol. I y II. JohnWiley and Sons. (1957).
* Kays, W.m., London, A.L.- Compact Heat Exchangers. Mc Graw-Hill. (1964).

Journals

* Heat Transfer Engineering. USA.
* International Journal of Heat and Mass Transfer, Elsevier.
* Applied Thermal Engineering, Elsevier.
* ASHRAE Journal. USA.
* Energy, Pergamon.

Web sites of interest

* http://www.ashrae.org/

OBSERVATIONS

COURSE GUIDE 2023/24

Faculty 264 - Faculty of Engineering - Gipuzkoa. Eibar Department **Cycle** .

Degree GRENOV20 - Bachelor's Degree In Renewable Energy Engineering **Year** Third year

COURSE

27866 - Geothermal and Solar Thermal Energy **Credits, ECTS:** 6

COURSE DESCRIPTION

The most usual thermal renewable energy sources are biomass, solar, and geothermal. The scope of this subject deals with the latter two (solar thermal and geothermal), and the role they play for low temperature thermal energy generation, both for space conditioning, and for hot water production. This subject is related to other subjects, such as Thermodynamics, and Heat Transfer (both at 2nd course), and Energy Efficiency at 4th course.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

The subject uses a practical focus in order to design, calculate and analize the preformance of solar thermal systems, and the appliances used to capture and use geothermal energy. Specifically, we will work these comptences:
- To develope the essential knowledge of geothermal and solar thermal energy, together with the technologies used to take advantage of them
- To coherently use the procedural knowledge associated with scientific methodology, in order to solve the problems associated to these technologies, aiming to select the optimal typologies and working parametres
- To adopt an attitude propitious to energy saving, so as to value if the proposed system is efficient enough, or too polluting compared to other technologies, and to define improvements, in case they are needed
- G013 - To work effectively in a group, integrating skills and knowledge, to make decisions in the field of Renewable Energy engineering

Theoretical and Practical Contents

A- Solar thermal energy
1. Introduction to solar energy
2. Solar radiation
3. Low and medium temperature solar systems
4. Solar collectors
5. Storage system
6. Solar thermal system design. Legislation
7. Solar heating. Passive solar systems

B- Geothermal energy
8. Introduction to geothermal energy
9. The earth. Internal structure and heat from the earth
10. Very low enthalpy geothermal energy uses
11. The heat pump
12. Geothermal heat exchanger. Sizing
13. Implementation

TEACHING METHODS

Magistral classes will be based on the study of actual installations, analyzing the basic concepts of their performance, with a theoretical-practical focus.
Classroom practices will be used to design and size a solar thermal and a geothermal system, working in group with other classmates.
Laboratory practices will be used to deepen in the knowledge of these systems, using commonly used elements of solar and geothermal systems, and performing different tests with them.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	30	5	15	10					
Horas de Actividad No Presencial del Alumno/a	45	7,5	22,5	15					

Legend:
M: Lecture-based
S: Seminar
GA: Applied classroom-based groups
GL: Applied laboratory-based groups
GO: Applied computer-based groups
GCL: Applied clinical-based groups
TA: Workshop
TI: Industrial workshop
GCA: Applied fieldwork groups

Evaluation methods

- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 40%

- Exercises, cases or problem sets 10%
- Teamwork assignments (problem solving, Project design) 50%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Written exam: during the course, there will be to theoretical-practical written examns, each of them about parts A and B of the temary. Passing each of these exams will mean that the corresponding part of the temary is passed. It will combine theoretical questions and practical exercises. It will be 40% of the final grade. In order to pass the subject, the students should attend both partial examns, or the final exam, and pass them. If the student wants to resign to the evaluation of the subject, she/he must ask for it, with a written request, a month prior to the end of the teaching period.

Laboratory practices: the students will have to write a report with the conclusions of the laboratory practices. It will be 10% of the final grade. This is mandatory.

Group work: Students will have to write a technical report of the design of a solar thermal installation, and a geothermal installation. It will be 0% of the final grade. This is mandatory.

In the case of suspending laboratory practices or teamwork in the ordinary call, there will be a period until the extraordinary exam call to present a report on practices or teamwork that allows you to pass the subject. In this case, it will be considered as not suitable for the ordinary call.

In the case of not approving any of the three parts that make up the final mark of the subject, the mark that will appear in the minutes will be that of the section with the lowest mark.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

In the extraordinary call, the student will be graded following the same criteria. Additionally, the grade obtained in the written exam, the laboratory practices or the group work can be saved from the ordinary call, if any of these has been passed.

In the case of not approving any of the three parts that make up the final mark of the subject, the mark that will appear in the minutes will be that of the section with the lowest mark.

MANDATORY MATERIALS

There is no mandatory material. During the course, the teacher will upload to the eGela platform the materials used in the classroom, as well as supplementary material considered of interest.

BIBLIOGRAPHY

Basic bibliography

Detailed bibliography

- Manual de climatización geotérmica : desarrollo de todo el proceso de instalación de un sistema de geotermia de muy baja temperatura / Asociación Cluster de Xeotermia Galega
- Solar engineering of thermal processes / John A. Duffie, William A. Beckman. John Wiley & Sons, Hoboken, New Jersey : 2006.

Journals

Renewable Energy
Renewable and Sustainable Energy Reviews

Web sites of interest

www.idae.es
www.asit-solar.com
www.googlenergy.com

OBSERVATIONS

COURSE GUIDE 2023/24

Faculty 264 - Faculty of Engineering - Gipuzkoa. Eibar Department **Cycle** .

Degree GRENOV20 - Bachelor's Degree In Renewable Energy Engineering **Year** Third year

COURSE

27869 - Electrical Plants Using Renewable Energy Sources **Credits, ECTS:** 6

COURSE DESCRIPTION

In this subject, the electrical installations required for the connection of the renewable energy generation with the power grid are described.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Specific competency FE02: Understand and apply the general principles related to the electrical installations that connect the renewable energy with the low and medium voltage power grid.

Theoretical and Practical Contents

1.- Introduction to the power system
2.- Power lines
3.- Substations and switchgear
4.- Low voltage installations
5.- Voltage quality

TEACHING METHODS

The methodology is based on master classes, practical tasks, laboratory tasks and external visits.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	30		15	12					3
Horas de Actividad No Presencial del Alumno/a	45		22,5	18					4,5

Legend:
M: Lecture-based
S: Seminar
GA: Applied classroom-based groups
GL: Applied laboratory-based groups
GO: Applied computer-based groups
GCL: Applied clinical-based groups
TA: Workshop
TI: Industrial workshop
GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 60%
- Exercises, cases or problem sets 20%
- Assignments 20%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

CONTINUOUS EVALUATION
The assessment is based on continuous evaluation. The assessment tools are:
- Written examination: Weight 60 %
- Laboratory and visits: Weight 20 %
- Assignments: Weight 20 %

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

FINAL EVALUATION
The assessment is based on final evaluation. The assessment tools are:
- Written examination: Weight 80 %
- Laboratory and visits evaluation exam: Weight 20 %

The laboratory and visits evaluation exam is not obligatory if the assessment in the ordinary evaluation is made satisfactorily: do in time the 100 % of the tasks and minimum mark of 5/10.

MANDATORY MATERIALS

Documentation of the subject's web page. Accessible at: https://egela.ehu.eus/

BIBLIOGRAPHY

Basic bibliography

[1] E. Lakervi, E. J. Holmes, Electricity Distribution Network Design, IET, 2003.
[2] N.Jenkins, J. Ekanayake, G. Strbac, Distributed Generation, IET, 2010.
[3] B. Fox, L. Bryans, D. Flynn, N. Jenkins, D. Milborrow, M. O'Malley, R. Watson, O. Anaya-Lara, Wind Power Integration: Connection and System Operational Aspects, IET, 2014.
[4] J. M. Gers, Distribution System Analysis and Automation, IET, 2013.
[5] S. Stewart, Distribution Switchgear, IET, 2004.

Detailed bibliography

[1] H. M. Ryan, High-Voltage Engineering and Testing, IET, 2013.
[2] J. M. Gers, E. J. Holmes, Protection of Electricity Distribution Networks, IET, 2011.
[3] M. H. J. Bollen, The Smart Grid: Adapting the Power System to New Challenges, Morgan & Claypool, 2011.
[4] M. E. EI-Hawary, Electrical Power Systems. Design and Analysis, IEEE, 1995.

Journals

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Web sites of interest

http://www.ormazabal.com/
http://www.ecn.es/
http://www.trefinasa.com/
http://www.generalcable.es/
http://es.prysmiangroup.com/
http://www.nexans.es/
http://www.arteche.com/
http://www.grupoarruti.com/
http://www.saprem.com/
http://www.ziv.es/
http://www.ree.es
http://www.circutor.es
http://www.schneiderelectric.es

OBSERVATIONS

COURSE GUIDE 2023/24

Faculty 264 - Faculty of Engineering - Gipuzkoa. Eibar Department **Cycle** .

Degree GRENOV20 - Bachelor's Degree In Renewable Energy Engineering **Year** Third year

COURSE

27871 - Automatic Regulation & Control **Credits, ECTS:** 6

COURSE DESCRIPTION

The subject "Automatic Regulation and Control" belongs to the Specific Training module (FE) of the Degree in Renewable Energy Engineering. This is a compulsory course taught in the first quarter of the third year.
This subject applies some knowledge acquired in the 1st year subjects "Physics I" (fundamental equations of mechanics) and "Mathematical and Numerical Analysis" (solving equations using the Laplace transform), in addition to "Electrical Circuits" (fundamental equations of electricity) of the 2nd year, so it is necessary to master these subjects for its correct development. The work developed in this course provides the necessary knowledge for students to model, simulate and control renewable energy systems, so that this knowledge can be used in subjects such as "Photovoltaic Solar Energy" (3rd year), "Electronic Energy Conversion Systems" (4th year), "Electric Vehicles" (4th year, optional), "Modeling and Control of Electrical Machines" (4th year, elective), and can be used together with the knowledge acquired in the subjects "Wind Energy" (3rd year), "Geothermal and Solar Thermal Energy" (3rd year year), "Marine Energy" (4th year year, optional) when developing works proposed in these subjects or in the "Final Degree Project" (4th year year).
The subject provides the competence "Acquire the knowledge and skills for modeling, control and simulation of systems" (FE01) to the Specific Training module of the Degree, linked to the competences of the Degree G003, G004, G005 and G012.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Specific Competence FE01: Adquire knowledge and skills for modeling, control and simulation of systems.
Learning Results:
1. Represent any simple physical system according to its differential equation, and from there, obtain both the transfer function and the state equations of state of the same
2. Analyzes and identifies the behavior of a system in both time and frequency domains.
3. It studies and evaluates the stability of a system in the time domain and also in the frequency domain.
4. Design the suitable Proportional Integral Derivative control for a system to cumply the asked specifications.
5. Simulates the operation of any system, verifies and adjusts the parameters of the Proportional Integral Derivative controller so that the system cumplies the asked specifications.
All learning results are observable and controllable, both in written form by solving exercises on paper (exercises, exams) and by solving exercises on computer using the calculation/simulation software MatLab/Simulink (exercises, exams).
The score on each section of each proposed exercise, in the different tests performed, will show the acquired knowledge and learning results of the student, serving as a tool for correction or feed-back in case of unsatisfactory results. For this purpose, all the resolutions of the exercises proposed in the classroom practices (PA), controls (CO), exams (EX) and computer practice (laboratory) test problems (PO), will be published later on the e-Gela platform.
The evaluation of the transversal skill "Working in a multilingual and multidisciplinary environment" will be made with the following learning outcomes:
1. Uses clear, orderly and correct written and spoken language in the practice notebook and reports.
2. Works properly in inclusive, multicultural and multilingual contexts.

Theoretical and Practical Contents

Topic 1. Introduction to automatic control. Basic concepts. System concept. Open loop. Closed loop. Disturbances. Historical overview. Classification of systems.
Topic 2. Mathematical models of linear systems. Modelling. Linear dynamic systems. Causality.
Topic 3. External and internal representation of linear systems. Differential equations. Transfer function. Impulse function. Block diagram. Flow diagram. Realisations State equations. Controllability. Observability.
Topic 4. Analysis and time identification of linear systems. Transient regime specifications. Steady-state specifications. First order systems. Second order systems. Higher order systems. Delayed systems
Topic 5. Stability of systems in the time domain. Concept of stability. Routh-Hurwitz criterion. Root locus method.
Topic 6. Analysis and stability of systems in the frequency domain. Frequency response of systems. Graphical representations. Bode diagram. Specifications of the frequency response. Relative stability. Gain margin and Phase margin.
Topic 7. Time and frequency domain controller design and discretisation. Basic control actions. P, PI, PD and PID controllers. Discretisation of continuous time systems and controllers.
Topic 8. Design of controllers for Renewable Energy systems: wind power systems, photovoltaic systems, solar thermal systems, etc. Discretisation of controllers and simulation in MatLab.

TEACHING METHODS

The teaching methodology of the new Bachelor's Degrees in Engineering is based on the philosophy of the popular Bologna agreement, which includes, in addition to the hours taught in class (classroom teaching), the hours worked by students outside the classroom (non-classroom teaching). All these working hours are counted in ECTS credits, where 1 ECTS credit is made up of 10 classroom hours plus 15 non-classroom hours.

Classroom teaching consists of lectures (M), classroom practices (PA) and computer practices (PO). Problem-based learning strategies and simulations are used.
In the master classes, the theoretical concepts will be explained, and some exercises will also be carried out for the students to do at home individually.
The Classroom Practicals are structured in seminars related to the topics taught in the master classes (syllabus). The teacher will explain how to do the new exercises and they will do some of the previous seminars to clarify doubts, but above all it is the students who will do the exercises individually and also in groups, where the teacher will help in case of doubts. Exercises that are not completed in class, the students will have to finish at home. After several days, the results of the exercises will be published on the e-Gela platform, so that the students can compare them with their own, and if they have not been able to solve them satisfactorily, they will try to do them again. Finally, a few days later, the complete resolutions of the exercises will be published, explaining all the steps to follow to obtain the solution.
The Computer practice sessions will be carried out using MatLab/Simulink calculation/simulation software, where, on the basis of a script provided by the teacher, they will complete them in the laboratory, carrying out the necessary calculations and simulations in groups. However, students will often have to complete them at home. It will also be explained how to solve the exercises of the lectures and classroom practices by using this tool, which will contribute to the self-learning of the students, being able to correct the exercises independently.
The tutoring hours are used by the students so that the teacher, in his/her office, can resolve any doubts and questions that have not been made clear to them both in the classroom classes and in the non-classroom work hours. In no case are these private classes for people who do not regularly attend the face-to-face classes.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	30		15		15				
Horas de Actividad No Presencial del Alumno/a	40		30		20				

Legend: M: Lecture-based | S: Seminar | GA: Applied classroom-based groups | GL: Applied laboratory-based groups | GO: Applied computer-based groups | GCL: Applied clinical-based groups | TA: Workshop | TI: Industrial workshop | GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 70%
- Exercises, cases or problem sets 30%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

The evaluation will be made according to these two possible cases, where the student's wish to make a continuous evaluation (1) or a final evaluation (2), and the compulsory attendance to the practicals are taken into account:

1) Final exam (EX, 30% of the final mark), control (CO, 30% of the final mark), completion of computer practices (laboratory) and handing in of notebooks and/or work (PO, 20% of the final mark) and deliverable exercises (EN, 20% of the final mark). The transversal competences (TC, 5%) will be assessed in the laboratory notebooks/teamwork. The final mark in this case will be calculated according to the following formula:

Final Mark = 0.3*CO+0.2*PO+0.2*EN+0.3*EX

The individual control (CO) will take place at mid-term and will evaluate the first 4 or 5 topics of the syllabus, where if at least 50% of its maximum value is obtained, it will be possible to choose to take only the second half (the rest of the topics) in the final exam (EX), where at least 50% of its maximum value must also be obtained. Otherwise, the final exam will consist of the entire syllabus of the subject, in which case the percentage of the control will be assigned to the final exam, leaving the formula for the final grade as follows:

Final Mark = 0.2*PO+0.2*EN+0.6*EX

However, due to the continuous nature of the subject, taking the second half of the exam does not imply that the concepts acquired in the first half do not have to be remembered and/or used in the cases or sections in which it is necessary to do so. The deliverable exercises (EN) will consist of problems posed individually to the students to be carried out and handed in to the teacher. There will be two in total, and both must be passed independently (minimum 50%) for the part of the deliverable exercises to be passed. In case of failing one or both of them, the student will have to take the final practical exam. In order to pass the course, a minimum of 50% must be passed in each of the parts that make up the final grade. Even if the grade (Final Grade) is 5 or higher, if in any of the parts the student has not achieved 50%, the grade will appear in the proceedings will be 4.5 Failed. Both the control (CO) and the exam (EX) will basically consist of exercises to be solved, and maybe some theoretical questions.

Students who do not comply with any of the following requirements will not be assessed according to case 1) and will automatically be assessed according to case 2):

- Failure to regularly attend the practicals (minimum 90%).

- Failure to take all the tests that form the final grade during the teaching weeks.

Those who voluntarily do not wish to be assessed according to case 1) and wish to be assessed according to case 2), have the right to do so as long as they request it in writing to the lecturer responsible for the subject, at least 1 month before the end of the teaching period of the four-month period (article 12, section 2. of the Regulations on the Assessment of students in official undergraduate degrees, 19/02/2020).

Those who hinder or obstruct the normal delivery of classes (by not being quiet, by being late repeatedly, etc.), after two warnings, will no longer be allowed to attend class and will be directly assessed according to case 2).

2) Final exam, which will consist of a theoretical part (EX, 70% of the final mark) and a practical part (EP, 30% of the final mark). This case will be applied to those who do not attend class (free enrolments) and also for students who do not regularly attend the different types of teaching. The final mark will be calculated using the following formula:

Final Mark = 0.7*EX+0.3*EP

Even if the grade (Final Grade) is 5 or higher, if in any of the parts the student has not achieved 50%, the grade will appear in the proceedings will be 4.5 Failed.

In the case of continuous assessment, case 1), the student must write to the lecturer who teaches the subject, at least one month before the end of the teaching period of the subject, stating "Not presented". In the case of final assessment, case 2), failure to sit the final official exam will result in the automatic waiver of the corresponding exam session, indicating "Not presented", (article 12, points 2. and 3. respectively, of the Regulations Governing Student Assessment in Official Undergraduate Degrees, 19/02/2020).

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

For the Extraordinary call, the final evaluation (2) will be used, that is, a theory exam (EX) and a practical exam (EP).

Final Mark = 0.7*EX+0.3*EP

The practical exam (EP) is not compulsory if the two parts (PL) and (EN) were passed individually in the ordinary call, in which case the mark obtained in the ordinary exam will be used in the calculation of the final mark (PL+EN=EP). In order to pass, it is necessary to have passed a minimum of 50% in each of the two parts (EX) and (EP) that make up the final mark for the subject.

Even if the grade (Final Grade) is 5 or higher, if in any of the parts the student has not achieved 50%, the grade will appear in the proceedings will be 4.5 Failed.

No marks are saved from one year to the next.

Those who do not take the Extraordinary Final Examination (EX) will receive a "No Presented" on their transcript and will be automatically withdrawn from the exam.

MANDATORY MATERIALS

Various documents provided through the e-Gela platform: course notes, seminar exercises, practice scripts, etc.

BIBLIOGRAPHY

Basic bibliography

-E. Jacob. "Regulación Automática y Control. Apuntes". Servivio de Publicaciones de la Escuela de Ingeniería de Eibar UPV/EHU, 2016.
-J. J. Distefano. "Retroalimentación y Sistemas de Control". McGraw Hill.
-A. Tapia. "Erregulazio automatikoa". Elhuyar, 1995.
-E. Umez-Eronini. "Dinámica de sistemas y control". Thomson Learning, 2001.
-A. Gilat. "MatLab, una introducción con problemas prácticos". Editorial Reverté, 2006.
-A. Moreno. "MatLab y la Control System Toobox". RA-MA Editorial, 1999.
-O. Barambones. "Sistemas Digitales de Control". Servicio de Publicaciones de UPV/EHU, 2004.

Detailed bibliography

-B. C. Kuo. "Sistemas de Control Automático". Prentice-Hall.
-K. Ogata. "Ingeniería de Control Moderna". Prentice-Hall
-K. Ogata. "Design linear control system with MatLab". Prentice Hall, 1999.
-Sintonización de PID de forma sencilla, http://www.mathworks.es/company/events/webinars/
-Diseño de un aerogenerador con Model Based-Design, http://www.mathworks.es/company/events/webinars/

Journals

-Automática e Instrumentación, http://www.biblioteka.ehu.es/

Web sites of interest

-Comité Español de Automática (CEA), http://www.cea-ifac.es/
-Universidad de Oviedo, Área de Ingeniería de Sistemas y Automática, http://www.isa.uniovi.es/docencia/raeuitig/
-MathWorks (MatLab), http://www.mathworks.es/company/events/webinars/

OBSERVATIONS

COURSE GUIDE 2023/24

Faculty 264 - Faculty of Engineering - Gipuzkoa. Eibar Department **Cycle** .

Degree GRENOV20 - Bachelor's Degree In Renewable Energy Engineering **Year** Fourth year

COURSE

27875 - Energy Efficiency **Credits, ECTS:** 6

COURSE DESCRIPTION

Energy saving and efficiency are key issues in an energy model based on renewable energy. At the same time, as fossil energy becomes more expensive, and renewable energy, with a lower energy density, become more important, energy saving will be more necessary.This subject deals with concepts related with energy consumption evaluation, and the options available to reduce that consumption and improve the efficiency of the processes.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

The subject uses a practical focus in order to explain energy efficiency measures in industry and building sectors. Specifically, we will work these comptences:
* To develope the essential knowledge of energy efficiency, together with the technologies used to take advantage of it
* To coherently use the procedural knowledge associated with scientific methodology, in order to solve the problems associated to these technologies, aiming to select the optimal typologies and working parametres
* G012 - To apply the strategies of scientific methodology: analyze the problematic situation qualitatively and quantitatively, propose hypotheses and solutions using the models of Renewable Energy engineering

Theoretical and Practical Contents

Part 0 - Introduction and legislation
0. Objectives
1. Historical origin
2. Energy efficiency
3. Basic concepts
4. Actual legislative context (national and international)
Part 1 - Industry
1. Combined heat and power
2. Heat recovery
3. Isolation improvement
Part 2 - Buildings
1. Building envelope
2. Thermal systems in buildings
Part 3 - Industry and building integration
1. District heating
2. Other practical examples

TEACHING METHODS

Magistral classes will be based on the study of actual systems, analyzing the basic concepts of their performance, with a theoretical-practical focus.
Classroom practices will be used to work in groups with other classmates, based on real cases, to propose and evaluate energy efficiency measures.
Seminars will be used to share the advances of the working groups.
Computer practices will be used to learn different computer programs used to evaluate energy efficiency measures.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	30	5	15		10				
Horas de Actividad No Presencial del Alumno/a	40	10	30		10				

Legend:
M: Lecture-based
S: Seminar
GA: Applied classroom-based groups
GL: Applied laboratory-based groups
GO: Applied computer-based groups
GCL: Applied clinical-based groups
TA: Workshop
TI: Industrial workshop
GCA: Applied fieldwork groups

Evaluation methods

- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 40%
- Teamwork assignments (problem solving, Project design) 60%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Extended written exam: A final theoritcal-practical exam lwill be done. The total percentage of this part in the fainal grade

is 40%. The final exam needs to be passed in order to pass the subject.
Group work: Students will have to write two technical reports on energy efficiency in industry and in buildings. It will be 60% of the final grade. This is mandatory.

FINAL GRADE: EXTENDED WRITTEN EXAM (40%) + GROUP WORK (60%)
* In order to pass the subject, the extended written exam's grade should be of at least 35%. If this minimum grade is not obtain, the grade appearing itn the subject record will be that of the written exam.
NOTE: Those students that, with a justified cause (Art. 43 Normativa de Gestión para la Enseñanzas de Grado. UPV/EHU), can not take part in the mixed evaluation system, may attend a a final exam that also covers the practical part of the subject. In such a case, the student needs to inform the teacher, with at least one month in advance of the final exam date.
Article 39 of the same normative sets that the student can give up the evaluation call, with at least one month in advance of the end of the teaching period of the subject.
If the student does not attend the written exam, in any of the calls, it will be equivalent to renouncing the subject in that call, and the subject record will appear as "Not Presented".

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

In the extraordinary call, the student will be graded following the same criteria. In the case of the mixed evaluation (by default), the student can save the grade of the written exam or the group work, in the next cases:
* The grade of the written exam is higher than 3.5/10
* The group work is passed (higher than 5.0/10)
In case the student wants to improve the grading of the group work, the new reports should be sent to the teacher the day before the written exam.

MANDATORY MATERIALS

There is no compulsory material. During the course, the teacher will upload to the egela platform the materials used in the classroom, as well as supplementary material considered of interest.

BIBLIOGRAPHY

Basic bibliography

Detailed bibliography

* Handbook of Energy Efficiency and Renewable Energy. CRC Press. 2007 D. YOGI; KREITH, FRANK. GOSWAMI (2007)
* Energy Efficiency in Industry (Eur) de J.SIRCHIS y J. Sirchis.

Journals

* Applied Energy (Elsevier)
* Energy and Buildings (Elsevier)
* Energy Conversion and Management (Elsevier)

Web sites of interest

* www.idae.es
* http://apps1.eere.energy.gov/buildings/energyplus

OBSERVATIONS

COURSE GUIDE 2023/24

Faculty 264 - Faculty of Engineering - Gipuzkoa. Eibar Department **Cycle** .

Degree GRENOV20 - Bachelor's Degree In Renewable Energy Engineering **Year** Fourth year

COURSE

27877 - Thermoelectric Solar Power **Credits, ECTS:** 6

COURSE DESCRIPTION

Amongst the technologies for the exploitation of renewable energies, Solar Thermoelectric Energy or Concentrating Solar Power (CSP) plants have gained more and more importance during the last decade. This subject covers the design and tecno-economic analysis of these plants. With that aim, the following tecnologies are analysed: parabolic-trough, central tower receiver and Stirling dish.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

The subject covers from a practical point of view, the analysis of the electric power generation by solar thermal means.

Theoretical and Practical Contents

Chapter 1 Introduction to Concentrating Solar Power plants
Chapter 2 Fundamentals of thermodynamic power cicles applied to Concentrating Solar Power plants
Chapter 3 Funddamentals of thermal radiation applied to Concentrating Solar Power plants
Chapter 4 Parabolic-Trough Concentrating Solar Power plants
Chapter 5 Thermal Energy Storage and hibdirization
Chapter 6 Central Receiver Concentrating Solar Power plants
Chapter 7 Stirling Dish Concentrating Solar Power plants

TEACHING METHODS

M (Master class): Master classes will be based on the presentation of the theoretical concepts needed for the design and tecno-economic analysis of CSP plants

S (Seminar): Seminars will cover specific issues relevant to CSP plants, i.e., renewable energy markets and sustainability of CSP plants.

GA (Class practice): Class practices will cover practical exercises dealing with relevant issues regarding CSP plants, as well as the execution the team projects.

GO (Computer Practice): Computer practices will cover the use of the System Advisor Model (SAM) software for the techno-economic evaluation of CSP plants.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	30	5	15		10				
Horas de Actividad No Presencial del Alumno/a	45	7,5	22,5		15				

Legend:
M: Lecture-based — S: Seminar — GA: Applied classroom-based groups
GL: Applied laboratory-based groups — GO: Applied computer-based groups — GCL: Applied clinical-based groups
TA: Workshop — TI: Industrial workshop — GCA: Applied fieldwork groups

Evaluation methods

- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 40%
- Teamwork assignments (problem solving, Project design) 60%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Written exam: A final theoretica exercise will be made. The total percentage of this examen in the final mark will be of 40%. To pass the subject, the mark of this exam should be at least of 3.5. It this mark is not reached, the mark of the team works wont be added to the obtained mark.

Team works: Throughout the course, in the class and computer practices, the students will execute the team works on the design of a parabolic-trough CSP plant. The teams will be of 2-4 students each. The total percentage of this work in the final mark will be of 60%.

FINAL MARK: WRITTEN EXAM (40%) + TEAM WORK (60%)

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

In the extraordinary call, the student will be evaluated following the same criteria than in the ordinary. Additionally, he/she will save the mark from the written exam or the team work if in the ordinary call:

- A minimum of 3.5 is get in the written exam.
- The team work is passed.

MANDATORY MATERIALS

There is not material for mandatory use. Throughout the course, the teacher will upload to the eGela platform all the required material, including presentations as well as the rest of material that could be required by the subject.

BIBLIOGRAPHY

Basic bibliography

* K. Lovegrove, W. Stein, Concentrating solar power technology: Principles, developments and applications.

* U.S. Department of Energy. Concentrating Solar Power: Energy from Mirrors.

* World Bank Studies. Concentrating Solar Power in Developing Countries: Regulatory and Financial Incentives for Scaling Up.

Detailed bibliography

* U.S. Department of Energy. Concentrating Solar Power: Energy from Mirrors.

* World Bank Studies. Concentrating Solar Power in Developing Countries: Regulatory and Financial Incentives for Scaling Up.

Journals

Web sites of interest

* Solar Concentra: http://www.solarconcentra.org/

* System Advisory Model (SAM): https://sam.nrel.gov/

* Power from the Sun: http://www.powerfromthesun.net/

OBSERVATIONS

COURSE GUIDE 2023/24

Faculty 264 - Faculty of Engineering - Gipuzkoa. Eibar Department **Cycle** .

Degree GRENOV20 - Bachelor's Degree In Renewable Energy Engineering **Year** Fourth year

COURSE

28093 - CE Marking Regulations for Electrical and Electronic Equipment **Credits, ECTS:** 6

COURSE DESCRIPTION

The CE Marking Regulations for Electrical and Electronic Equipment is an optative subject that is taken during the first four-month period of the fourth year of the Renewable Energy Engineering degree.

This course applies some of the knowledge acquired in the previous years. In particular, in the 1st year subject "Physics II. Electromagnetism and Waves (electromagnetism), in the 2nd year subjects "Electrical Circuits" (definition and calculation of electrical magnitudes) and "Electronics" (fundamental bases of electronic devices), in the 3rd year courses "Electrical Energy Conditioning" (power converters) and "Instrumentation, Monitoring and Communications in Energy Systems" (measurement instrumentation), so it is necessary to master these subjects for its correct development.

The objective of this subject is to become familiar with the directives and regulations applicable to electrical/electronic equipment for CE marking, as well as to know how to apply the specific regulations for renewable energy systems.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Transversal competence G013 - To work effectively in a group integrating skills and knowledge to make decisions in the field of Renewable Energy engineering. Its evaluation is included in the team assignments.

Transversal competence G007 - To work in a multilingual and multidisciplinary environment

Learning results of the subject:

- To know the regulations applicable to electrical and electronic equipment for CE marking.
- To knows the specific regulations for renewable energy systems.
- To communicate knowledge and conclusions both orally and in writing, with the ability to synthesize and using the vocabulary and terminology specific of the subject.

Theoretical and Practical Contents

1. Introduction. CE marking. Declaration of Conformity. Directives. Harmonized standards. Generic and product standards.
2. Low Voltage and Electromagnetic Compatibility European Directives.
3. Electrical safety regulations. As an example, EN 62368 is analyzed.
4. EMC emissions regulations. The following standards, among others, are analyzed: EN 61000-3-2 , EN 61000-3-3-3, EN 61000-6-3 , EN 61000-6-4 ,EN 55022 (CISPR 22) , etc. Emission limits and equipment required for testing.
5. EMC immunity regulations. . The following standards, among others, are analyzed: EN 61000-6-1 , EN 61000-6-2 ,EN 61000-4-2 , EN 61000-4-4-4 , EN 61000-4-11 etc. Limits and necessary equipment to carry out the tests.
6. Specific regulations in renewable energy systems.
7. Laboratory instrumentation and testing. Using the equipment available in the school, tests will be performed for pre-certification in the field of conducted and radiated EMI emissions, harmonic current emissions, electrostatic discharge immunity (ESD), burst immunity, surge immunity, voltage dip immunity, dielectric strength, etc.

TEACHING METHODS

Magisterial classes,
Laboratory practices,
Individual and team works.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	40			20					
Horas de Actividad No Presencial del Alumno/a	60			30					

Legend:
M: Lecture-based
S: Seminar
GA: Applied classroom-based groups
GL: Applied laboratory-based groups
GO: Applied computer-based groups
GCL: Applied clinical-based groups
TA: Workshop
TI: Industrial workshop
GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Individual assignments 50%
- Oral presentation of assigned tasks, Reading¿ 50%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Works 100%
The individual and team works will be evaluated.

Students who do not follow the continuous evaluation system may be evaluated by means of a final written test. In the event that the student does not follow the continuous evaluation system and does not take the written test, in any of the evaluation sessions, he/she will be registered as a No Present.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Works 100%
The individual and team works will be evaluated.

Students who do not follow the continuous evaluation system may be evaluated by means of a final written test. In the event that the student does not follow the continuous evaluation system and does not take the written test, in any of the evaluation sessions, he/she will be registered as a No Present.

MANDATORY MATERIALS

Materials and slides provided by the teacher.

BIBLIOGRAPHY

Basic bibliography

- CE Marking Handbook. Dave Lohbeck. Ed. Newnes.

Detailed bibliography

- EMC for Systems and installations. Tim Williams Ed. Newnes 1999
- EMC for Product designers. Tim Williams. Ed. Newnes 2001
- Testing for EMC Compliance. Mark I. and Montrose E. Ed. Jon Wiley 2004

Journals

Web sites of interest

Internet resources:
https://www.aenor.com/
https://iec.ch/homepage

OBSERVATIONS