ENGLISH FRIENDLY COURSES (EFC) 2021/2022 – CAMPUS OF GIPUZKOA

Coordinator: subdir.relacinter.ep-ss@ehu.eus

Coordinator: euti-ei.internacional@ehu.eus

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

### English Friendly Courses taught in SPANISH:

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<thead>
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<td>Common Courses</td>
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<tr>
<td>25974 Fundamentos Físicos de la Ingeniería</td>
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<tr>
<td>Bachelor’s Degree in Civil Engineering</td>
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<td>26597 Seguridad y Legislación</td>
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<td>26569 Geología</td>
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<td>26534 Física Aplicada</td>
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<td>26555 Introducción a la prevención, seguridad, salud y proyectos técnicos</td>
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<tr>
<td>Bachelor’s Degree in Mechanical Engineering</td>
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<tr>
<td>25975 Fundamentos Químicos de la Ingeniería</td>
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¹ SCHEDULE: Morning (M)/ Afternoon (A): begins at 13.30.

By clicking the subject’s name, its Syllabus will appear.
### FACULTY OF ENGINEERING – GIPUZKOA (263)

<table>
<thead>
<tr>
<th>COURSE</th>
<th>SEMESTER</th>
<th>CREDITS</th>
<th>SCHEDULE</th>
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<tbody>
<tr>
<td>25983 Ciencia de los Materiales</td>
<td>Sep. 2021- Jan. 2022</td>
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Bachelor's Degree in Industrial Electronics and Automation Engineering

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<tbody>
<tr>
<td>25999 Informática Industrial</td>
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### FACULTY OF ENGINEERING – GIPUZKOA. EIBAR DEPARTMENT (264)

<table>
<thead>
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<tbody>
<tr>
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<tr>
<td>27859 Estática y Resistencia de Materiales</td>
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<tr>
<td>25986 Sistemas de Gestión Integrada</td>
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<td>Sep. 2021- Jan. 2022</td>
<td>6</td>
<td>M</td>
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<td>27850 Cálculo</td>
<td>Sep. 2021- Jan. 2022</td>
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<td>27650 Informática</td>
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<td>6</td>
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<tr>
<td>27862 Transferencia de Calor</td>
<td>Jan. 2022- May 2022</td>
<td>6</td>
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<tr>
<td>27861 Matemática Estadística</td>
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### English Friendly Courses taught in BASQUE:

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<th>SCHEDULE</th>
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<tr>
<td>26569 Geología</td>
<td>Jan. 2022- May 2022</td>
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2 SCHEDULE: Morning (M)/ Afternoon (A): begins at 13.30. By clicking the subject’s name, its Syllabus will appear.
COURSE GUIDE

<table>
<thead>
<tr>
<th>Faculty</th>
<th>263 - Faculty of Engineering - Gipuzkoa</th>
<th>Cycle</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree</td>
<td>GMECAN20 - Bachelor’s Degree in Mechanical Engineering</td>
<td>Year</td>
<td>First year</td>
</tr>
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COURSE

| Course Code | 25974 - Physical Basics of Engineering | Credits, ECTS: | 12 |

COURSE DESCRIPTION

The subject is inserted into the module of basic formation of Degree in Industrial Engineering. As every professional, the engineer must have mastery and skill in handling basic knowledge of physics to successfully tackle the solutions to the problems that will arise during the professional practice.

Adding the skills acquired in this course to those obtained in other subjects within the basic formation module, the future engineer will be ready to acquire more specific training in higher grades. In addition, she/he will obtain resources and basic tools for interdisciplinary work that will develop as a professional.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Competencies of the subject. It is shown in brackets the relationship that exists between the competencies of the subject and the crosscurricular or specific ones.

1. To develop basic knowledge of physics, applied in a significant way to the understanding of problematic situations that arise in different areas of the course (C3).
2. To use procedures associated with the methodology of science consistently with the aim to solve problematic situations of fundamental physics (experimental ones and paper and pencil ones): make qualitative analysis, hypothesize, build alternative strategies, solve, manipulate devices and analyze the results (C4, C13).
3. To express and analyze in a proper way information related to the basic processes of physics, by using texts, formulas, tables, graphs and charts (C4, C13).
4. To work in a team, in collaboration with partners to tackle issues of physics: make proposals, analyze the contributions of others, discuss ideas and take the appropriate decision (C4, C14).
5. To have the right attitude towards the learning process, being participative and positive, and showing willingness to overcome the problems that can arise (C12).

Crosscurricular competencies of the degree:

C10. To have discipline and the ability to work in a multilingual environment.
C12. To have a responsible and ordered attitude to work, taking into account the challenge and needs of establishing continuous training, appearing willing to learn.
C13. To apply the own strategies of scientific methodology: set out problematic situations in a qualitative and quantitative way, formulate hypothesis and seek answers using the model of the industrial engineering.
C14. To work efficiently in group integrating capacities and knowledge to take decisions in the field of industrial engineering.

Specific competencies of the module:

C3. The ability to learn new methods and basic and technological knowledge that gives versatility that enable them to adapt to the new grades.
C4. Problem solving skills, decision-taking initiative, creativity, critical reasoning, and in the field of industrial engineering, knowledge, skills and ability to communicate and the ability to transmit.

CONTENIDOS TEORICO-PRACTICOS

In lectures and classroom practices the following topics will be worked
- Dynamics of the particle
- Work, energy and its conservation
- Lineal momentum and its conservation
- Dynamics of the solid rigid
- Angular momentum and its conservation
- Electric field and Gauss’s law
- Electric potential
- Capacitors and capacitance
- Direct-current circuits
- Magnetic field
- Electromagnetic induction
- Equations of Maxwell, electromagnetic waves.

Lab-practices include different topics, as mechanics, electromagnetism, thermodynamics and waves.
**TEACHING METHODS**

1. Another way of teaching and learning: continuous evaluation.

Most of you do not yet have college experience, but usually, classes are organized as follows: the teacher presents certain theoretical contents and then solves a list of problems related to the previous exposition. The resources used are those that are well-known: notes, textbooks, transparencies, lab, etc. Finally, the student makes a test or exam that decides his/her grade. Do you find it familiar?

Maybe you do not know any other method of teaching and learning and you may think there is not other way to teach and learn! However, this is not the case. For this subject, we have a different proposal. We will take into account the work done throughout the course rather than risk all in one go. Do we make an attempt?

This new way demands more involvement on your part, you will be asked participation and continuous work, and you must bring the subject up to date. Everything will be different: teaching, learning and assessment.

2. But what is learning?

Learning does not consist just in storing data. Learning is not only knowing where to find information. Learning is not only to be able to solve similar exercises than those solved by the lecturer in class. To learn is to face a problem related to a theme and be able to look appropriate answers for resolution.

But what is a problem? It is a situation that we cannot solve instantaneously. At first, we do not know the path we must take to resolve it. Thus, pay attention to it! An exercise and a problem are not the same! An exercise is a situation to solve, but in this case, we do know which path to follow to find the exit.

Learning, therefore, means having the ability to solve competently a new problematic situation. And look! We have arrived at a keyword in this guide: competency.

3. What is a competency?

A competency is something that joins knowledge, skills, abilities, attitudes and values. If you integrate the competencies of a particular subject, you will be able to complete the tasks or work on the subject properly.

As your university studies progress, you will integrate different competencies that are absolutely necessary to work as an engineer. Here there are some of them: to be able to identify the different aspects of a problem; to search, organize and represent data, using charts and graphs; to know how to use laboratory techniques; to describe situations; to communicate, to inform, to argue ...

During the degree, each subject will help you to integrate these and other skills. To assimilate them, you will have to work each of them.

You must bear in mind that the primary objective of education are these competencies and that the contents included at the list of topics, although very important, are moved to second place. In fact, the collection of themes for each subject is just a pretext to integrate these competencies we are talking about.

4. How are we going to work the subject day to day?

The program outlines the list of topics to work all along the academic year. To work each of the themes we will use the following resources and tasks:

- Study-guide sheets: based on the textbook, there you will find the specific contents and problems to study and work. You have them available in eGela (Moodle platform of university).
- Theory classes: directed to the whole group.
- Classroom practices: problems related to the concepts presented in the lectures will be solved.
- Lab sessions: practical training about the scientific methodology applied to experiments of physics. Acquisition of the competencies for a good completion of a lab-report. Both, the realization of the practice and the subsequent report will be done in groups.
- Other tasks: Periodically, the student will be asked to complete tasks of different nature, solved individually or in group. They will be performed according to the teacher’s instructions.

**TYPES OF TEACHING**

<table>
<thead>
<tr>
<th>Types of teaching</th>
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<th>S</th>
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<tr>
<td>Hours of face-to-face teaching</td>
<td>60</td>
<td>45</td>
<td>15</td>
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<th>Legend:</th>
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**Evaluation methods**

- End-of-course evaluation

**Evaluation tools and percentages of final mark**

- Written test, open questions  60%
- Exercises, cases or problem sets  25%
- Tareas presenciales, no-presenciales, individuales y/o grupales  15%

**ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT**

ORDINARY EXAM CALL: GUIDELINES Declining to sit

There exist two assessment options: I) continuous assessment or II) final exam. The student who wants to renounce to
the continuous assessment and sit the final exam must inform the teacher filling and sending a form (that will be on eGela) before the 26th week of the teaching period.

I) CONTINUOUS ASSESSMENT

During the academic year the students will have the opportunity to obtain 100 points. Those who get 50 points and fulfil the requirements explained below will pass the course.

- Activity to assess: Additional tasks, reports, problems, group works, tests, seminars, etc.
  Period: During the whole course.
  Scoring: 25%
  Observations: If a task is not completed for the asked date without justification implies zero points in this task. To pass the ordinary call via continuous assessment it is compulsory to obtain a minimum grade of 10 out of 25 to prove the acquisition of the competencies.

- Activity to assess: 1st written-examination.
  Period: first topics.
  Scoring: 10%
  Observations: The tested topics are again included in the 2nd written-examination.

- Activity to assess: 2nd written-examination
  Period: First four-month period.
  Scoring: 20%
  Observations: Topics included in the first four-month period. It is compulsory to obtain a minimum grade of 3.5 out of 10 to prove the acquisition of the competencies that should be obtained in order not to repeat the written-examination regarding these topics in the 4th written-examination.

- Activity to assess: 3rd written-examination.
  Period: first topics of the second four-month period.
  Scoring: 15%
  Observations: The tested topics are again included in the 4rd written-examination.

- Activity to assess: 4th written-examination.
  Period: Second four-month period.
  Scoring: 20%
  Observations: Topics included in the second four-month period. It is compulsory to obtain a minimum grade of 3.5 out of 10 to prove the acquisition of the competencies that should be obtained in the proof that corresponds:
  Students that have 3.5 (or more) out of 10 should be examined only in the topics taught in the second four-month period. They also have the option of making the exam of the whole course to improve the mark obtained in the 2nd test.
  Students that have not obtained 3.5 out of 10 in the 2nd test, should have to make an exam that corresponds to the whole course. In this exam, it is necessary to obtain 3.5 out of 10 in each part of the exam related to each four-month period. In case that these minimum criteria are not achieved, the student will be conducted to the test of the extraordinary call.

- Activity to assess: Laboratory practices
  Period: During the whole course.
  Scoring: 10%
  Observations: They are compulsory (2).

NOTES and REQUIREMENTS:
(1) To pass the course via the continuous evaluation, in addition to the requirement to obtain a minimum score of 3.5 out of 10 on the 2nd and 4th control, the student has to sit all the written-tests.

(2) Laboratory practices are mandatory, which means that to pass the course is a prerequisite to perform all laboratory practices, deliver all reports (for more information, see eGela). Those who do not pass the lab-practices will have to sit a specific exam about lab-topics in the extraordinary call to accredit the competencies.

(3) Students who do not obtain a minimum of 10 out of 25 on tasks will have a test that may accredit competency in the extraordinary call.

II) Assessment system: Final exam

The student who wants to renounce to the ordinary call and sit the final exam must inform the teacher filling and sending a form.
The date and hour of the final exam will be the same as those of the 4th written examination. The exam will consist of:

65% of the scoring: Individual written examination (minimum 3.5 out of 10 on the contents of each four-month period)
25% of the scoring: examination of tasks (minimum: 10 out of 25)

The scoring of the lab obtained all along the academic year will be maintained. In case that the student does not sit the exam the qualification will be ‘Not presented’

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

EXTRAORDINARY EXAM CALL: GUIDELINES & DECLINING TO SIT

The scoring is divided into:
10% Mark of laboratory practices. (Minimum: 5 out of 10)
25% Mark of tasks. (Minimum: 10 out of 25)
65% Individual written examination. (Minimum 3.5 out of 10 on the contents of each four-month period)

In the rest the tests corresponding to the parts that have not achieved the minimum are made. To renounce to this call it is enough not to take the exam.

MANDATORY MATERIALS

- University Physics with Modern Physics
  13th edition, Sears Zemansky
  Authors: H. Young, R. A. Freedman
  ISBN-13 978-0321696861
  Editorial: Pearson, Prentice Hall

BIBLIOGRAFIA

Basic bibliography

- Physics for scientists and engineers with modern physics
  Third edition
  Authors: Paul M. Fishbane, Stephen G. Gasiorowicz, Stephen T. Thornton
  Editorial: Pearson, Prentice Hall

- Physics
  7th edition
  Author: J.D.Cutnell, K.W.Johnson

Detailed bibliography


Journals

Web sites of interest

http://www.sc.ehu.es/sbweb/fisica_
http://www.kettering.edu/~drussell/demos.html
http://mit.ocw.universia.net/Physics/index.htm
http://www.ehu.es/acustica/index.html
http://lacomunidad.elpais.com/apuntes-cientificos-desde-el-mit/posts

OBSERVATIONS
**COURSE GUIDE**

**Faculty** 263 - Faculty of Engineering - Gipuzkoa  
**Degree** GCIVIL20 - Bachelor’s Degree in Civil Engineering  
**Cycle** Not Applicable  
**Year** First year  
**Credits, ECTS:** 7.5

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**COURSE DESCRIPTION**

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

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**COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT**

In the course we will work on the following transverse competences

T1: an ability to identify, formulate and solve 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.

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**CONTENIDOS TEÓRICO-PRÁCTICOS**

**Topic 1: Introduction to geology.**
- Areas of engineering geology
- Geology in civil engineering

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

Topic 8: Hydrogeology
Hydrologic cycle
Groundwater: storage, circulation and extraction
Erosion by groundwater

Topic 9: Rock mass
Geomechanical classification of the rocky matrix
Geomechanical classification of the rock mass
On-site testing of the rock mass

Topic 10: Climatology
Composition and general structure of the atmosphere
Climate and parameters that determine the climate
Global atmospheric circulation and climatic zoning

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

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**Legend:**  
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- 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 can be continuous or final evaluation for those who give up correctly the continuous evaluation.

**FOR THE CASE OF CONTINUOUS EVALUATION**, the evaluation will be carried out as indicated below:

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.

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:

\[(\text{mark of the ordinary call})=(\text{Mark of the theoretical exam} + \text{labratory exercises}) \times (1+f)\]

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.

**FOR THE CASE OF FINAL EVALUATION**

In order to access this type of evaluation, the student must give up continuous evaluation. To do this, students must submit a written document to the teaching staff responsible for the subject giving up the continuous evaluation, for which they will have a period of 9 weeks from the beginning of the semester corresponding to the subject. This procedure is stated in the agreement on December 15, 2016 of the Governing Council of the University of the Basque Country, and

The final evaluation will consist of two parts:
The first part (80% final score) will be an individual written exam corresponding to theoretical and theoretic-practical issues seen in class.

The second part (20% final score) will be an individual written test corresponding to the contents concerning the laboratory practices. For this, the students will contact the professor responsible for the subject (within a period not exceeding 10 weeks from the beginning of the semester corresponding to the subject) in order to specify the content concerning the practices.

WITHDRAWAL:

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 can be continuous or final evaluation for those who give up correctly the continuous evaluation.

FOR THE CASE OF CONTINUOUS EVALUATION, the evaluation will be carried out as indicated below:

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.
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.

FOR THE CASE OF FINAL EVALUATION
In order to access this type of evaluation, the student must give up continuous evaluation. To do this, students must submit a written document to the teaching staff responsible for the subject giving up the continuous evaluation, for which they will have a period of 9 weeks from the beginning of the semester corresponding to the subject. This procedure is stated in the agreement on December 15, 2016 of the Governing Council of the University of the Basque Country, and published in the BOPV on March 13, 2017, chapter II, article 8.

The final evaluation will consist of two parts:
The first part (80% final score) will be an individual written exam corresponding to theoretical and theoretic-practical issues seen in class.

The second part (20% final score) will be an individual written test corresponding to the contents concerning the laboratory practices. For this, the students will contact the professor responsible for the subject (within a period not exceeding 10 weeks from the beginning of the semester corresponding to the subject) in order to specify the content concerning the practices.

WITHDRAWAL:

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.

BIBLIOGRAFÍA

Basic bibliography

Detailed bibliography

Journals
- 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.
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 procedural knowledge associated to the scientific methodology for the solving of problematic situations in basic physics; perform quantitative analysis, express hypothesis, prepare alternative strategies, resolve and analyze results.

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

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

CONTENIDOS TEÓRICO-PRACTICOS

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

1. Introduction. Social and environmental impact of building.
2. Particle statics
3. Forces applied on the rigid body
4. Statics of the rigid body
5. Gravitational centers
6. Graphical statics
7. Isostatic triangular structures on the plane
8. Intern 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 guidelines, 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 established 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

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<tr>
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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 to pass them. For that, the assistance is compulsory, and the corresponding reports must be delivered correctly (more details in the eGela platform).

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

- Evaluation activity: 2nd control (approximately the first 10 weeks of classes)
  Points: 25% of the final mark
Observations: No contents can be compensated after.

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

NOTES AND REQUISITES:

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

(2) FINAL EXAM EVALUATION METHOD

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

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

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

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

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

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

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

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

MANDATORY MATERIALS

Material for drawing in the chapter of graphical statistics

BIBLIOGRAFÍA

Basic bibliography


Detailed bibliography


Journals

Web sites of interest

http://ocw.mit.edu/courses/architecture/4-440-basic-structural-design-spring-2009/
http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-050-solid-mechanics-fall-2004/
COURSE GUIDE 2021/22

Faculty 263 - Faculty of Engineering - Gipuzkoa
Degree GMECAN20 - Bachelor’s Degree in Mechanical Engineering
Cycle Not Applicable
Year First year

COURSE

25975 - Chemical Fundamentals of Engineering Credits, ECTS: 9

COURSE DESCRIPTION

The subject ‘Fundamentals of Chemical Engineering’ is, together with other basic subjects, a support to Engineering. It helps to understand many phenomena of the world that surrounds us being present both in nature and in industry. Through chemistry not only new processes are discovered, also we try to know why and how they work, and how they can be improved and controlled. In addition, it is a great tool to tackle environmental problems.

In this subject, chemistry, organic and inorganic nomenclature will be reviewed, the basic theoretical concepts that allow the students to understand the nature of matter, from atomic structure to the main types of intramolecular bond (ionic, covalent and metallic) will be introduced, as well as intermolecular interactions that define the macroscopic properties of matter and its three states of aggregation. The fundamentals of chemical kinetics and thermodynamics necessary in order to understand the reactions and chemical equilibria will be provided.

In this course basic and necessary principles are developed to meet and understand other subjects: Materials Science (2nd year) and Environmental Technologies (4th year), common for all grades of Industrial Engineering.

There are no prerequisites for this course. It is recommended to have studied Chemistry in high school and have basic knowledge of organic and inorganic chemical nomenclature and physicochemical magnitudes and units.

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

GENERAL SKILLS:
G-1 Adopt a responsible attitude and orderly work habits and tackle with motivation and interest the difficulties that arise in the learning process.
G-2 Teamwork, integrating skills and knowledge to take decisions on the development of the proposed tasks.
G-3 Autonomous learning.
G-4 Ability to manage information.
G-5 Oral and written communication.
G-6 Prepare reports.

SPECIFIC SKILLS
S-1 Develop knowledge and understanding of the basic principles of general chemistry and its applications.
S-2 Apply the strategies of the scientific method to solve problems of general chemistry at a theoretical and experimental level.
S-3 Be able to explain in a comprehensibly way phenomena and processes of everyday life related to basic aspects of Chemistry.
S-4 Analyze problems, make decisions and use equations and models suitable for resolution.
S-5 Develop the capacity of oral and written communication, transmit knowledge and results using the language and specific terminology of Engineering and Chemistry.
S-6 Develop good laboratory practices by safe handling of chemicals and generated wastes and properly assessing the risks of handling chemicals.

LEARNING OUTCOMES
O-1 Name and write formulas of chemical compounds.
O-2 Explain and interpret the atomic models.
O-3 Relate the electron configuration of the atom with its position in the periodic table, its properties and type of bond.
O-4 Balance equations and make stoichiometric calculations.
O-5 Relate the type of chemical bond with the properties of substances.
O-6 Relate the intermolecular bonding with the states of aggregation of matter.
O-7 Describe the main properties of gases, liquids and solids.
O-8 Apply the basics of chemical kinetics to the study of the reaction rate.
O-9 Enunciate the thermodynamic laws and apply them to the energy study of chemical reactions.
O-10 Explain the concept of chemical equilibrium and how different factors affect the evolution of the state of equilibrium.

CONTENIDOS TEÓRICO-PRÁCTICOS

Unit 1: Compounds and fundamental concepts.
Chemical nomenclature of inorganic compounds. Chemical nomenclature of organic compounds. Basic concepts and stoichiometry. Physical properties of the compounds. Concentration of the solutions.

Unit 2: Atomic structure.

Unit 3: Chemical bonding.

Unit 4: Physical states and properties of matter.
Solid state. Liquid state. Gas state.

Unit 5: Classical thermodynamics.

Unit 6: Thermochemistry.

Unit 7: Spontaneity and free energy.

Unit 8: Equilibria.

PRACTICES
Practice 1: Safety standards and laboratory work.
Practice 2: Preparation of solutions.
Practice 3: Calorimetry.
Practice 4: Chemical kinetics.
Practice 5: Chemical equilibrium.
Practice 6: Acid base titration.

TEACHING METHODS
Theory class (1):
The main objectives of the subject will be clearly stated, the subject contents will be explained and problems, that help students to better understand the meaning of the concepts, will be resolved.

Classroom practices (2):
Resolution of issues and problems individually or in groups led by the lecturer.

Laboratory practices (3):
Experimental laboratory activities related to the subject, developed in the laboratory under the supervision of the lecturer.

Evaluation and training activities:
Two tests of individual assessment will be carried out in each semester.
Evaluation questionnaires are supplied to the students through the virtual classroom.

(1) It will allow the acquisition of skills: G-3 G-5, S-1, S-2, S-3, S-4 and S-5.
It will be made available to students the material necessary for their understanding.

(2) It will allow the acquisition of skills: G-1, G-2, G-3, G-4, G-5, G-6, S-1, S-2, S-3, S-4 and S-5.

(3) It will allow the acquisition of skills: G-2, G-3, G-4, G-5, G-6, S-5 y S-6.

TYPES OF TEACHING

- End-of-course evaluation

Evaluation tools and percentages of final mark
- Written test, open questions 80%
- Exercises, cases or problem sets 20%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT
In this subject the system of continuous assessment is used. It will consist of:
1.- Two tests of individual assessment in each quarter. Each test will consist of a written exam including theoretical issues (concepts, definitions, etc), and theoretical and practical questions related to the application of theoretical knowledge.
One of the tests will be done in the middle of the four-month period (mid-term test) and will be liberatory if the student earns a grade of 6.5/10. At the end of the quarter a second test will be held in the period set in the academic calendar of the center. The student will pass this test with a minimum grade of 5/10 (for both students who have liberated matter in the mid-term test or not).

The computation of the tests in the final grade will be:
- If the student liberates matter in mid-term tests, 20% each.
- If the student does not reach the 6.5/10 score in the mid-term tests, and therefore does not liberate matter, the exam at the end of the quarter will be the 40% of the final mark.

2.- Laboratory practices: attitude, reports and knowledge examination will be assessed at the end of the practices. They will be the 20% of the final mark.

Students will have the right to be assessed through the final assessment system regardless of whether or not they have participated in the continuous assessment system. To this end, the student must submit in writing to the lecturer responsible for the subject the waiver of the continuous assessment, for which he/she will have a period of 18 weeks from the beginning of the course according to the academic calendar of the center. The final assessment for the students who did not carry out the continuous assessment will consist of:
1.- Carry out a laboratory practice to evaluate the learning outcome of the subject related to the application of experimental techniques, or make the practices during the course, the reports and the exam (20%).
2.- Take the final written test consisting of a written exam of theory and problems (80%).

Students may submit their renouncement to the call by a letter to the lecturer who teaches the subject within a period to be at least one month before the date of completion of the teaching period of the corresponding subject.

NOTE: To pass the subject it is necessary to overcome both the laboratory practices and the written examination of theory and problems.

Passed quarters are saved until the extraordinary call.

The laboratory practices can be saved for the next academic year if the student has passed the practical part and not the theoretical part of the subject. The student who wants to save them would have to use a call.

**EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT**

It will consist of a written exam including theoretical issues (concepts, definitions, etc), and theoretical and practical questions related to the application of theoretical knowledge (80%), and a laboratory practice exam (20%).

Those students who do not take the exam will not consume a call.

**MANDATORY MATERIALS**

VIRTUAL PLATFORM: Egela.

**BIBLIOGRAFÍA**

Basic bibliography

General Chemistry. Ralph H. Petrucci. Editorial Prentice Hall.

Detailed bibliography

Química Orgánica. Mary Ann Fox. Editorial Pearson-Education
Fundamentos de Química Analítica. Douglas A. Skoog. Editorial Thomson

Journals

Web sites of interest

http://cwx.prenhall.com/bookbind/pubbooks/blb_la/
http://www.lenntech.com/espanol/tabla-periodica.htm

**OBSERVATIONS**

Con carácter general, y salvo que se indique lo contrario, durante el desarrollo de una prueba de evaluación en la UPV/EHU, quedará prohibida la utilización de libros, notas o apuntes, así como de aparatos o dispositivos telefónicos, electrónicos, informáticos, o de otro tipo, por parte del alumnado.
The subject called -Materials Science- is a compulsory subject and therefore essential, given the importance of knowing to the fullest possible extent the materials that are used in engineering for all type of components and devices, and the way these materials should be managed to achieve their best benefits. The contents of the course are undoubtedly basic or fundamental, but also they affect the practical application of the knowledge acquired in multiple facets of engineering. Fundamental knowledge of mathematics and chemistry are important.

**COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT**

**Objectives:**
- Study of the structure-properties relationships of engineering materials.
- Description of the main mechanical tests carried out to materials.
- Study of the characteristics of metals, ceramics, polymers and composites. Selection criteria.

**Learning outcomes:**
- Employ appropriately the specific terminology of the subject, expressing the basic fundamentals of materials science by the proper use of graphic, mathematical and verbal language.
- Distinguish the main types of materials and relate their different characteristics with their various applications.
- Link the internal structure of materials with their specific physicochemical and mechanical properties, establishing the impact these properties have on the practical use of each material.
- Understand the concept of equilibrium state of a material and reason in which way a mechanical or thermal treatment may change the equilibrium state and, therefore, the material properties.
- Work cooperatively in tasks framed in the field of materials science, dealing with team tasks and analyzing and discussing ideas contributed by the other team members.

**CONTENIDOS TEÓRICO-PRÁCTICOS**

**Theoretical contents:**
Unit 3. Structure of materials: subatomic, atomic and microstructure. Analysis of the structure at different levels, based on the knowledge at the atomic and molecular level. Crystalline and amorphous structures. Defects in the crystal structures. Dislocations and plastic deformation. Strengthening mechanisms.

**Practical contents:**
The following practices will be carried out:

Practice 1: Introduction to materials
Practice 2: Hardness of materials
Practice 3: Tensile test of materials
Practice 4: Crystallography. Study of crystallographic directions and planes.
Practice 5: Thermal treatments in metals.
Practice 6: Microstructures observation.
Practice 7: Experimental observation of corrosion.
TEACHING METHODS

During the classroom hours master classes will be given, problems classes will be carried out and finally laboratory practices will be performed. In the master classes PowerPoint presentations will be carried out by the lecturer, during the problems classes problems will be proposed by the lecturer and time will be dedicated to their resolution, sometimes they will be resolved in group. In the laboratory activities the students will be distributed in small groups and they will perform practical work with laboratory equipment, whenever possible.

In the event that the sanitary conditions prevent the face-to-face teaching activity and / or evaluation, a non-face-to-face modality will be activated and the students will be informed promptly.

TYPES OF TEACHING

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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 20%
- Individual assignments 10%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

The evaluation criteria in the ordinary call will be:
- Laboratory practices: are mandatory and account for 20% of the final grade. The student will deliver a report for each practice within the period prescribed by the lecturer and will take a written practices test at the end of the semester. The final practices grade will be obtained from both: 40% of the reports and 60% of the written test.
- Individual tasks: involves the resolution of problems proposed by the lecturer and accounts for 10% of the final grade.
- Final exam: 70% of the final grade. Problems and theoretical questions.

In order to pass the course, students must pass the final exams and the practices exam. Otherwise, both will have to be repeated. When a student takes the final exam or the practices exam, is participating in this call. To give up the call the student does not have to take part in any of the two exams.

In case of resignation of the continuous assessment within the established deadlines, a final assessment of the subject will be done by means of a final written exam (80%) and a practical exam (20%).

In the event that the sanitary conditions prevent the face-to-face teaching activity and / or evaluation, a non-face-to-face modality will be activated and the students will be informed promptly.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

In the extraordinary call the final evaluation system will be applied.

In the event that the sanitary conditions prevent the face-to-face teaching activity and / or evaluation, a non-face-to-face modality will be activated and the students will be informed promptly.

MANDATORY MATERIALS

Scientific calculator

BIBLIOGRAFÍA

Basic bibliography

Detailed bibliography

Journals

Web sites of interest
COURSE GUIDE 2021/22

Faculty 263 - Faculty of Engineering - Gipuzkoa
Degree GIEIAU20 - Bachelor's Degree in Industrial Electronics and Automation Engine
Cycle Not Applicable
Year Third year

COURSE 25999 - Industrial Information Technology Credits, ECTS: 6

COURSE DESCRIPTION

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

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

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

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

(Check the official documents of the degree)

- (TEEOI10) Industrial Information Technology and communications
- (C3) Basic technology
- (C4) Problem solving
- (C5) Measuring and reporting
- (C10) Multilingual / Multidisciplinary work environments
- (C13) Scientific methodology

And the expected learning results are these:
- To be able to interpret technical documents
- To design Control and Supervisory systems
- To analyse industrial systems
- To design and implement informatics systems for the industry
- 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

CONTENIDOS TEÓRICO-PRACTICOS

1. Industrial IT in our industrial environment
2. LabVIEW basics
3. Communications and the Cloud
4. LabVIEW programming
5. Real Time Systems and IoT
6. LabVIEW developing

TEACHING METHODS

The aim of the course is to make the students learn in a gradual way, in order to be able to design and implement industrial applications of some complexity. The methodology to achieve this gradual learning is mainly stressed with the practical tests: three increasingly demanding tests, from simple to complex, that the student must pass during the regular term period.

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

If none of the students can attend the lessons (for example, due to COVID-19 social distancing measures), the teachers will make possible to do all the tasks remotely. They could also replace the practical tests with other ways to assess.
### Types of Teaching

<table>
<thead>
<tr>
<th>Types of teaching</th>
<th>M</th>
<th>S</th>
<th>GA</th>
<th>GL</th>
<th>GO</th>
<th>GCL</th>
<th>TA</th>
<th>TI</th>
<th>GCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours of face-to-face teaching</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>60</td>
<td>60</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>60</td>
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</tbody>
</table>

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 Tools and Percentages of Final Mark

- Continuous evaluation
- End-of-course evaluation

### Evaluation Methods

- Exercises, cases or problem sets 20%
- Teamwork assignments (problem solving, Project design) 20%
- Practical tests 60%

### Ordinary Examination Period: Guidelines and Opting Out

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

The items are the following:

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

2. Programming in LabVIEW practical test (week 11) 20%
   - This test will be held in the laboratory during the regular practical sessions. There would be an extra chance to pass this test in the official exam date.

3. Developing in LabVIEW practical test (official exam date) 20%
   - This test will be held in the laboratory in the official exam date.

4. Group work on industrial applications (week 8) 20%
   - The details of this work will be explained beforehand.

5. Report of the laboratory sessions (two days before the official exam date) 20%
   - The student will report on the work done during the laboratory sessions.

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

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

### Extraordinary Examination Period: Guidelines and Opting Out

The considerations of the regular call apply to the extraordinary call too. The only exception is that the deadline of the individual work and the report is two days after the official exam date instead of two days before. 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 2019 in your own laptop. The UPV/EHU has a student license available (https://www.ehu.eus/liz/niacademic/).
**BIBLIOGRAFÍA**

**Basic bibliography**

egela.ehu.eus

**Detailed bibliography**

- Absolute Beginner's guide to C. Greg Perry. SAMS.

**Journals**

- Revista Iberoamericana de Automática e Informática Industrial RIAI
  ISSN: 1697-7912
  http://www.journals.elsevier.com/revista-iberoamericana-de-automatica-e-informatica-industrial-riai/

- IEEE Transactions on Industrial Informatics
  ISSN 1551-3203
  http://tii.ieee-ies.org/

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

**Web sites of interest**

https://informatics.industriainformatika.pw/

http://www.ni.com/

http://blog.eyesonvis.com/

https://www.isa.org/isa101/

http://www.iiconsortium.org/

**OBSERVATIONS**

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

The practical sessions will be held in the Control Laboratory, in the absence of other indications.

Coordinator of the subject for the 2021/22 term: Aitzol Ezeiza
27859 - STATICS AND MECHANICS OF MATERIALS

DESCRIPTION & CONTEXTUALISATION OF THE SUBJECT
This subject 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.

The subject offers an overview of the mechanical design of parts.

COMPETENCES/LEARNING OUTCOMES OF THE SUBJECT
Competences:
Learn about and use the principles of materials resistance.
Solve problems with initiative, decision-making, creativity, critical thinking and communication.
Develop the necessary learning skills to carry out ongoing training with a high level of autonomy.
Apply strategies found in scientific methodology.
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/PRACTICAL CONTENT**
Unit 1. Statics of the particle and the rigid solid.
Unit 2. Beams and cables.
Unit 3. Structures.
Unit 4. Stress and deformation
Unit 5. Axial loads: tensile and compression.
Unit 6. Torque.
Unit 7. Bending and buckling.

**METHODOLOGY**
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.
- 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.

**TYPES OF TEACHING**

<table>
<thead>
<tr>
<th>TYPE OF TEACHING</th>
<th>M</th>
<th>S</th>
<th>GA</th>
<th>GL</th>
<th>GO</th>
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Legend: M: Lecture S: Seminario GA: Practical Class Work GL: Practical Lab work GO: Practical computer work
GCL: Clinical Practice TA: Workshop TI: Ind. workshop GCA: Field workshop
ASSESSMENT SYSTEMS
- Continuous assessment
- Final assessment

TOOLS USED & GRADING PERCENTAGES
- Extended written exam 70%
- Practical work (exercises, case studies & problems set) 10%
- Team work 20%

ORDINARY EXAM CALL: GUIDELINES & DECLINING TO SIT
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 EXAM CALL: GUIDELINES & DECLINING TO SIT
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.
BIBLIOGRAPHY

Basic references:

In-depth bibliography:
Mechanics of Materiales, R.C. Hibbeler, Pearson, 2006
The most usual thermal renewable energy sources are biomass, solar, and geothermal. The scope of this subject deals with the latter two (solar thermal and geothermal), and the role they play for low temperature thermal energy generation, both for space conditioning, and for hot water production. This subject is related to other subjects, such as Thermodynamics, and Heat Transfer (both at 2nd course), and Energy Efficiency at 4th course.

The subject uses a practical focus in order to design, calculate and analyze the performance of solar thermal systems, and the appliances used to capture and use geothermal energy. Specifically, we will work these competences:

* To develop the essential knowledge of geothermal and solar thermal energy, together with the technologies used to take advantage of them
* To coherently use the procedural knowledge associated with scientific methodology, in order to solve the problems associated to these technologies, aiming to select the optimal typologies and working parameters
* To adopt an attitude propitious to energy saving, so as to value if the proposed system is efficient enough, or too polluting compared to other technologies, and to define improvements, in case they are needed

CONTENIDOS TEÓRICO-PRÁCTICOS

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

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

C- Solar and geothermal system combination

TEACHING METHODS

Magistral classes will be based on the study of actual installations, analyzing the basic concepts of their performance, with a theoretical-practical focus.

Classroom practices will be used to design and size a solar thermal and a geothermal system, working in group with other classmates.

Laboratory practices will be used to deepen in the knowledge of these systems, using commonly used elements of solar and geothermal systems, and performing different tests with them.

TYPES OF TEACHING

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</tbody>
</table>

Legend: M: Lecture-based  S: Seminar  GA: Applied classroom-based groups
TA: Workshop  TI: Industrial workshop  GCA: Applied fieldwork groups

Evaluation methods

- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 40%
- Exercises, cases or problem sets 10%
- Teamwork assignments (problem solving, Project design) 50%

**ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT**

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

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

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

**EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT**

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

**MANDATORY MATERIALS**

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

**BIBLIOGRAFÍA**

Basic bibliography

- Manual de climatización geotérmica : desarrollo de todo el proceso de instalación de un sistema de geotermia de muy baja temperatura / Asociación Cluster de Xeotermia Galega

Journals

- Renewable Energy
- Renewable and Sustainable Energy Reviews

Web sites of interest

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

**OBSERVATIONS**
**SUBJECT**

- **Plan:** GRENOV20 - Bachelor's Degree In Renewable Energy Engineering
- **Year:** Fourth year
- **Grid:** 27875 - Eficiencia Energética
- **ECTS Credits:** 6

**DESCRIPTION & CONTEXTUALISATION OF THE SUBJECT**

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.

**COMPETENCES/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 competences:

- To develop 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 parameters

**THEORETICAL/PRACTICAL CONTENT**

**Part 0 - Introduction and legislation**

- **Objectives**
  1. Historical origin
  2. Energy efficiency
  3. Basic concepts
  4. Actual legislative context (national and international)

**Part 1 - Industry**

- Combined heat and power
- Heat recovery
- Isolation improvement

**Part 2 - Buildings**

- Building envelope
- Thermal systems in buildings

**Part 3 - Industry and building integration**

- District heating
- Other practical examples

**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**

<table>
<thead>
<tr>
<th>Type of teaching</th>
<th>M</th>
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<th>GCL</th>
<th>TA</th>
<th>TI</th>
<th>GCA</th>
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</thead>
<tbody>
<tr>
<td>Classroom hours</td>
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<td>5</td>
<td>15</td>
<td>10</td>
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<tr>
<td>Hours of study outside the classroom</td>
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<td>30</td>
<td>10</td>
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</table>

**LEGEND:**

- **M:** Lecture
- **S:** Seminar
- **GA:** Pract.Class.Work
- **GL:** Pract.Lab work
- **GO:** Pract. computer wo
- **GCL:** Clinical Practice
- **TA:** Workshop
- **TI:** Ind. workshop
- **GCA:** Field workshop

**ASSESSMENT SYSTEMS**

- Final assessment system

**TOOLS USED & GRADING PERCENTAGES**

- Extended written exam: 40%
- Team work (problem solving, project design): 60%

**ORDINARY EXAM CALL: GUIDELINES & DECLINING TO SIT**

Extended written exam: A final theoretical-practical exam will be done. The total percentage of this part in the final 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 in 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 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 EXAM CALL: GUIDELINES & DECLINING TO SIT
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.

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

BIBLIOGRAPHY

Basic bibliography

In-depth bibliography
* Energy Efficiency in Industry (Eur) de J.SIRCHIS y J. Sirchis.

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

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

REMARKS
### COURSE GUIDE 2021/22

<table>
<thead>
<tr>
<th>Faculty</th>
<th>264 - Faculty of Engineering - Gipuzkoa. Eibar Department</th>
<th>Cycle</th>
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<tbody>
<tr>
<td>Degree</td>
<td>GRENOV20 - Bachelor's Degree In Renewable Energy Engineering</td>
<td>Year</td>
<td>First year</td>
</tr>
</tbody>
</table>

### COURSE

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

### COURSE DESCRIPTION

The subject of CALCULUS is a subject of the first term of the first course and has 6 ECTS credits. The Presential classes are divided into three types: master classes (30 hours), classroom practices (23 hours) and seminars (7 hours).

In addition to the classes, students will have to work 45 hours of lectures, 34.5 hours of classroom practice and 10.5 hours of seminars.

### COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

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

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

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

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

### CONTENIDOS TEÓRICO-PRÁCTICOS

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

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

**Item 3. Derivability of real functions from real variables.**

**Item 4. Functions of several variables.**

**Item 5. Derivability of functions of several real variables.**

**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 provided with 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

<table>
<thead>
<tr>
<th>Types of teaching</th>
<th>M</th>
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Legend:
- M: Lecture-based
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- 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 subject, students may waive the call within a period of at least one month before the date of the end of the teaching period of the corresponding subject. This resignation must be submitted by written to the teachers responsible for the subject.

### EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

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

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

### MANDATORY MATERIALS

Workbook

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

**Basic bibliography**

**Detailed bibliography**
PROBLEMAS:

**Journals**
LA GACETA DE LA REAL SOCIEDAD MATEMÁTICA ESPAÑOLA

**Web sites of interest**
- http://www.divulgamat.net
- http://www.hiru.com
- http://www.vitutor.com/
- https://www.geogebra.org/
- https://es.mathworks.com/
- https://www.khanacademy.org/

**OBSERVATIONS**
The subject is part of the following project, IKDi321-21.
# COURSE GUIDE 2021/22

<table>
<thead>
<tr>
<th>Faculty</th>
<th>264 - Faculty of Engineering - Gipuzkoa. Eibar Department</th>
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</table>

## 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.

## COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

### CONTENIDOS TEÓRICO-PRÁCTICOS

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

## TEACHING METHODS

- Ahozko adierazpena
- Kasuen irakurketa, eztabaida eta bateratze lana egin.
- Problemask ebatzi.


Beharrezko asistentzia %100. (klase praktikoetara)
**TYPES OF TEACHING**

<table>
<thead>
<tr>
<th>Types of teaching</th>
<th>M</th>
<th>S</th>
<th>GA</th>
<th>GL</th>
<th>GO</th>
<th>GCL</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Hours of face-to-face teaching</td>
<td>45</td>
<td>15</td>
<td>15</td>
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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

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**Evaluation tools and percentages of final mark**

- Continuous evaluation  
- End-of-course evaluation

**Evaluation methods**

- 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**

- 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%

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**EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT**

- 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%

---

**MANDATORY MATERIALS**

- Apuntes de clase

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**BIBLIOGRAFÍA**

**Basic bibliography**

- Casanovas, Montserrat y Bachs, Jorge (2001): "Management y Finanzas de la empresas promotyoras-constructoras". Editorial Deusto  
- Amat, O: "Contabilidad y finanzas para no financieros" Editorial Deusto  

**Detailed bibliography**

- Centeno, R. Economía para Ingenieros; Ediciones Pirámide (1999)  
- Cuervo García, A. Introducción a la Administración de Empresas; Editorial Civitas (1996)  
- Pérez Carballo Veiga, F.J. Control de la gestión empresarial; Esic Editorial  
- Blanco Ibarra, F. contabilidad de costes y analítica de gestión para las decisiones estratégicas

**Journals**

- Base de datos emerald

**Web sites of interest**
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 techno-economic analysis of these plants. With that aim, the following technologies are analysed: parabolic-trough, central tower receiver and Stirling dish.

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

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

M (Master Class): Master classes will be based on the presentation of the theoretical concepts needed for the design and techno-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.

- Final assessment system
- Extended written exam 40%
- Team work (problem solving, project design) 60%

Written exam: A final theoretical exercise will be made. The total percentage of this exam 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 won't 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 EXAM CALL: GUIDELINES & DECLINING TO SIT

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.

COMPULSORY 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


In-depth bibliography


Journals

Useful websites

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

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

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

REMARKS
27862 – HEAT TRANSFER

TEACHING GUIDE 2018/19

Centre 264 - Faculty of Engineering - Gipuzkoa. Elbar Department
Cycle Indifferent
Plan GRENOV20 - Bachelor’s Degree In Renewable Energy Engineering
Year Second year
ECTS Credits: 6

DESCRIPTION & CONTEXTUALISATION OF THE SUBJECT

In the practice of engineering, obtaining a basic 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 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 need to obtain a solid base in calculus (1st year calculus and extension of mathematics in 2nd year) and physics (physics and physical expansion of 1º year). Equally, it is advantageous to have passed thermodynamics, fluid mechanics and differential equations (all 2nd year), although the concepts associated with these themes are presented and reviewed as needed.

ORDINARY EXAM CALL: GUIDELINES & DECLINING TO SIT

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 tests will be taken during the year using the Socratic tool in each test, all the class must participate and 80% of the answers must be correct in order to get 5% of the final grade, otherwise no grade will be awarded.

2 - COMPUTER PROBLEMS**: 7 computer problem classes (1.5 hours’ duration each) will be taken using EES software. In the last three computer classes theoretical problems presented in lectures will be solved. In these 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 result will be Pass or Fail. The student will be given one problem, similar to those presented during the first hour, and if he/she finds the correct solution he/she will get 5% of the final grade, otherwise nothing. Since there are 3 evaluated computer classes, their total weight is 15% of the final grade.

Note: Students that have a formal reason (according to the article 43 of the Management Regulation for Degree Course Teaching. UPV/EHU) may not participate in the joint evaluation system will have access to a final exam which will be also evaluated the practical part. For this purpose, the student shall express his/her wish, in writing and justified to the teacher in charge of the subject, within a period of at least one month before the date set for the evaluation of the subject. In this case, the student will be evaluated in a single final exam, which will include a practical part, and shall cover 100% of the mark. Article 39 of the same regulation states that the student that wishes to withdraw may submit his/her withdrawal from the call for evaluation through a letter sent to the professor who taught the year within a minimum period of one month prior to the date of completion of the teaching period of the year. In the event that the student has to take the
written test written in any of the calls, this will mean the withdrawal from such call for evaluation and the student will be considered as not presented.

EXTRAORDINARY EXAM CALL: GUIDELINES & DECLINING TO SIT

The extraordinary call is governed by the same criteria as the ordinary call.
### COURSE GUIDE 2020/21

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Degree</th>
<th>Cycle</th>
<th>Year</th>
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</thead>
<tbody>
<tr>
<td>264 - Faculty of Engineering - Gipuzkoa. Eibar Department</td>
<td>GRENOV20 - Bachelor's Degree In Renewable Energy Engineering</td>
<td>Not Applicable</td>
<td>Second year</td>
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</table>

### COURSE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>27861</td>
<td>Statistical Mathematics</td>
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</tbody>
</table>

### COURSE DESCRIPTION

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

### COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

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

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

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

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

### COURSE CONTENTS, THEORETICAL & APPLIED

<table>
<thead>
<tr>
<th>Unit</th>
<th>Course Content</th>
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</table>
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.

TEACHING METHODS
- Final exam: 75%.
- Computer training: 25%
A minimum score of 4 marks is required for both the computer training and the final exam.

TYPES OF TEACHING

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<td>30</td>
<td>15</td>
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<tr>
<td>Hours of student work outside the classroom</td>
<td>45</td>
<td>22.5</td>
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Legend:
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- TA: Workshop
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- 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**


**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**