Universidad del País Vasco Euskal Herriko Unibertsitatea

ENGLISH FRIENDLY COURSES (EFC) 2024-2025
CAMPUS OF GIPUZKOA

Donostia: https://www.ehu.eus/en/web/gipuzkoako-ingeniaritza-eskola/visiting-students-donostia
Contact: gie-coord.international@ehu.eus

Eibar: https://www.ehu.eus/en/web/gipuzkoako-ingeniaritza-eskola/visiting-students-eibar
Contact: gie-eibar.international@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	⇨
27650	Informática	1st	6	M	⇨
27850	Cálculo	1st	6	M	⇨
27859	Estática y Resistencia de Materiales	1st	6	M/A	⇨

[1] SEMESTER: Annual: September 2024 to May 2025
1st: September 2024 to January 2025
2nd : January 2025 to May 2025

[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
27866	Energía Geotérmica y Solar Térmica	1st	6	M	
27871	Regulación Automática y Control	1st	6	M	
27875	Eficiencia Energética	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	
27857	Circuitos Eléctricos	1st	6	M/A	
27877	Energía Solar Termoeléctrica	2nd	6	M	

Universidad del País Vasco Euskal Herriko Unibertsitatea

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					
25984	Mecánica Aplicada	Annual	9	A	
25985	Ekoizpen eta Fabrikazio Sistemak	2nd	6	A	
Bachelor´s Degree in Civil Engineering					
26569	Geologia	2nd	7,5	M	
26534	Fisika Aplikatua	1st	9	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	
27650	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	
27857	Zirkuitu Elektrikoak	1st	6	M/A	
27861	Matematika Estatistikoa	2nd	6	M	
27862	Bero Transferentzia	2nd	6	M/A	

[3] SEMESTER: Annual: September 2024 to May 2025
1st: September 2024 to January 2025
2nd : January 2025 to May 2025

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

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

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

COURSE

25984 - Applied Mechanics **Credits, ECTS:** 9

COURSE DESCRIPTION

Applied Mechanics aims to study Statics, Kinematics and Dynamics of rigid solids. This knowledge is the scientific and technical bases of industrial engineering, essential for any engineer to carry out his work with confidence and reliability. On the other hand, within the Degree in Mechanical Engineering, this subject is the basis for other subjects in the following courses such as: Resistance and Elasticity of Materials, Kinematics and Dynamics of Machines, Machine Design, Industrial Structures and Buildings, among others.

The concepts of Applied Mechanics will be developed from Vector Calculus and Matrix Algebra, analyzing mechanical systems, which are described graphically. In this way, a good level is required in the knowledge and use of Calculus and Algebra (1st course).

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

The main result of the course is to know the behavior of rigid solids based on different types of applied actions. For this, the knowledge of solid statics, kinematics and dynamics must be guaranteed. At the same time, students will develop the capability of solving exercises based on theoretical concepts.

Applied Mechanics will allow the student to obtain the following specific knowledge and skills:

- To understand how to obtain resultant and moment in sliding vector systems, as well as to obtain the equivalent system.

- To calculate the geometric features of a mass distribution.

- To master the statics of a rigid-body or a rigid-body system. To understand the conditions that actions and constraints must meet in a mechanical system to be in equilibrium.

- To analyze the equilibrium of mechanical systems by graphically posing the Free Solid Diagram.

- To calculate the forces transmitted by isostatic articulated structures.

- Ability to analyze mechanical systems including, when necessary, friction forces.

- Ability to relate the forces exerted on a cable with its geometry and internal forces.

- Ability to calculate internal forces and moments in beams.

- Ability to analyze the stresses generated by axial, shear, bending and torsion forces in simple structural elements.

- Ability to perform a kinematic analysis of a rigid body using fields of velocity and acceleration or relative motion.

- To carry out the graphical resolution of kinematic systems with plane movement.

- Ability to solve dynamic exercises with different methods: Linear and Angular Momentum Theorems or Mechanical Energy Theorem.

- Ability to perform dynamic analysis of rigid-bodies with fixed axes.

- Ability to perform dynamic analysis of rigid-bodies with plane movement (mechanisms).

Theoretical and Practical Contents

1. BLOCK: STATICS

1. Chapter: FUNDAMENTALS OF VECTOR CALCULUS
2. Chapter: GEOMETRY OF MASSES AND PLANE SURFACES
3. Chapter: STATICS OF THE RIGID-BODY
4. Chapter: FRICTION
5. Chapter: CABLES
6. Chapter: FUNDAMENTALS OF STRENGTH OF MATERIALS

2. BLOCK: KINEMATICS AND DYNAMICS

7. Chapter: KINEMATICS OF THE RIGID-BODY
8. Chapter: STUDY OF PLANE MOTION
9. Chapter: MAGNITUDES AND FUNDAMENTAL THEOREMS OF DYNAMICS
10. Chapter: DYNAMICS OF THE RIGID-BODY
11. Chapter: DYNAMICS OF THE SOLID WITH FIXED AXIS
12. Chapter: DYNAMICS OF THE SOLID WITH PLANE MOTION

TEACHING METHODS

---ENGLISH---

Training and learning will be organized as follows:

- The master class and classroom practice are 3 hours a week. Basic theoretical concepts will be explained, developing theorems, demonstrating the statements used and giving examples. Classroom doubts will be clarified and class-based tasks will be proposed. In addition, to apply the theory, students will be asked to do the exercises in class, they will be given time to practice the exercise and the teacher will be able to clarify any doubts. It is strongly recommended to go to these classes to learn the fundamental theory which is necessary for the practical exercises.

- Outside of the classroom, students are encouraged to do additional work on their own with a minimum of 3-4 hours per week. Students must review the theoretical concepts taught in class and understand the developments. In addition, students will also have to work on the collections of exercises that are published in eGela. It is recommended to make use of teacher's tutorials to clarify doubts throughout the course.

- During the exam periods, students are recommended to make additional efforts (around +45 h) to review the whole content during the course.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	60		30						
Horas de Actividad No Presencial del Alumno/a	90		45						

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 100%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

---ENGLISH---

To pass Applied Mechanics in the ordinary call, it is necessary to pass the exam of the two blocks previously defined in the theoretical-practical contents. To pass each block, students must get at least 5/10 on the exam (both).

Theory and exercises will be examined in independent parts in the exam of each block. In the theoretical part, developments, explanations, and theoretical-practical issues are raised. The weight of this part will be between 20-40% of the exam.

There will be an opportunity to pass the first block during the exam period in January. In this way, students can reach the ordinary call with half of the subject approved. It is not imperative to take this exam in January.

The January exam is part of the evaluation system of the ordinary call. Therefore, following the ethical guidelines is mandatory for the student. Cheating during the exam or other types of fraud will be penalized with a 0 in the ordinary call. In this case, the student will be considered to have taken the exam.

The ordinary call exam will allow all students to take one or two blocks at a time. In both cases, the student will be considered to have taken (fully) the exam.

The student who does not show up for the final exam will get the grade of Not Presented. That student will not keep the note obtained in January for the extraordinary call, even if he/she had approved it.

The marks of the exams carried out for the students who have taken the final exam will be saved for the extraordinary call, so if one of the blocks has already been passed, it will be saved.

The final mark will be the average of the two blocks, with the weight of each block being 50%. To make the average, the highest grade of the exams taken will be used for each block.

If at the end of the ordinary call, both blocks are failed with a final mark of more than 4.0, the mark will be settled to 4.0.

If health circumstances do recommend it, the evaluation of the student may alternatively be carried out remotely through telematic means offered by the e-gela platform: tasks, questionnaires, etc.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

To pass Applied Mechanics in the ordinary call, it is necessary to pass the exam of the two blocks previously defined in the theoretical-practical contents. To pass each block, students must get at least 5/10 on the exam (both).

Theory and exercises will be examined in independent parts in the exam of each block. In the theoretical part, developments, explanations, and theoretical-practical issues are raised. The weight of this part will be between 20-40% of the exam.

Students will have again the option of taking one or both blocks. In both cases, it will be considered that the student has taken (fully) the exam.

The marks of students who have taken the ordinary call will be saved. If the student did not take the exam in the ordinary call, the mark will not be saved, even if he had passed it.

The student who does not take the exam in the extraordinary call will be set as Not Presented.

The final mark will be the average of the two blocks, with the weight of each block being 50%. To make the average, the highest grade of the exams taken will be used for each block.

If at the end of the ordinary call, both blocks are failed with a final mark of more than 4.0, the mark will be settled to 4.0.

If health circumstances do recommend it, the evaluation of the student may alternatively be carried out remotely through telematic means offered by the e-gela platform: tasks, questionnaires, etc.

MANDATORY MATERIALS

Theory and problems developed and solved in the classroom.

Besides, additional material to support self-study.

Special (high-level) problems for in-depth analysis of concepts taught and for self-study.

BIBLIOGRAPHY

Basic bibliography

Applied Mechanics is fundamental for every engineer so there is a hige variety of books. For that students interest please refer to the teacher. Many of them are spanish versions of english/american books.

Mecánica vectorial para ingenieros, Estática. Beer, Johnston. Mc Graw Hill
Mecánica vectorial para ingenieros, Dinámica. Beer, Johnston. Mc Graw Hill
Mecánica para ingenieros, Estática. Shames. Prentice Hall
Mecánica para ingenieros, Dinámica. Shames. Prentice Hall
Mecánica aplicada, estática y cinemática. Bilbao, Amezua. Síntesis
Mecánica aplicada, dinámica. Bilbao, Amezua, Altuzarra. Síntesis
Mecánica para ingenieros, Estática. Meriam, Kraige. Reverté
Mecánica para ingenieros, Dinámica, Kraige. Meriam. Reverté
Curso de Mecánica. Bastero, Casellas. EUNSA

Detailed bibliography

Journals

Web sites of interest

https://www.journals.elsevier.com/international-journal-of-mechanical-sciences
https://www.asme.org/
http://ocw.upm.es/course/mecanica

OBSERVATIONS

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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.

Theoretical and Practical Contents

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

BIBLIOGRAPHY

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

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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.

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, 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.- Fast Prototyping and IoT
4.- Communications and the Cloud

TEACHING METHODS

The evaluation type of this course is continuous. During the four-month period, the student may conduct laboratory practices and classroom exercises to acquire skills. Although class hours are by definition lectures, the resolution of exercises, teamwork, and discussion of problems will be the usual dynamic. The subject is face-to-face, and attendance is mandatory, as indicated in the Student Guide. It is also mandatory to monitor eGela activities by keeping an eye on messages and following established deadlines

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 25%
- Teamwork assignments (problem solving, Project design) 50%
- Laboratory practical test 25%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Briefly, 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.- Laboratory practical test 25% (minimum 50%)

2.- Team work on industrial applications 50% (minimum 50%)

3.- Individual work about laboratory sessions (minimum 50%)

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 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/).

BIBLIOGRAPHY

Basic bibliography

https://egela.ehu.eus/

Detailed bibliography

- Lutz Mark. Learning Python: Powerful Object-Oriented Programming. Ed. O'Reilly Media, USA, 2013.
- Usmani Zeeshan. Kaggle for Beginners: with Kernel Code. Ed. Gufhtugu, 2017.
- Ed Doering. NI myRIO Project Essentials Guide. Ed. National Technology and Science Press, 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://informatics.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/

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 struggle 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.

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

Degree GBIZAT20 - Grado Doble: Ingeniería Civil + Arquitectura Técnica **Year** First year

COURSE

26569 - Geology **Credits, ECTS:** 7,5

COURSE DESCRIPTION

This geology course enables the student to understand the main geological processes related to Civil Engineering.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

In the course we will work on the following transverse competences
T1: an ability to identify, formulate and sovle engineering problems by applying principles of engineering, science and mathematics.
T2: An ability to work in a team.
T3: An ability to communicate effectively orally and in a written way.

In the course we will work on the following specific competences

C1.- Know the basic principles of geology in order to understand how do most geological processes work.
C2.- Learn to read geological cartographies in order to know the types of substrates and geological structures with the help of geological maps.
C3.- Distinguish between the different types of materials that we find on Earth in order to classify the different types of rocks and minerals.
C4.- Understand the dimension of time in Geology to be able to order the processes that have occurred throughout the history of the Earth on the time scale.
C5.- Know the internal structure of the Earth in order to understand the geological processes that occur in the earth's crust.
C6.- Know the external structure of the Earth in order to understand the variables that regulate the climate and their relationship with the agents that shape the Earth's surface.
C7.- Know both the basic principles and generalizations of mineralogy, as well as the various mineralogical processes and formation environments, becoming familiar with the different geological disciplines, especially the petrological ones.

The student will obtain the following learning outcomes:

1. Applies the strategies of scientific methodology to solve engineering problems: perform qualitative analysis, use scientific-technical terminology, abstract, formulate hypotheses, build models, apply results, analyze existence, uniqueness, properties and interpretation of solutions, look for generalizations and build proofs.

2. Solve geometry problems graphically on the plane, using the appropriate techniques and methods.

3. Interpret geological cartographies to be able to know the types of substrates and geological structures present with the help of geological maps, and differentiate the different types of materials that we find on Earth in order to classify the different types of rocks and minerals.

Theoretical and Practical Contents

Topic 1: Introduction to geology.

Topic 2: Mineralogy
Mineral composition
Mineral structure
Physical properties of minerals
Classes of Rock-forming minerals

Topic 3: Petrology
Petrographic cycle
Igneous rocks
Sedimentary rocks
Metamorphic rocks

Topic 4: Internal geodynamics:
Earth´s structure and composition
Continental drift
Plate tectonics

Volcanos
Earthquakes

Topic 5: Geological structures
Stresses and deformations in the crust
Influence factors on rock resistance
Geological structures due to ductile behavior: folds and diapirs
Geological structures due to brittle behavior: faults and joints

Topic 6: time in geology
Geological time scale
Fundamental principles of stratigraphy
Relative and absolute dating

Topic 7: Climatology
Composition and general structure of the atmosphere
Climate and parameters that determine the climate
Global atmospheric circulation and climatic zoning

Topic 8: Geomorphology
Weathering, erosion, transport and sedimentation
Gravitational processes
Surface water streams
Coastal processes
Glaciers
Wind

Topic 9: Hydrogeology
Hydrologic cycle
Groundwater: storage, circulation and extraction
Erosion by gorundwater

Topic 10: Rock mass
Geomechanical classification of the rocky matrix
Geomechanical classification of the rock mass
On-site testing of the rock mass

Topic 11: Geological cartography

TEACHING METHODS

In the classes, we will work on theoretical explanations and exercises related to each topic.

Throughout the course, we will propose exercises for learning and continuous self-evaluation of the students, so that they can see the progress in their training process at all times.

We will carry out a midterm exam in the middle of the semester.

We will carry out compulsory laboratory practices.

In all the exams, theoretical, theoretical-practical questions and / or exercises may be proposed.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	45		15	15					
Horas de Actividad No Presencial del Alumno/a	67,5		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 80%
- Laboratory practices 20%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

The evaluation of the course will be carried out taking into account:
a) Classroom exercises
The weekly individual study and the resolution of exercises constitutes a powerful learning tool. For this reason, theoretical-practical or practical exercises of what was seen in class will be proposed and they will be evaluated. It is not compulsory to do the exercises, but they will have quantitative effects on the final mark of the students who have passed the course, by means of a multiplying factor greater than 1, which will be explained in point d) of this section.

b) Laboratory practices (20% of the final mark)
Attendance and presentation of laboratory reports are compulsory. Whoever does the laboratory practices must obtain a minimum grade of 5 to pass the course. Whoever does not carry out the practices or who fails them must present a practical exam in the final exam and must obtain a minimum grade of 5 in this part to pass the course.

c) Written exam (80% of the mark)
There will be a partial exam in the middle of the semester in which the theoretical-practical contents will be evaluated and whose value will be 30% of the grade. To release this part of the final exam, the minimum grade is 5. Whoever releases this part will have to obtain a minimum of 5 in the final test to pass the course.

In the final exam, the theoretical-practical contents of the second part (30% of the mark) and the classroom practices (20% of the mark) will be evaluated. In case of not having released the partial exam, the final exam would have the complete theoretical-practical contents (60% of the mark) and the classroom practices (20% of the mark) and the minimum mark to pass the subject is 5 in total, being necessary to obtain more than a 4 in each of the parts (theoretical-practical contents and classroom practices). If a 5 is not obtained in the written exam, the laboratory practices will not be taken into account.

The exams propose theoretical, theoretical-practical questions and / or exercises.

d) Final mark:
Once the conditions to pass the course have been completed, the mark for the course will be determined taking into account the mark obtained in the classroom exercises. The mark for the course will be given by:

(mark of the ordinary call)=(Mark of the theoretical exam + laboratory exercises) * (1+f)
where f is a multiplying factor (f<0,2) determined by the mark obtained in the classroom exercises.
For example: Mark of theoretical exam + laboratory practices=6,5; f=0,15. Subject grade= 7,5.

We will not save parts or notes from one academic year to another.
WITHDRAWALL:
If the student does not show up to the written final exam, professors will assume that he/she gives up the evaluation call and we will indicate as "Not shown up".
If the sanitary circumstances so advice, we will assess the students non-face-to-face through the telematic means offered by the e-gela platform.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

The evaluation of the course will be carried out taking into account:
a) Classroom exercises
The weekly individual study and the resolution of exercises constitutes a powerful learning tool. For this reason, theoretical-practical or practical exercises of what was seen in class will be proposed and they will be evaluated. It is not compulsory to do the exercises, but they will have quantitative effects on the final mark of the students who have passed the course, by means of a multiplying factor greater than 1, which will be explained in point d) of this section.

b) Laboratory practices (20% of the final mark)
Attendance and presentation of laboratory reports are compulsory. Whoever does the laboratory practices must obtain a minimum grade of 5 to pass the course. Whoever does not carry out the practices or who fails them must present a practical exam in the final exam and must obtain a minimum grade of 5 in this part to pass the course.

c) Written exam (80% of the mark)
There will be a partial exam in the middle of the semester in which the theoretical-practical contents will be evaluated and whose value will be 30% of the grade. To release this part of the final exam, the minimum grade is 5. Whoever releases this part will have to obtain a minimum of 5 in the final test to pass the course.

In the final exam, the theoretical-practical contents of the second part (30% of the mark) and the classroom practices (20% of the mark) will be evaluated. In case of not having released the partial exam, the final exam would have the complete theoretical-practical contents (60% of the mark) and the classroom practices (20% of the mark) and the minimum mark to pass the subject is 5 in total, being necessary to obtain more than a 4 in each of the parts (theoretical-practical contents and classroom practices). If a 5 is not obtained in the written exam, the laboratory practices will not be taken into account.

The exams propose theoretical, theoretical-practical questions and / or exercises.

d) Final mark:
Once the conditions to pass the course have been completed, the mark for the course will be determined taking into account the mark obtained in the classroom exercises. The mark for the course will be given by:

(mark of the ordinary call)=(Mark of the theoretical exam + laboratory exercises) * (1+f)
where f is a multiplying factor (f<0,2) determined by the mark obtained in the classroom exercises.
For example: Mark of theoretical exam + laboratory practices=6,5; f=0,15. Subject grade= 7,5.

We will not save parts or notes from one academic year to another.
WITHDRAWALL:
If the student does not show up to the written final exam, professors will assume that he/she gives up the evaluation call and we will indicate as "Not shown up".
If the sanitary circumstances so advice, we will assess the students non-face-to-face through the telematic means offered by the e-gela platform.

MANDATORY MATERIALS

- Notes of the subject.
- Theory and exercises explained in class and proposed to the students.
- Sheets of laboratory practices.
- Theory and exercises explained in laboratory practices and proposed to the students.

BIBLIOGRAPHY

Basic bibliography

Grotzinger J, Jordan TH, Press F, Siever R. Understanding Earth. New York: WH Freeman, 2010.

G. M. Bennison, P.A. Olver, K.A. Moseley, An introduction to geological structures and maps, Taylor & Francis, London, 2011.

Detailed bibliography

D.G. Price, Engineering Geology, Springer, 2009.
A. Parriaux, Basics for engineers, CRC Press,London, 2009.
R. M. Busch, Laboratory manual in Physical Geology, Pearson Prentice Hall,. 2011.
A. Ludman, S. Marshak, Laboratory manual for introductory geology, WW Norton & company, New York, 2019.
D. A. V. Stow, Sedimentary rocks in the Field, a colur guide, Manson Publishing, London, 2005.

Journals

- Geological Society of American Bulletin.
- Geology
- Earth and Planetary Science Letters
- American Association of Petroleum Geology Bulletin

Web sites of interest

http://pubs.usgs.gov/gip/dynamic/understanding.html
Webgeology: http://webgeology.alfaweb.no/
American Museum of Natural History: http://www.amnh.org/

OBSERVATIONS

A calculator may be used in the exam, unless otherwise indicated

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

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

COURSE

25985 - Production and Manufacturing Systems **Credits, ECTS:** 6

COURSE DESCRIPTION

EKOIZPEN ETA FABRIKAZIO SISTEMAK izeneko ikasgaia Mecanica Graduaren 2. Kurtsoan irakasten da. Fabrikazio arloari buruzko sarrerako ikasgaia da. Ikasgai honen helburu nagusia fabrikazio prozesuen hastapenak ikustekoa da. Kurtsoan zehar, fabrikazio prozesu nagusiak (galdaketa, konformazio plastikoa, mekanizazio prozesuak, etb.) eta hauetan erabiltzen diren tresneri eta makinak ikasten dira. Honetaz gain, eta fabrikazio arloan garrantzia handia duenez, osagaien neurketarako erabiltzen diren teknologiak eta instrumentuak ere ikasten dira, metrologia dimentsionala dena, hain zuzen. Testuinguru honen barruan, fabrikazio teknologia ikasgaian, ikasleak osagai konkretu bat fabrikatzeko prozesu egokienak zeintzuk diren justifikatzeko gai izateko, behar besteko konpetentziak hartuko ditu. Aldi berean, fabrikazio prozesu baterako tresneria, ekipamendua eta funtsezko parametroak (bere magnitude ordenan) proposatzeko gaitasuna izan behar du ikasleak.
Azkenik, ikasleak piezak fabrikatzeko erabiltzen diren makina-erremintetan erabiltzen diren kontrol eta eragingailu sistemak, piezen egiaztapen geometrikoa egiteko tresneria eta metodoak deskribatzeko gai izatea bilatzen da.
Guzti hau, testuinguru orokor bezala gure inguruan (Euskal Autonomia Erkidegoan) ditugun osagarri eta makina-erreminta industriaren garrantzia hartuz.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Principios y posibilidades de los procesos de producción y fabricación.

Theoretical and Practical Contents

CHAPTER 1: Introduction to manufacturing and form processes.
CHAPTER 2: Metrology.
CHAPTER 3: Introduction to machining processes.
CHAPTER 4: Modeling of machining and cutting processes.
CHAPTER 5: Numerical control.
CHAPTER 6: Special machining processes.
CHAPTER 7: Sheet metal cutting and bending.
CHAPTER 8: Drawing, rolling and extrusion.
CHAPTER 9: Forging.
CHAPTER 10: Casting.
CHAPTER 11: Welding processes.

TEACHING METHODS

Ikasgaiaren irakasletza hurrengo instrumentuen bidez gertatzen da:
- Eskola teoriko-praktikoa (M eta AP): Gelan egindakoak, non irakasleak ikasgaiaren kontzeptu nagusiak azalduko dituen gardenkiak, ariketak, fabrikazio kasu errealak, eta abarren bidez.
- Tailer Industrialeko Praktikak (ITP): Talde txikietan emango dira, non pieza eta osagai erreal desberdinen fabrikazio prozesuak aztertzeko, arazo errealen kalkulua egiteko, fabrikazio tailer baten aurkitu ahal ditugun makinak zein tresneriak erabiltzeko aukera izango duten.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	37,5		15	7,5					
Horas de Actividad No Presencial del Alumno/a	56,25		22,5	11,25					

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 70%

- Exercises, cases or problem sets 30%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

- Bukaerako notan, azterketaren pisua %70 izango da.
- Praktika eta ondoren egin beharreko lan eta informen pisua %30 izango da.
- Azterketara aurkeztu ahal izateko, praktika guztiak (%100) eta egin behar diren lanak/informeak eginda eta gainditua edukitzea derrigorrezkoa izango da.
- Irakasgaia gainditzeko, azterketaren nota minimoa 5.0 izan beharko da.
- Graduko eta Lehenengo eta Bigarren Zikloko Ikasketen Gestiorako Arautegiaren 39 artikuluaren arabera, aurreikusita dagoen bukaerako probara ez aurkezteak ebaluazioaren deialdiari uko egitea suposatuko du eta Ez Aurkeztuta gisa agertuko da.
- Graduko eta Lehenengo eta Bigarren Zikloko Ikasketen Gestiorako Arautegiaren 43 artikuluaren arabera, ikasleari, justifikatutako arrazoiengatik ezin bazaio egin etengabeko ebaluazioa, bukaerako proba bakarra egingo zaio, irakasgaiko jakintzak eta gaitasunak bereganatu dituela egiazta dezan.Horretarako, eskaera bat egin beharko du Eskolako web orrialdean (Idazkaritza eta Izapideak atalean) agertzen diren prozedura eta epea errespetatuz.
-Egoera sanitarioak horrela gomendatzen badu, ebaluazio ez presentziala burutuko da, e-gela plataforma bitartez.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

There will be a single written exam. All the content given in the subject can be included.

In order to pass the subject, it is mandatory to complete all the practice sessions.
Students who have not done these practices will have to take a written exam to pass this part. This practical exam will be done after the official exam. All the content given in the practices will be evaluated.

To pass the subject, a minimum mark of 5.0 is necessary.

If necessaary, do to sanitary constraints, online evaluation could be carried out using e-Gela platform or similar.

MANDATORY MATERIALS

Notes and documentation provided by the teaching staff.

BIBLIOGRAPHY

Basic bibliography

1 - Echepare Zugasti, Ricardo, Mecanizado por arranque de viruta: máquinas-herramienta.
2 - Weck, Manfred. Handbook of machine tools. ISSN/ISBN: 0471262242. Biblioteca: 621.7/.9.
3 - López de Lacalle, Norberto, Sánchez Galíndez, José Antonio, Lamikiz Mentxaka, Aitzol. Mecanizado de alto rendimiento: procesos de arranque. ISSN/ISBN: 8460913805. Biblioteca: 621.9 LOP.
4 - Jesús del Río. Conformación plástica de materiales metálicos (en frío y en caliente).ISBN 84-96437-09-4. Biblioteca: 621.7 RIO.
5 - Hernández Riesco, Germán. Manual del soldador. ISBN: 84-931444-5-2. Biblioteca: 621.791 HER.
-5-2. Biblioteca: 621.791 HER.

Detailed bibliography

1- G. Boothroyd. Fundamentos del corte de metales y las máquinas-herramienta. Editoral McGraw-Hill. ISBN/ISSN 0-07-090935-0 (968-6046-58-5). Biblioteca: 621.9.02.
2- M. C. Shaw. Metal cutting principles. Oxford Science Publications.ISBN 0-19-859002-4. Biblioteca 621.9.
3- G. F. Micheletti. Mecanizado por arranque de viruta. Editorial Blume. ISBN/ISSN 84-7031-250-2. Biblioteca 621.9.
4- I. V. Sanz Glaria. Metrología dimensional . Escuela Técnica Superior de Ingenieros de Caminos, Canales y Puertos, Santander. ISBN/ISSN 84-86928-92-3. Biblioteca 681.2.
5- M. Reina Gómez. Soldadura de los aceros : aplicaciones. Editor M. Reina Gómez, Madrid. ISBN/ISSN 84-605-1475-7. Biblioteca 621.791.
6- José MªLasheras. Tecnología mecánica y metrotecnia. Donostiarra. 84-7063-087-3.
7- P. Coca Rebollero, J. Rosique Jiménez. Tecnología mecánica y metrotecnia. Pirámide. 84-368-0247-0.
8- E.P. DeGarmo, J.T. Black, R.A.Kohser. Materiales y procesos de fabricación. Reverte, S.A. 84-291-4822-1
9- A.Kucher. Tecnología de metales. Mir Moscu. 5-03-000683-4
10- John E. Neely. Materiales y procesos de Manufactura. Limusa, S.A.. 968-18-4381-9
11- Jesús del Río. Deformación plástica de los metales. Gustavo Gili, S.A. 84-252-0995-1
12- J.Billigmann, H.D. Feldmann. Estampado y prensado a maquina. Reverte, S.A.. 84-291-6034-5
13- Mario Rossi. Estampado en frío de la chapa. Dossat, S.A.. 84-237-0384-3
14- Oehler-Kaiser. Herramientas de troquelar, estampar y embutir. Gustavo Gili, S.A.. 84-252-20640-5
15- Oscar Schü Alonso. Tratado Practico de moldeo y fundición. Gustavo Gili, S.A.
16- J.M. De La Poza Lleida. Hornos para fundir metales y sus aleaciones. OIKOS-TAU. 84-281-0819-6.
17- Avner. Introducción a la metalurgia física. Mc. Graw Hill.
18- Coca Rosique Rebolledo. Ciencia de Materiales. Cosmos.

Journals

- International Journal of Machine Tools and Manufacture. Editor: Elsevier
- CIRP Annals: manufacturing technology. International Institution for Production Engineering Research. Editor: Elsevier
- Precision. Editor: Elsevier
- International Journal of Advanced Manufacutirng Technologies, JAMT. Editor: Springer.
- IMHE Información de máquinas-herramienta, equipos y accesorios. Editor: Ediciones Técnicas Izaro.
- Interempresas: Metalmecánica
- Soldadura y tecnologías de unión. Editor: Asociación Española de Soldadura y Tecnologías de Unión CESOL.
- Deformación metálica. (Técnicas de fabricación, acabado y transformación del fleje, chapa, tubos y alambre). Editor: Elsevier Prensa.
- Moldes. Editor: Metal Spain.
- Fundidores. (Fundiciones férreas y no férreas en arena, coquilla y fundición a presión). Editor: Metal Spain.

Web sites of interest

https://egela.ehu.eus/

OBSERVATIONS

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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.

Theoretical and Practical Contents

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

BIBLIOGRAPHY

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

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

Knowledge
RCO1: Graduates will be able to identify concepts and techniques from both basic and specific subjects, enabling the learning of new methods, theories, and modern engineering tools, thus providing sufficient versatility to adapt to new situations in the practice of their profession.

Competencies
RC2: Graduates will be capable of organizing and planning activities within the realm of companies, institutions, and organizations in the renewable energy sector, applying principles and methods of quality.

Skills
HE5: Graduates will be able to effectively work in teams in a constructive manner, integrating capacities and knowledge to make decisions.

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

Minimum attendance 95%

Lectures

In-person: Explanatory, demonstrative sessions by the professor.

Online: Reading texts, autonomous study, and preparation for theoretical objective tests, searching for and reading the necessary bibliography.

Classroom Practices

In-person: Project design.

Online: Project design.

The subject is divided into 4 projects that students will develop over the course of 15 weeks of the first semester. The aim is for students to apply the concepts of quality management, environment, and occupational risk prevention to a company

created by them through self-directed learning.

TASK 1: Week 4

TASK 2: Week 7

TASK 3: Week 11

TASK 4: Week 15

Attendance at the defenses of the projects is mandatory. Unjustified absences will result in a grade of 0

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%
- Exercises, cases or problem sets 5%
- Individual assignments 5%
- Teamwork assignments (problem solving, Project design) 60%
- Oral presentation of assigned tasks, Reading¿ 10%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

"In assessment tests, the use of books, notes, or any kind of electronic, telecommunication, computer, or other devices by students is strictly prohibited. The only materials permitted are: pen, pencil, traditional calculator, ruler, and eraser."

REGULAR SESSION

DESIGN AND DEFENSE OF PROJECTS BASED ON THE MATERIAL COVERED IN CLASS AND THE REQUIRED INFORMATION SEARCHED BY THE STUDENT. PROJECTS WILL BE ASSESSED AS FOLLOWS: 20% ORAL PRESENTATION, 5% STUDENT ATTITUDE, AND 75% PROJECT CONTENT.

MINIMUM ATTENDANCE 95%

Students who are unable to participate in the mixed assessment system (or, if applicable, the continuous assessment system) may opt for a final exam where the practical part will also be evaluated. To do so, they must communicate their intention in writing to the responsible professor within a period of 9 weeks for semester-long courses, starting from the beginning of the semester as indicated in article 8.3. In this case, the student will be evaluated through a single final exam, which will include a practical component and will constitute 100% of the grade.

Article 12. Waiver of Examination

12.2.- In the case of continuous assessment, if the weight of the final test is more than 40% of the subject's grade, simply not attending this final test will result in the final grade for the subject being marked as 'not attended'. Otherwise, if the weight of the final test is equal to or less than 40% of the subject's grade, students may waive the examination within a period that, at a minimum, extends until one month before the end date of the teaching period for the corresponding subject. This waiver must be submitted in writing to the responsible faculty member.

If a student does not attend the written test in any of the examination sessions, it will be considered a waiver of that examination session and will be recorded as 'Not Attended'.

"In the event that health conditions prevent the conduct of face-to-face teaching and/or assessment activities, a non-face-to-face modality will be activated, of which students will be promptly informed."

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Article 9

The assessment of subjects in extraordinary examination sessions will be conducted exclusively through the final evaluation system

MANDATORY MATERIALS

The essential bibliography required to follow the contents is provided through the subject's website. It includes:

Notes and slides categorized by topics.
Statements of practical exercises.
Documents for completing team assignments.

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

Cluster cases,

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

Emerald database

Web sites of interest

www.ihobe.net
www.euskalit.net
www.osalan.net
www.aenor.com

OBSERVATIONS

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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 Energy field.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Knowledge:
-RCO1: The graduate will be able to identify concepts and techniques of basic and specific subjects, which allow the learning of new methods, theories and modern engineering tools, providing sufficient versatility so that you are able to adapt to new situations in the exercise of your profession.
-RCO11: The graduate will be able to describe basic concepts about hardware, software, operating systems, programming and computer programs with application in engineering.

Skills or abilities:
-HE1: The graduate will be able to solve problems with initiative, decision making, creativity and reasoning critical.
-HE5: The graduate will be able to work effectively as a team in a constructive manner, integrating skills and knowledge to make decisions.
-HE6: The graduate will be able to acquire new knowledge and skills to carry out training continuous, as well as to undertake subsequent studies, with a high degree of autonomy.

Theoretical and Practical Contents

Topic 1: Programming Methodology
1 Problem resolution
2 Efficiency: optimization
3 Efficacy: precision, accuracy and error
4 Problem modeling and specification

Topic 2: Programming with Matlab
1. MATLAB and the M programming language
2. Imperative programming: data and processing
3. Structured programming
4. Modular programming
5. 2D and 3D graphics

TEACHING METHODS

During the semester, learners are required to perform some individual pieces of work, group works and a final exam. Mark percentages may vary depending on learners' individual and group performance. Learner's should be autonomous and show their own initiatives (HE6). In this vein, learner's are required to maintain an e-porfolio.

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 50%

- Portfolio 50%

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
-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

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

Knowledge or Content:
RCO1: The graduate will be capable of identifying concepts and techniques from basic and specific subjects that allow the learning of new methods, theories, and modern engineering tools, providing sufficient versatility to adapt to new situations in their professional practice.
RCO5: The graduate will be able to identify concepts and methods related to mathematics that are applicable in the field of engineering.

Competencies:
RC4: The graduate will be capable of applying the strategies inherent to the scientific methodology: analyzing problematic situations both qualitatively and quantitatively, formulating hypotheses and solutions using models specific to renewable energy engineering.

Skills or Abilities:
HE1: The graduate will be capable of solving problems with initiative, decision-making, creativity, and critical reasoning.
HE5: The graduate will be capable of working effectively in a team constructively, integrating skills and knowledge to make decisions.
HE6: The graduate will be capable of acquiring new knowledge and skills for continuous learning, as well as pursuing further studies, with a high degree of autonomy.

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

Theoretical and Practical Contents

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.

BIBLIOGRAPHY

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.

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

Theoretical and Practical Contents

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.

BIBLIOGRAPHY

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

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

Likewise, these are the RESULTS OF THE TRAINING AND LEARNING PROCESS that the students will have to obtain at the end of the course in terms of KNOWLEDGE, COMPETENCES and SKILLS:

2.1.Knowledge or contents
*RCO10: The graduate will be able to identify fundamental aspects of energy efficiency and sustainability in renewable energy systems (facilities and buildings).

2.2.Competencies
*RC1: The graduate will be able to elaborate, draft and develop technical and business projects in the field of renewable energy engineering.
*RC3: The graduate will be able to apply scientific-technical knowledge for the practice of the profession of Renewable Energy Engineer, performing functions of consulting, auditing, analysis, calculation, design, construction, maintenance and operation of facilities.

2.3. Abilities or skills
*HT: Skills or abilities linked to a qualification
*HE2: The graduate will be able to assess the social, economic and environmental impact of technical solutions, taking into account their sustainability.
*HE3: The graduate will be able to interpret relevant data to make judgments, including a reflection on social, scientific or ethical issues, to carry out measurements, calculations, valuations, appraisals, appraisals, surveys, studies, reports, work plans and other similar work.
*HE5: The graduate will be able to work effectively in a constructive team, integrating skills and knowledge to make decisions.

Theoretical and Practical Contents

Part 0 - Introduction
1.General concepts and assessment of Energy Efficiency

Part 1 - Industry
1. Introduction to Energy Efficiency in Industry
2. Power Cycle Improvements
3. Insulation improvements
4. Heat recovery
5. Cogeneration

Part 2 - Buildings
1. Introduction to Energy Efficiency in Buildings
2. The Technical Building Code (CTE) in the field of energy
3. Thermal calculations in buildings
4. Energy efficiency in building envelope and ventilation
5. Energy efficiency in heating and DHW thermal installations.

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

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

Knowledge
RCO1: The graduate will be able to identify concepts and techniques from basic and specific subjects, enabling the learning of new methods, theories, and modern engineering tools, providing enough versatility to adapt to new situations in the exercise of their profession.

Competencies
RC2: The graduate will be able to organize and plan activities in the field of companies, institutions, and organizations in the renewable energy sector, applying quality principles and methods.

Skills
HE5: The graduate will be able to work effectively in teams in a constructive manner, integrating abilities and knowledge to make decisions.
HE6: The graduate will be able to acquire new knowledge and skills to carry out continuous training, as well as to undertake further studies, with a high degree of autonomy.

Theoretical and Practical Contents

Theme 1: Introduction to business. General concepts
Theme 2: Company Fundamentals
Learn about different types of companies and the notion of 'company'
Theme 3: Marketing
Strategic marketing Operational marketing. Exercises: allocation of prices based on cost
Theme 4: Finance I
Sources of financing. Balance sheet, operating account. Financial equilibrium. Investments. Profitability
Theme 5: Teamwork
Phases for obtaining results. Necessary functions. Leadership
Theme 6: StrategY
Evolution of a strategy. External analysis: Porter's 5 forces Internal analysis: Value chain General strategies Specific strategies

TEACHING METHODS

Oral presentations.

Case reading, discussion, and sharing.

Problem-solving.

During classroom practices, the student will work in teams on four assignments:

ASSIGNMENT 1: Due in week 21 of class. The team will give an oral presentation on an economic topic they find interesting, which must be related to the SDGs. No report is required; the presentation will be made using PowerPoint or a similar program.

ASSIGNMENT 2: Due in week 26 of class. The team will create a company and develop the required points for this task. Points covered in class in topics 1-2-3. No report is required; the presentation will be made using PowerPoint or a similar program.

ASSIGNMENT 3: Due in week 27 of class. Students will answer the questions posed by working with the material uploaded to Egela and various provided sources of information.

ASSIGNMENT 4: Due in week 30 of class. Students will apply what they have learned in topic 6 to the company created in assignment 2. Instead of studying the topic and evaluating it in the exam, students are expected to apply it directly to the created company and engage in self-directed learning.

Minimum attendance of 100% (practical classes).

Attendance at the defenses of the assignments is mandatory. If an absence is not justified, the grade will be 0

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

"In assessment tests, the use of books, notes, or any kind of electronic, telecommunication, computer, or other devices by students is strictly prohibited. The only materials permitted are: pen, pencil, non-programmable calculator, ruler, and eraser."

Only a non-programmable CALCULATOR will be allowed for the exam.

REGULAR SESSION:

PRACTICAL CLASSES WITH DELIVERABLES DURING THE COURSE 30% OF THE FINAL GRADE.

FINAL EXAM (THEORY + EXERCISES) 70% OF THE FINAL GRADE. BOTH THEORETICAL AND PRACTICAL PARTS MUST BE PASSED WITH A MINIMUM OF 50% EACH.

MINIMUM ATTENDANCE FOR PRACTICAL CLASSES: 100%

Students who are unable to participate in the mixed assessment system (or, if applicable, the continuous assessment system) may opt for a final exam where the practical part will also be evaluated. To do so, they must communicate their intention in writing to the responsible professor within a period of 9 weeks for semester-long courses, starting from the beginning of the semester as indicated in article 8.3. In this case, the student will be evaluated through a single final exam, which will include a practical component and will constitute 100% of the grade.

Article 12. Waiver of the examination

12.2.- In the case of continuous assessment, if the weight of the final test is higher than 40% of the grade for the subject, simply not attending this final test will result in the final grade for the subject being marked as 'not attended'. Otherwise, if the weight of the final test is equal to or less than 40% of the grade for the subject, students may waive the examination within a period that, at a minimum, extends until one month before the end date of the teaching period for the corresponding subject. This waiver must be submitted in writing to the responsible faculty member.

In the event that the student does not attend the written test in any of the examination sessions, it will be considered a waiver of that examination session and will be recorded as 'Not Attended'.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Article 9

Assessment for subjects in extraordinary examination sessions will be conducted exclusively through the final evaluation system.

Only the use of a non-programmable CALCULATOR will be allowed for the exam.

"In the event that health conditions prevent the conduct of face-to-face teaching and/or assessment activities, a non-face-to-face modality will be activated, of which students will be promptly informed."

MANDATORY MATERIALS

The basic bibliography necessary for following the contents is provided through the subject's website. It includes essential material such as:

Notes and slides organized by topics.
Statements of practical exercises.
Documents for completing team assignments

BIBLIOGRAPHY

Basic bibliography

Mankiw, N. G., & Mankiw, N. G. (2009). Principios de economía (5a ed.). Cengage Learning.

Guadix Martín José, Muñuzuri Sanz, J., & Rodríguez Palero María. (2020). Organización y gestión de empresas: análisis de balances, control económico, inversiones y financiación. Universidad de Sevilla.

García del Junco, J., Ramírez García, C., & García Álvarez de Perea, J. (2021). Administración y dirección de empresas para el marketing e investigación de mercados (Ser. Economía y empresa). Pirámide.

Chiavenato, I. (2019). Introducción a la teoría general de la administración: una visión integral de la moderna administración de las organizaciones (Décima edición). McGraw Hill Interamericana.

Cordovés Torres Gómez de Cádiz Dánel Córdovés (Ed.). (2022). Dirección empresarial: sistemas de gestión e innovación. Editorial Universitaria. Retrieved 2023, from https://elibro.net/ereader/elibrodemo/218102.

Detailed bibliography

Journals

Web sites of interest

OBSERVATIONS

Universidad del País Vasco Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

Knowledge or Content:
RCO1: The graduate will be capable of identifying concepts and techniques from basic and specific subjects that allow the learning of new methods, theories, and modern engineering tools, providing sufficient versatility to adapt to new situations in their professional practice.
RCO5: The graduate will be able to identify concepts and methods related to mathematics that are applicable in the field of engineering.

Competencies:
RC4: The graduate will be capable of applying the strategies inherent to the scientific methodology: analyzing problematic situations both qualitatively and quantitatively, formulating hypotheses and solutions using models specific to renewable energy engineering.

Skills or Abilities:
HE1: The graduate will be capable of solving problems with initiative, decision-making, creativity, and critical reasoning.
HE5: The graduate will be capable of working effectively in a team constructively, integrating skills and knowledge to make decisions.
HE6: The graduate will be capable of acquiring new knowledge and skills for continuous learning, as well as pursuing further studies, with a high degree of autonomy.

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.

Theoretical and Practical Contents

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.

BIBLIOGRAPHY

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

La asignatura está dentro del siguiente proyecto, IKDi3 -23-40.

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

Knowledge of heat transmission is acquired as the basic principles and applied to the resolution of engineering problems.

The transversal competence G012 is worked on. Thus, the strategies of scientific methodology are applied: the problematic situation is analysed qualitatively and quantitatively. Hypotheses and solutions that will be used in the models of Renewable Energy engineering are proposed.

KNOWLEDGE OR CONTENTS

- RCO1: The graduate will be able to identify concepts and techniques from basic and specific subjects, enabling the learning of new methods, theories and modern engineering tools, providing sufficient versatility to be able to adapt to new situations in the exercise of his/her profession.

- RCO7: The graduate will identify the laws of applied thermodynamics and heat transfer, as well as the basic principles of fluid mechanics, which are applicable in the field of engineering.

COMPETENCIES

- RC4: The graduate will be able to apply the strategies of scientific methodology: analyse the problematic situation qualitatively and quantitatively, propose hypotheses and solutions using the models of renewable energy engineering.

SKILLS OR ABILITIES

- HE1: The graduate will be able to solve problems with initiative, decision-making, creativity and critical reasoning.

- HE5: The graduate will be able to work effectively in a constructive team, integrating skills and knowledge to make decisions.

- HE6: The graduate will be able to acquire new knowledge and skills in order to carry out continuous training, as well as to undertake further studies, with a high degree of autonomy.

Theoretical and Practical Contents

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

ÇENGEL, Y. A. HEAT AND MASS TRANSFER, A Practical Approach. McGraw-Hill. 3rd Edition (2007).

BIBLIOGRAPHY

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/
https://www.jove.com/es/

OBSERVATIONS

Universidad del País Vasco / Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

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

-

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

Universidad del País Vasco Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

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

COURSE

27857 - Electrical Circuits **Credits, ECTS:** 6

COURSE DESCRIPTION

The subject Electrical Circuits is part of the Degree in Renewable Energy Engineering, within the module that the industrial branch has in common, which includes a group of subjects shared in the field of Industrial Engineering. It is one of the compulsory second-year subjects, taught in the first semester, with the aim of supporting subsequent electrical and electronic subjects. It is taught by faculty members of the Department of Electrical Engineering.

Electrical Circuits is a subject that serves as an introduction to electrical and electronic systems. Its main objective is to provide a general overview of the fundamental principles and most important aspects of electrical technology. Fundamental concepts of electricity are covered, and the basic tools for analysing electrical circuits are developed. Subsequently, the characteristics of modelling with dependent sources and the generalised use of the most relevant theorems in electrical network analysis are addressed. Additionally, the foundations for the analysis and design of three-phase networks are laid, highlighting the assemblies, measuring instruments, and devices associated with this type of networks.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

KNOWLEDGE OR CONTENT:
-RCO1: Undergraduates will be able to identify concepts and techniques from core and specific subjects that enable them to learn new methods, theories, and modern engineering tools, providing sufficient versatility to adapt to new situations in their professional work.
-RCO2: Undergraduates will be able to describe the fundamentals of electrical circuits, electrical machines, low and medium voltage electrical installations, as well as energy generation and storage technologies.

COMPETENCIES:
-RC4: Undergraduates will be able to apply strategies specific to the scientific methodology: analyse the problematic situation both qualitatively and quantitatively, and propose hypotheses and solutions using models specific to renewable energy engineering.

SKILLS OR BROAD-SPECTRUM ABILITIES:
-HE1: Undergraduates will be able to solve problems with initiative, decision-making, creativity, and critical reasoning.
-HE5: Undergraduates will be able to work effectively in a team in a constructive manner, integrating abilities and knowledge to make decisions.
-HE6: Undergraduates will be able to acquire new knowledge and skills for continuous learning, as well as to undertake further studies with a high degree of autonomy.

Theoretical and Practical Contents

CHAPTER 1: INTRODUCTION TO ELECTRICAL CIRCUITS.
An introductory chapter that describes basic electrical devices, as well as the fundamental laws of electrical circuits, nodal analysis, mesh current method, and the behaviour of inductors and capacitors in direct current (DC).
1.1: Fundamental Laws of Electrical Circuits.
1.2: Mesh Current Method.
1.3: Resistive Circuits.
1.4: Circuits with Inductances.
1.5: Behaviour of Inductors in DC.
1.6: Behaviour of Capacitors in DC.
1.7: Charging and Discharging of a Capacitor.
1.8: Equivalent Capacitance of Different Configurations.
1.9: DC Analysis of Networks with Resistors and Capacitors.
1.10: Thévenin and Norton Theorems.

CHAPTER 2: PERIODIC WAVEFORMS.
This chapter covers the fundamental concepts of waveforms, the average and root mean square (RMS) values of functions, the peak factor, and the form factor or ripple factor.
2.1: Fundamental Concepts of Periodic Waveforms.
2.2: Average Value of Periodic Functions.
2.3: RMS Value of Periodic Functions.
2.4: Peak Factor.
2.5: Form Factor or Ripple Factor.
2.6: RMS Value of Functions with Sine and Cosine Waves.

CHAPTER 3: AC CIRCUIT ANALYSIS.

This chapter addresses the fundamental concepts of impedances, circuits excited by sinusoidal generators, the concept of phasors and their applications, active, reactive, and apparent power, power factor, power factor correction, and circuits with dependent sources.

3.1: Fundamental Concepts of Impedances.
3.2: Circuits Excited by Sinusoidal Generators.
3.3: Concept of Phasor and Applications.
3.4: Power in the General Case.
3.5: Active, Reactive, and Apparent Power.
3.6: Complex Power.
3.7: Boucherot Theorem.
3.8: Power Factor Correction.
3.9: Types of Dependent Sources.
3.10: Modelling of Devices with Dependent Sources.
3.11: Thévenin and Norton Equivalent Circuits with Dependent Sources.
3.12: Methodology for the Analysis of Networks with Dependent Sources.

CHAPTER 4: FUNDAMENTAL THEOREMS.

This chapter deals with circuit analysis techniques that involve the use of fundamental theorems of circuit theory.

4.1: Analysis of Linear Networks.
4.2: Superposition Theorem.
4.3: Maximum Power Transfer Theorem.
4.4: Other Theorems.

CHAPTER 5: BALANCED POLYPHASE SYSTEMS.

This chapter covers three-phase electrical systems in the most common configurations used in such networks.

5.1: Balanced Three-Phase Systems.
5.2: Concepts in Balanced Three-Phase Systems.
5.3: Balanced Star Connection with Positive and Negative Sequences.
5.4: Balanced Delta Connection with Positive and Negative Sequences.
5.5: Star-Delta and Delta-Star Transformations.
5.6: Single-Phase Equivalent Circuit.
5.7: Power in Balanced Three-Phase Systems.
5.8: Methods of Power Measurement.

LABORATORY PRACTICALS.

Students will undertake 7 practicals, each lasting 2 hours. The practicals will cover the concepts explained in the theoretical syllabus:

-Measurements in DC Circuits.
-Measurement of Parameters in Capacitors and Inductors.
-Verification of Fundamental Theorems.
-Measurements in AC Circuits.
-Measurement of Power in AC Circuits.
-Measurements in Three-Phase Circuits.
-Measurement of Power in Three-Phase Circuits.

TEACHING METHODS

The course is organized into theory lectures (M), classroom practicals (GA), laboratory practicals (GL), and individualized tutorials, which are held in the professor's office.

The theoretical classes are conducted using a combination of conventional and IT means. Students have access to exercises to solve via the eGela platform, which are introduced as the necessary theoretical knowledge is taught. Additionally, students are provided with course notes containing solved exercises, exercises proposed in exams, unsolved exercises, and the set of laboratory practicals that will be carried out during the semester. In this regard, the format of the practicals includes the theoretical resolution of exercises and a set of tables that record the individual readings that students must perform through the setup of the experiments.

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 10%
- Individual assignments 20%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

SISTEMA DE EVALUACIÓN CONTINUA
Para poder ser evaluado mediante el sistema de evaluación continua, se requiere de una asistencia a clase con regularidad.

Grading tools:
-Written Exam: This will account for 70% of the final mark. A minimum score of 4 out of 10 must be achieved in the Written Exam. The Written Exam will be held during the official examination period.

-Laboratory Practicals: This will account for 10% of the final mark. Attendance and completion of all laboratory practicals are mandatory to qualify for the continuous assessment system. In the laboratory test, a minimum score of 5 out of 10 is required. The laboratory practicals mark will not be saved from year to year.

-Individual and/or Group Projects: Projects will be completed throughout the semester, accounting for 20% of the final mark. The non-submission of any Project does not, by itself, imply a rejection of the continuous assessment system. However, not submitting any project will result in a 0 for that project when calculating the final mark.

If the laboratory practicals are not passed, the student may still take the written exam. If the written exam is passed, the course will not be considered passed, but the exam mark may be saved for the extraordinary exam. Similarly, if the laboratory practicals are passed but the written exam is not, the course will not be considered passed, but the laboratory practicals mark may be saved for the extraordinary exam.

If any of the minimum scores are not achieved, the final mark will be capped at 4 out of 10.

FINAL SYSTEM EVALUATION
According to Article 8 of the Regulations governing the assessment of students in official Bachelor's degree programs, students have the right to be evaluated through the final evaluation system. To do this, students must submit a letter/email to the course instructor asking for this evaluation system within the first 9 weeks from the beginning of the semester. The final evaluation system assesses learning outcomes through a test conducted during the official examination period. The test consists of a written exam (90% of the mark) and evaluation activities related to Laboratory Practical sessions (10% of the mark). A minimum score of 4 out of 10 is required on the exam, and a minimum score of 5 out of 10 is required on the Laboratory Practical evaluation activity. If any of the minimum scores are not achieved, the final mark will be capped at 4 out of 10.

OPTING OUT
According to Article 12 of the Regulations governing the assessment of students in official Bachelor's degree programs, in the case of continuous assessment, where the weight of the final exam is over 40% of the mark for the course, simply not attending the final exam will be marked as "no show". When it comes to the final evaluation system, not attending the test scheduled during the official examination period will automatically as an opt out of the exam session. Opting out of the exam session will be marked as "No show".

INFORMATION REGARDING THE USE OF MATERIALS, MEDIA, AND RESOURCES:
In general, and unless otherwise indicated, the use of books, notes, or any other material, as well as electronic, computer, or other devices, is prohibited during assessments at UPV/EHU. If necessary, during the assessment, places may be designated for students to deposit unauthorized materials, ensuring they are out of reach.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

According to Article 9 of the Regulations governing the assessment of students in official Bachelor's degree programs, assessments in the extraordinary examination session will be conducted exclusively through the final evaluation system. The final evaluation system assesses learning outcomes through a test conducted during the official examination period. The test consists of a written exam (90% of the mark) and evaluation activities related to laboratory practicals (10% of the mark). It is necessary to obtain a minimum of 4 out of 10 points in the exam, and a minimum of 5 out of 10 points in the laboratory practicals evaluation activity. If any of the minimum scores is not achieved, the final mark will be capped at 4 out of 10.

Not attending the test, scheduled during the official examination period, will automatically be considered as an opt out of the examination session. Opting out of the examination session will be marked as "no show".

MANDATORY MATERIALS

Provided notes.

BIBLIOGRAPHY

Basic bibliography

-Análisis de Circuitos Lineales I y II. A. J. Álvarez, P. Amo, M. Labrador, F. López, J. Palmero
-Teoría y Problemas de Circuitos Eléctricos. J.A. Edminister

Detailed bibliography

-Network Analysis. Van Valkenburg. Ed. Limusa
-Electric Circuits. J.W. Nilsson, S.A. Riedel. Ed. Prentice Hall
-Fundamentals of Electric Circuits. C.K. Alexander, M.N. Sadiku. Ed. McGraw-Hill
-Electric Technology. J.R. Folch, M.R. Guasp, C.R. Porta. Ed. Síntesis

Journals

-Cuadernos de energía
-Anales de Mecánica y Electricidad
-Ingeniería Energética

Web sites of interest

-https://egela.ehu.es/
-http://www.ingeniaritza-elektrikoa.ehu.es
-http://www.ree.es/es/
-http://www.unesa.es/
-http://www.iberdrola.es/

OBSERVATIONS

The subject Electrical Circuits is fundamental in the Renewable Energy Engineering Degree, as it introduces students to various methods of electrical circuit analysis and the fundamental characteristics of their response and simulation. Aspects such as Ohm's, Kirchhoff's laws, and theorems like Thévenin's, Norton's, superposition, maximum power transfer, among others, are treated with special attention, addressing both direct current and alternating current approaches. These aspects are of particular importance in various disciplines taught in the areas of Electrical Engineering and Electronic Technology included in this Engineering Degree.

In this context, a set of subjects requires the concepts associated with Electrical Circuits. Among them, subjects such as Electric Machines, Electronics, Distributed Generation Technologies, Electrical Installations for Renewable Energies, Power Conditioning, Electronic Energy Conversion Systems, Instrumentation, Monitoring, and Communications in Energy Systems, etc., stand out. These subjects complement and apply the knowledge acquired in Electrical Circuits, providing students with a solid foundation for their training in the field of renewable energies and electrical engineering.

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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 addresses from a practical approach the study of facilities for generating electricity through the use of solar thermal energy. Specifically, the following competences will be worked on:

- The graduate will be able to describe the renewable energy sources (wind, photovoltaic, hydraulic, geothermal and solar thermal, biomass and marine), the basic principles of operation, and their associated technologies

- The graduate will be able to apply the strategies of the scientific methodology: analyze the qualitative and quantitative problem situation, to raise hypotheses and solutions using the models of the renewable energy engineering

- The graduate/or will be able to work effectively as a team in a constructive way, integrating capacities and knowledge to adopt decisions

- The graduate will be able to acquire new knowledge and skills to carry out continuous training, as well as to undertake subsequent studies, with a high degree of autonomy

- The graduation/or develop a favorable attitude towards energy savings, so that they can remember and assess whether the installation analyzed is efficient enough in the face of the standards of thermosolar technology

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

Universidad del País Vasco Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

Knowledge or Content:
RCO1: The graduate will be capable of identifying concepts and techniques from basic and specific subjects that allow the learning of new methods, theories, and modern engineering tools, providing sufficient versatility to adapt to new situations in their professional practice.
RCO5: The graduate will be able to identify concepts and methods related to mathematics that are applicable in the field of engineering.

Competencies:
RC4: The graduate will be capable of applying the strategies inherent to the scientific methodology: analyzing problematic situations both qualitatively and quantitatively, formulating hypotheses and solutions using models specific to renewable energy engineering.

Skills or Abilities:
HE1: The graduate will be capable of solving problems with initiative, decision-making, creativity, and critical reasoning.
HE5: The graduate will be capable of working effectively in a team constructively, integrating skills and knowledge to make decisions.
HE6: The graduate will be capable of acquiring new knowledge and skills for continuous learning, as well as pursuing further studies, with a high degree of autonomy.

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.

Theoretical and Practical Contents

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

BIBLIOGRAPHY

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

Ikasgaia hurrengo proiektuaren barruan dago, IKDi3 23-40.

Universidad del País Vasco — Euskal Herriko Unibertsitatea

COURSE GUIDE 2024/25

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

Knowledge or Content:
RCO1: The graduate will be capable of identifying concepts and techniques from basic and specific subjects that allow the learning of new methods, theories, and modern engineering tools, providing sufficient versatility to adapt to new situations in their professional practice.
RCO5: The graduate will be able to identify concepts and methods related to mathematics that are applicable in the field of engineering.

Competencies:
RC4: The graduate will be capable of applying the strategies inherent to the scientific methodology: analyzing problematic situations both qualitatively and quantitatively, formulating hypotheses and solutions using models specific to renewable energy engineering.

Skills or Abilities:
HE1: The graduate will be capable of solving problems with initiative, decision-making, creativity, and critical reasoning.
HE5: The graduate will be capable of working effectively in a team constructively, integrating skills and knowledge to make decisions.
HE6: The graduate will be capable of acquiring new knowledge and skills for continuous learning, as well as pursuing further studies, with a high degree of autonomy.

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.

Theoretical and Practical Contents

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.

BIBLIOGRAPHY

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.
TRANSFORMADAS DE LAPLACE.- M. Spiegel.- Ed. Schaum Mc Graw-Hill.

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

Ikasgaia hurrengo proiektuaren barruan dago, IKDi3 23-40.