# ENGLISH FRIENDLY COURSES (EFC) 2019 -2020 – CAMPUS OF GIPUZKOA

**Donostia**: http://www.ehu.eus/en/web/politeknikoa/home. **Coordinator:** subdir.relacinter.ep-ss@ehu.eus

**Eibar**: http://www.ehu.eus/es/web/eibar. **Coordinator**: euti-ei.internacional@ehu.eus

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

| FACULTY OF ENGINEERING – GIPUZKOA (263 ) | | SEMESTER | CREDITS | SCHEDULE[1] |
|---|---|---|---|---|
| 25980 | Fundamentos de Tecnología Eléctrica | Annual | 9 | A |
| 25974 | Fundamentos Físicos de la Ingeniería | Annual | 12 | M |
| 26597 | Seguridad y Legislación | Sep. 2019- Jan. 2020 | 6 | A |
| 26556 | Prevención y Seguridad en el Trabajo | Sep. 2019- Jan. 2020 | 6 | M |
| 25999 | Informática Industrial | Sep. 2019- Jan. 2020 | 6 | M |
| 26534 | Física Aplicada | Sep. 2019- Jan. 2020 | 9 | M |
| 26571 | Chemistry | Sep. 2019- Jan. 2020 | 6 | M |
| 26532 | Acústica Arquitectónica | Jan. 2020 - May 2020 | 6 | A |
| 26587 | Acústica | Jan. 2020 - May 2020 | 6 | A |
| 26555 | Introducción a la prevención, seguridad, salud y proyectos técnicos | Jan. 2020- May 2020 | 6 | A |

| FACULTY OF ENGINEERING- GIPUZKOA- EIBAR DEPARTMENT (264 ) | | SEMESTER | CREDITS | SCHEDULE |
|---|---|---|---|---|
| 27859 | Estática y Resistencia de Materiales | Sep. 2019- Jan. 2020 | 6 | M/A |
| 25986 | Sistemas de Gestión Integrada | Sep. 2019- Jan. 2020 | 6 | M |
| 27866 | Energía Geotérmica y Solar Térmica | Sep. 2019- Jan. 2020 | 6 | M |
| 27875 | Eficiencia Energética | Sep. 2019- Jan. 2020 | 6 | M |
| 27850 | Cálculo | Sep. 2019- Jan. 2020 | 6 | M |
| 25989 | Organización, Gestión y Administración de Empresas | Jan. 2020- May 2020 | 6 | M |
| 27877 | Energía Solar Termoeléctrica | Jan. 2020- May 2020 | 6 | M/A |
| 27862 | Transferencia de Calor | Jan. 2020- May 2020 | 6 | M |
| 27849 | Análisis Matemático y Numérico | Jan. 2020- May 2020 | 6 | M |

[1] SCHEDULE: Morning (M)/ Afternoon (A): begins at 13.30. M/A means that these subjects might have several classes in the afternoons for some weeks during the semester. By clicking the subject´s name, its Syllabus will appear.

**TEACHING GUIDE** 2018/19

| | | | |
|---|---|---|---|
| **Centre** | 263 - Faculty of Engineering - Gipuzkoa | **Cycle** | Indiferente |
| **Plan** | GIEIAU20 - Bachelor's Degree in Industrial Electronics and Automation Engine | **Year** | Third year |

## SUBJECT

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

## DESCRIPTION & CONTEXTUALISATION OF THE SUBJECT

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

## THEORETICAL/PRACTICAL CONTENT

In the classroom:
1.-Introduction to Industrial IT
2.-Interfaces (HMI)
3.-Data acquisition (DAQ)
4.-Communications
5.-Real Time systems
6.-Computer control systems implementations

In the Laboratory:
A.-LabVIEW basics
B.-LabVIEW programming
C.-LabVIEW developing

## 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 analyse and design industrial informatics applications (using the proposed tool).

## TYPES OF TEACHING

| Type of teaching | M | S | GA | GL | GO | GCL | TA | TI | GCA |
|---|---|---|---|---|---|---|---|---|---|
| Classroom hours | 30 | | | 30 | | | | | |
| Hours of study outside the classroom | 30 | | | 60 | | | | | |

**Legend:** M: Lecture S: Seminario 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

- Continuous assessment system
- Final assessment system

## TOOLS USED & GRADING PERCENTAGES

- Practical work (exercises, case studies & problems set) 20%
- Individual work 20%
- Practical tests 60%

## ORDINARY EXAM CALL: GUIDELINES & DECLINING TO SIT

In a nutshell, the subject has five evaluation items. All of them have the same weight (20%) in the final grade 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)
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)
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)
This test will be held in the laboratory in the official exam date.

4.- Individual work on interfaces (week 9)
The details of this work will be explained beforehand.

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

The student must pass all the parts to pass the course. There are some exceptional conditions to pass the course that you could ask the coordinator of 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 EXAM CALL: GUIDELINES & DECLINING TO SIT

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 are a week after the official exam date instead of two days before. The parts passed in the first call are kept for the second call, but the student could repeat the whole evaluation in order to get maximum mark.

## COMPULSORY MATERIALS

Documents available in eGela.
User Manuals for the laboratory hardware (DAQ cards, sbRIO, myRIO) and software (LabVIEW).

## BIBLIOGRAPHY

### Basic bibliography

- Introduction to data acquisition with LabView. Robert King. McGraw-Hill, New York, 2013.
- LabVIEW Data Acquisition Basics Manual. National Instruments. 1998.

### In-depth bibliography

- Absolute Beginner's guide to C. Greg Perry. SAMS.
- LabVIEW. Programación gráfica para el control de instrumentación. Antoni Manuel Lázaro. Ed. Paraninfo.
- LabVIEW programming, data acquisition and analysis. Jeffrey Beyon. Ed. Prentice Hall.
- Hands-on exercise manual for LabVIEW programming, data acquisition and analysis. Jeffrey Beyon. Ed. Prentice Hall.
- NI myRIO Project Essentials Guide. Ed Doering. Ed. National Technology and Science Press.

### 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

### Useful websites

http://www.ni.com/

http://blog.eyesonvis.com/

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

http://www.iiconsortium.org/

## REMARKS

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 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 coordinator of the subject for the 2018/19 term is Aitzol Ezeiza.

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

**TEACHING GUIDE** 2018/19

| | | | |
|---|---|---|---|
| **Centre** | 263 - Faculty of Engineering - Gipuzkoa | **Cycle** | Indiferente |
| **Plan** | GEDIFI20 - Bachelor`s Degree in Building Engineering | **Year** | First year |

## SUBJECT

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

## DESCRIPTION & CONTEXTUALISATION OF THE SUBJECT

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

Competencias de la asignatura:

C1. Aplicar el cálculo vectorial a la resolución de problemas de estática de sistemas estructurales, tanto por métodos analíticos como por métodos gráficos.

C2. Aplicar los conceptos físicos relativos al comportamiento elástico del sólido y elasticidad de los medios continuos, analizando y resolviendo problemas básicos.

C3. Manejar equipos experimentales simples. Elaborar y analizar los resultados obtenidos experimentalmente, siendo capaces de interpretar dichos resultados en el contexto conceptual desarrollado en la asignatura.

Asimismo, se desarrollan las siguientes competencias transversales (estas competencias, comunes a diversas asignaturas, se trabajan en la materia Física Aplicada a la vez que las competencias propias de asignatura).

T1. Resolución de problemas. Emplear coherentemente el conocimiento procedimental asociado a la metodología científica en la resolución de situaciones problemáticas de física básica; realizar análisis cualitativo, emitir hipótesis, elaborar estrategias alternativas, resolver y analizar resultados.

T2. Trabajo en equipo. Trabajar en equipo para abordar con los compañeros tareas cooperativas en el contexto de la física: realizar propuestas, analizar aportaciones de otros, discutir ideas y ejecutar las acciones pertinentes.

T3. Comunicación escrita: informes. Trabajar con información correspondiente a procesos relativos a la física básica, analizar y expresar correctamente las ideas, utilizando para ellos diversos sistemas de símbolos o formas de representación: texto, fórmulas, tablas, gráficos y diagramas.

## THEORETICAL/PRACTICAL CONTENT

Los temas que se abordan a lo largo del curso son los siguientes:

1. Introducción. Impacto social y ambiental de la edificación.
2. Estática de la partícula
3. Fuerzas aplicadas al sólido rígido
4. Estática del sólido rígido
5. Centros de gravedad
6. Estática gráfica
7. Estructuras triangulares isostáticas en el plano
8. Elasticidad
9. Esfuerzos internos en vigas isostáticas

A lo largo del curso se realizan también varias sesiones de prácticas de laboratorio en las que se comprueban experimentalmente conceptos como la descomposición de fuerzas, el carácter estático o dinámico de la fuerza de rozamiento, las fuerzas axiales en una estructura triangular, así como la importancia de considerar y la forma de estimar el error asociado a los resultados experimentales.

## METHODS

Con la metodología propuesta se pretende que el estudiante trabaje de forma continua de manera que vaya adquiriendo las competencias y asimilando los conceptos de forma progresiva. Seguiremos un libro de texto en la gran mayoría de temas de la asignatura. En cada tema, el alumno sabe qué puntos se van a tratar en las clases de teoría gracias a unas hojas-guía que se cuelgan en la plataforma virtual eGela. Se explican los conceptos en clase y más adelante se plantea al grupo un problema abierto relacionado con los conceptos explicados. Los estudiantes trabajan en dicho problema individualmente ó por parejas y al final de la clase entregan la tarea realizada (en algunos casos dicha tarea se realiza fuera de clase). Se comentarán las distintas estrategias de resolución y los errores que la profesora ha podido detectar. Las tareas entregadas contribuyen a la evaluación continua.

Además, para que el estudiante tenga una valoración realista de cómo va progresando, se realizan tres controles a lo largo del cuatrimestre cuyo resultado contribuye a la nota final. El contenido de cada control así como su peso en la evaluación va aumentando progresivamente. Así mismo, el estudiante tiene que asistir a las sesiones de prácticas y elaborar con su grupo los informes correspondientes, que también contribuyen a la evaluación.

## TYPES OF TEACHING

| Type of teaching | M | S | GA | GL | GO | GCL | TA | TI | GCA |
|---|---|---|---|---|---|---|---|---|---|
| Classroom hours | 60 | | 15 | 15 | | | | | |
| Hours of study outside the classroom | 75 | | 30 | 30 | | | | | |

**Legend:** M: Lecture S: Seminario 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 80%
- Practical work (exercises, case studies & problems set) 10%
- Prácticas de Laboratorio 10%

## ORDINARY EXAM CALL: GUIDELINES & DECLINING TO SIT

Existen dos opciones para ser evaluado/a: (1) seguir la evaluación continua o bien (2) decantarse por una prueba final. El o la estudiante que quiera renunciar a la evaluación continua y desee presentarse a la prueba final deberá comunicarlo por escrito al profesor o profesora para la décima semana del cuatrimestre. Deberá rellenar y entregar un formulario disponible en e-Gela.

En la evaluación se puede conseguir una puntuación máxima de 100 puntos; si el alumno logra 50 de ellos y cumple los requisitos detallados abajo, habrá aprobado la asignatura. La evaluación se realiza mediante las siguientes actividades:

(1) MÉTODO DE EVALUACIÓN CONTINUA:

• Actividad de Evaluación: Tareas adicionales, problemas, etc. (a lo largo de todo el cuatrimestre)
Puntuación: 10% nota final.
Observaciones: no completar una tarea para la fecha fijada sin justificación implica un cero en dicha tarea. Parte de estas tareas serán presenciales. Dicha tarea se realizará en clase el día que considere el profesor. Para aprobar por el sistema de evaluación continua habrá que tener 10/25 en tareas. En caso contrario, el alumno será suspendido eirá a la convocatoria extraordinaria.

• Actividad de Evaluación: Prácticas de laboratorio (a lo largo de todo el cuatrimestre)
Puntuación: 10% nota final
Observaciones: Es necesario aprobarlas para lo cual la asistencia es obligatoria y deben entregarse los informes correctamente. (Más detalles en la plataforma E-gela).

• Actividad de Evaluación: 1er control (aproximadamente tras las primeras 5 semanas de clase)
Puntuación: 15% nota final
Observaciones: No libera materia.

• Actividad de Evaluación: 2º control (aproximadamente tras 10 semanas de clase)
Puntuación: 25% nota final
Observaciones: No libera materia.

• Actividad de Evaluación: 3 er. Control (al final del cuatrimestre)
Puntuación: 40% nota final
Observaciones: Entra toda la materia del curso. Es necesario obtener una nota mínima de 3.5 sobre 10 para que se tenga en cuenta el resto de actividades de la evaluación continua.

NOTAS Y REQUISITOS:

Es necesario aprobar las prácticas de laboratorio para aprobar la asignatura. Para ello, la asistencia es obligatoria y deben entregarse los informes correctamente. Para los que no aprueben las prácticas se organizará una prueba en la que pueden acreditar las competencias en la convocatoria extraordinaria.

(2) MÉTODO DE EVALUACIÓN DE PRUEBA FINAL

En este caso se realizará una prueba final en la misma fecha que el tercer control de la evaluación continua, aunque ambos exámenes serán distintos. La nota final se obtendrá como sigue:

- 10% Prácticas de laboratorio (mínimo 5 sobre 10)
- 90% Prueba escrita individual

En el caso de que el alumno no se presente el día de la prueba final constará como no presentado.

## EXTRAORDINARY EXAM CALL: GUIDELINES & DECLINING TO SIT

%10 Prueba de prácticas de laboratorio. (Mínimo 5 sobre 10)

%90 Prueba escrita individual.

La evaluación se realiza mediante una prueba final. Los alumnos que no hayan aprobado las prácticas de laboratorio durante el curso deberán realizar una práctica el mismo día del examen (su peso sobre la nota final es del 10%). Todos los estudiantes que se presenten a la parte práctica la harán en grupo de forma análoga a la habitual a lo largo del curso.

Aquellos estudiantes que hayan seguido a lo largo del curso la evaluación continua y quieran conservar la calificación que habían obtenido en las distintas actividades (tareas, controles 1 y 2, prácticas de laboratorio) para que en la convocatoria extraordinaria se apliquen los mismos porcentajes y criterios que en la ordinaria (60% evaluación continua, 40% control de toda la materia), tendrán que solicitarlo a su profesor por escrito al menos 10 días antes de la fecha oficial de la convocatoria.

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

## COMPULSORY MATERIALS

Material de dibujo para la parte de estática gráfica (escuadra, cartabón)

## BIBLIOGRAPHY

### Basic bibliography

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

### In-depth bibliography

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

### Journals

**Useful websites**

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

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

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

**REMARKS**

**TEACHING GUIDE** 2018/19

**Centre** 263 - Faculty of Engineering - Gipuzkoa **Cycle** Indiferente

**Plan** GCIVIL20 - Bachelor`s Degree in Civil Engineering **Year** First year

## SUBJECT

26571 - Chemistry **ECTS Credits:** 6

## DESCRIPTION & CONTEXTUALISATION OF THE SUBJECT

"Chemistry" is a subject belong to the basic module for the 1st year of the Bachelor of Civil Engineering. It is a 6-ECTS subject, taught in the first semester by teachers from the Department of Chemical and Environmental Engineering.
This study guide is intended to provide students with a general view of the subject, of its learning outcomes, syllabus and teaching methodology.
The aim of this subject is to provide students with those principles of Chemistry that are relevant to Engineering. Hence, the subject is focused on developing the required skills to apply those principles. The contents of this subject are selected to introduce and enhance students understanding and application of chemistry principles that address the structure and properties of matter, as well as the changes, both physical and chemical changes, occurred within it. These aspects are of great importance in order to address other subjects of the Bachelor, such as Materials Science (2nd year) and Environmental Engineering (3rd year), as well as the works that civil engineers will carry out in their future work.

## COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Cross competencies
Ability to select the appropriate strategies and procedures to solve practical problems, showing a positive interaction with other students
Ability to communicate and discuss effectively the problem results, both orally and written, using the adequate terminology of Engineering and Chemistry
Ability to interact positively with other students
Specific competencies
Demonstrate knowledge of the essential principles of the structure of matter to gain understanding of properties and performance of materials and apply them for materials and environment technologies
Demonstrate a clear understanding of the underlying principles of the physical and chemical processes that chemical substances undergo and, thus, determine the consequences of these processes in different applications

## THEORETICAL/PRACTICAL CONTENT

THE STRUCTURE OF MATTER
- The periodic table
- Chemical bonds
- Inorganic and organic compounds

PHYSICAL CHANGES
- Properties of solids, liquids and gases
- Phase diagrams

CHEMICAL CHANGES
- Reactions among gases and combustion
- Reactions in solution
- Oxidation-reduction reactions and corrosion

## METHODS

The method of teaching will be focused on solving problems in order to encourage the students towards the practical aspects of the subject. Although the learning process will be guided by the teacher, the development of the independent study by students will be also promoted. The knowledge advances acquired by the students will be continuously assessed during the learning process in order to provide the students the feedback needed to improve their skills when solving chemical problems.

## TYPES OF TEACHING

| Type of teaching | M | S | GA | GL | GO | GCL | TA | TI | GCA |
|---|---|---|---|---|---|---|---|---|---|
| Classroom hours | 30 | | 30 | | | | | | |
| Hours of study outside the classroom | 45 | | 45 | | | | | | |

**Legend:** M: Lecture S: Seminario 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

- Continuous assessment system
- Final assessment system

## TOOLS USED & GRADING PERCENTAGES

- Practical work (exercises, case studies & problems set) 100%

## ORDINARY EXAM CALL: GUIDELINES & DECLINING TO SIT

Continuous assessment system
The structure of matter: 15%
Physical changes: 15%
Chemical changes: 70%
A minimum pass mark will be required for each module in order to pass the subject.
Those students who want to give up the call should let the teacher know about it, as set out in the Regulation Guidelines.

## EXTRAORDINARY EXAM CALL: GUIDELINES & DECLINING TO SIT

Final assessment system 100%

## COMPULSORY MATERIALS

The available resources found in the eGELA plataform

## BIBLIOGRAPHY

### Basic bibliography

R. Chang, "Chemistry". McGraw-Hill, 2016.
K.S. Chan, "Understanding advanced chemistry through problem solving". World Scientific, 2014.
R.H. Petrucci, "General chemistry: principles and modern applications with mastering chemistry". Pearson, 2011.
R. Chang, J. Overby, "General chemistry: the essential concepts". McGraw-Hill, 2011.
C.N.R. Rao, "Understanding chemistry". World Scientific, 2010.
W.L. Masterton, C.N. Hurley, "Chemistry: principles and reactions". Brooks-Cole, 2009.
N.J. Tro, "Introductory chemistry essentials". Pearson, 2009.

### In-depth bibliography

M. Ladd, "Bonding, structure and solid-state chemistry". Oxford University Press, 2016.
R.J. Ouellette, J.D. Rawn, "Principles of organic chemistry". Elsevier, 2015.
H.A. Favre, W.H. Powell, "Nomenclature of organic chemistry: IUPAC Recommendations and Preferred Names". RSC, 2014.
D.A. Skoog, "Fundamentals of analytical chemistry". Brooks-Cole, 2014.
P. Atkins, J. de Paula, "Atkins' physical chemistry". Oxford University Press, 2014.
W.M. Davis, "Physical chemistry: a modern introduction". CRC Press, 2012.
L.P. Eubanks, C.H. Middlecamp, C.E. Heltzel, S.W. Keller, "Chemistry in context: applying chemistry to society". McGraw-Hill, 2009.
R.J. Naumann, "Introduction to the physics and chemistry of materials". CRC Press, 2009.

### Journals

### Useful websites

"A Dictionary of Chemistry"
http://www.oxfordreference.com/view/10.1093/acref/9780199204632.001.0001/acref-9780199204632

"General Chemistry"
https://en.wikibooks.org/wiki/General_Chemistry

"Principles of Chemical Science"
http://ocw.mit.edu/courses/chemistry/5-111-principles-of-chemical-science-fall-2008/

## REMARKS

**TEACHING GUIDE** 2018/19

**Centre** 263 - Faculty of Engineering - Gipuzkoa **Cycle** Indiferente

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

## SUBJECT

26532 - Acoustics **ECTS Credits:** 6

## DESCRIPTION & CONTEXTUALISATION OF THE SUBJECT

Acoustics is one of the subjects in the 4th year of the Degree of Technical Architecture.

Noise is one of the most common pollutants in the today society. It is well known that being exposed to high or persistent noises can lead to severe health and comfort problems, which negatively affect our life quality. In 2013, a new appeared at the media telling “A pianist faces 7.5 years of prison for disturbing one neighbour”. The consciousness of the today society about building comfort and noise issues is rising more and more, which is also reflected on the increasing normative requisites to be fulfilled.

In Architectural Acoustics we try to provide you with the foundations that govern the phenomenon of noise, to analyse which are their effects as well as the methods to measure and evaluate them. Moreover, it develops a technical formation that will lead you to set-up and project spaces with an adequate sonority for their purpose, with acceptable noise levels that are isolated from noise sources. In this way we will create more comfortable and healthy spaces.

## COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Competencias de asignatura:

C1: Aplicar los conceptos fundamentales de la acústica a la elaboración de proyectos de edificación, de forma que éstos cumplan con los requisitos de acondicionamiento y aislamiento adecuados a su uso.

C2: Prevenir los posibles riesgos laborales derivados del ruido así como los riesgos medioambientales debidos a la contaminación acústica.

C3: Detectar problemas de aislamiento y acondicionamiento acústico, elaborar informes y análisis utilizando para ello el instrumental típico de medición de variables acústicas.

C4: Planificar intervenciones de acondicionamiento y aislamiento de recintos para mejorar su acústica.

En la asignatura se trabajarán las tres competencias transversales, así como las de módulo y de titulación correspondientes

## THEORETICAL/PRACTICAL CONTENT

Los contenidos están agrupados en cuatro grandes bloques:

Bloque 1. Se estudian las características físicas del sonido y cómo se relacionan con su percepción por el oído humano.

-Tema 1. Introducción
Introducción histórica. Magnitudes básicas. Oscilaciones. Movimiento armónico simple. Ondas. Espectro acústico.
-Tema 2. Audición
Características de la audición humana. La escala en decibelios. Niveles acústicos. Bandas de octava y tercio de octava. Umbrales de audición. Ponderación.

Bloque 2. Se describen los aspectos fundamentales relacionados con la propagación del sonido al aire libre y en recintos cerrados.
-Tema 3. Propagación del sonido al aire libre
Cálculo del nivel sonoro debido a una fuente. Atenuación. Efecto del suelo. Eficacia de barreras acústicas.
-Tema 4. Acondicionamiento acústico
Definición. Propagación en recintos cerrados. Reflexión y absorción. Campo directo y campo reverberante. Tiempo de reverberación. Elementos y materiales absorbentes. Fórmula de Sabine. Otros parámetros que caracterizan el comportamiento acústico de una sala. Reflectores. Difusores. Fenómenos que inciden en la acústica de un recinto.

Bloque 3: Se estudian diversas cuestiones relacionadas con el ruido.

-Tema 5. Ruido
Definición. Ruido como contaminante. Pérdida de audición por exposición al ruido. Escalas para determinar la molestia producida por el ruido. Niveles equivalentes. Normativa (laboral y CTE)

Bloque 4: Se describe el concepto de aislamiento acústico y las formas de conseguirlo.

-Tema 6. Aislamiento acústico
Definición. Medidas de aislamiento. Métodos de aislamiento a ruido aéreo. Métodos de aislamiento a ruidos de impacto y vibraciones. Materiales aislantes

## METHODS

Para ir adquiriendo progresivamente los conocimientos requeridos, se realizarán las siguientes actividades:

TAREAS: El profesor o profesora os irá solicitando tareas periódicamente y a lo largo del curso, que pueden consistir en:
- Resolución de problemas numéricos, individuales y en grupo
- Realización de trabajos y proyectos, individuales y en grupo
Estas tareas se irán colgando en la plataforma eGela de la asignatura. Se podrá mandar repetir una tarea cuyo contenido no sea el adecuado. Estas tareas pueden se de repaso de lo expuesto en clase o ampliación de conceptos nuevos; para resolverlas, tendréis que basaros en libros o páginas de Internet especializadas en Acústica y deben tener la profundidad que se espera de un alumno próximo a ser graduado.

PRÁCTICAS DE LABORATORIO: son obligatorias y se van a realizar con el objetivo de conocer tanto el equipo experimental como las técnicas y normas de medición habituales en la caracterización acústica de un recinto. Podéis consultar la relación de prácticas (con sus fechas) y la descripción de su contenido en la plataforma digital eGela. Las prácticas se realizan individualmente o en grupo y los informes se evalúan.

PRUEBA ESCRITA individual en la fecha oficial

ASISTENCIA A CLASE: La asistencia mínima a clase deberá ser un 75% de las horas lectivas. En caso de no cumplir con este requisito quedaría fuera de la evaluación continua.

## TYPES OF TEACHING

| Type of teaching | M | S | GA | GL | GO | GCL | TA | TI | GCA |
|---|---|---|---|---|---|---|---|---|---|
| Classroom hours | 30 | | 15 | 15 | | | | | |
| Hours of study outside the classroom | 30 | | 30 | 30 | | | | | |

**Legend:** M: Lecture S: Seminario 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%
- Practical work (exercises, case studies & problems set) 30%
- Prácticas de laboratorio 30%

## ORDINARY EXAM CALL: GUIDELINES & DECLINING TO SIT

Existen dos opciones para ser evaluado/a: (1) seguir la evaluación continua o bien (2) decantarse por una prueba final. El o la estudiante que quiera renunciar a la evaluación continua y desee presentarse a la prueba final deberá comunicarlo por escrito al profesor o profesora dos semanas antes del fin de las clases. Deberá rellenar y entregar un formulario disponible en e-Gela.

(1)EVALUACION CONTINUA:

- TAREAS (30% de la nota final)
- PRÁCTICAS DE LABORATORIO (30% de la nota final, mínimo 5 sobre 10): la asistencia a las sesiones de prácticas así como la entrega de los informes es obligatoria.
- PRUEBA ESCRITA individual (40% de la nota final, mínimo 5 sobre 10)
ASISTENCIA A CLASE: La asistencia mínima a clase deberá ser un 75% de las horas lectivas. En caso de no cumplir con este requisito quedaría fuera de la evaluación continua.

(2) PRUEBA FINAL:

El examen prueba final se realizará en la misma fecha y hora la prueba escrita de la evaluación continua, pero ambos exámenes no serán los mismos. Consistirá en lo siguiente:

- 30% Prácticas de laboratorio (mínimo de 5 sobre 10)
- 70% Prueba escrita individual (mínimo de 5 sobre 10)

OBSERVACIONES:

(1) En caso de no asistir a la prueba final, el estudiante constará como 'No presentado'.

## EXTRAORDINARY EXAM CALL: GUIDELINES & DECLINING TO SIT

- 30% Prácticas de laboratorio (mínimo de 5 sobre 10)
- 70% Prueba escrita individual (mínimo de 5 sobre 10)

La evaluación se realiza mediante una prueba final que incluye una parte práctica que se realizará en el laboratorio (su peso sobre la nota final es del 30%). Todos los estudiantes que se presenten a la parte práctica la harán en grupo de forma análoga a la habitual a lo largo del curso.

Aquellos estudiantes que hayan seguido a lo largo del curso la evaluación continua y quieran conservar la calificación que habían obtenido en las distintas actividades (tareas y prácticas de laboratorio) para que en la convocatoria extraordinaria se apliquen los mismos porcentajes que en la ordinaria (60% evaluación continua, 40% control de toda la materia), tendrán que solicitarlo a su profesora por escrito al menos 10 días antes de la fecha oficial de la convocatoria.

## COMPULSORY MATERIALS

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## BIBLIOGRAPHY

### Basic bibliography

Architectural acoustics, M. D. Egan, McGraw-Hill (1998)
Architectural acoustics, M. Long, Elsevier (2006)

### In-depth bibliography

### Journals

### Useful websites

## REMARKS

**TEACHING GUIDE** 2018/19

**Centre** 263 - Faculty of Engineering - Gipuzkoa

**Cycle** Indiferente

**Plan** GCIVIL20 - Bachelor`s Degree in Civil Engineering

**Year** Fourth year

## SUBJECT

26587 - Acoustics

**ECTS Credits:** 6

## DESCRIPTION & CONTEXTUALISATION OF THE SUBJECT

Acoustics is one of the subjects in the 4th year of the Degree of Technical Architecture.

Noise is one of the most common pollutants in the today society. It is well known that being exposed to high or persistent noises can lead to severe health and comfort problems, which negatively affect our life quality. In 2013, a new appeared at the media telling "A pianist faces 7.5 years of prison for disturbing one neighbour";. The consciousness of the today society about building comfort and noise issues is rising more and more, which is also reflected on the increasing normative requisites to be fulfilled.

In Architectural Acoustics we try to provide you with the foundations that govern the phenomenon of noise, to analyse which are their effects as well as the methods to measure and evaluate them. Moreover, it develops a technical formation that will lead you to set-up and project spaces with an adequate sonority for their purpose, with acceptable noise levels that are isolated from noise sources. In this way we will create more comfortable and healthy spaces.

## COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

Fundamentos de la Acústica. Estudio del sonido y control de ruido.

## THEORETICAL/PRACTICAL CONTENT

Tema 1 Introducción
Introducción histórica. Magnitudes básicas. Oscilaciones. Movimiento armónico simple.  Ondas.
Tema 2 Conceptos básicos de acústica.
Ondas sonoras. Velocidad del sonido. Frecuencia y longitud de onda. Presión sonora y nivel de presión sonora. Potencia sonra y nivel de potencia sonora. Bandas de octava y tercio de octava. Combinación de niveles sonoros. Nivel sonoro ponderado. Reflexión, transmisión y difración de ondas sonoras.
Tema 3 Propagación del sonido al aire libre.
Atenuación. Cálculo del nivel sonoro debido a una fuente de ruido. Eficacia de barreras acústicas.
Tema 4 Propagación del sonido en espacios cerrados.
Reflexión y absorción de ondas sonoras. Reberberación y tiempo de reberveración
Tema 5 Características de la audición.
Umbrales de audición. Efectos del ruido sobre el confort y la salud. Pérdida auditiva por exposición a ruidos de carácter laboral.
Tema 6 Medida de niveles sonoros y criterios para la estimación de molestia del ruido.
Nivel sonoro continuo equivalente. Instrumentos de medida acústica. Escalas para determinar la molestia producida por el ruido: curvas NC y NR. Contaminación acústica urbana.
Tema 7 Tratamiento acústico de recintos. Materiales acústicos.
Aislamiento y acondicionamiento acústico. Materiales para el aislamiento y acondicionamiento acústico.
Tema 8 Magnitudes características del aislamiento acústico.
Ley de la masa. Aislamiento de paredes simples y de capas múltiples

## METHODS

El alumno podrá elegir entre seguir una evaluación continua o bien ser calificado mediante un examen final. En caso de optar por la evaluación continua, serán valorados:
- tareas, que se propondrán a lo largo del curso: 70% de la nota final. Estas tareas podrán consistir en ejercicios numéricos, trabajos de exposición de un tema concreto, guiones de prácticas realizadas en el laboratorio etc. Las tareas podrán recogerse en el momento o bien en la siguiente sesión. Las prácticas de laboratprio son obligatorias.
- controles que se realizarán a lo largo del curso, previo aviso: 30% de la nota final
- asistencia a clase. Hace falta asistir regularmente, puesto que 4 ó más faltas en la entrega de tareas supondrán quedar fuera de la evaluación continua. Es decir, es requisito necesario aunque no cuente para la nota final
Antes de fin de curso y del día de la convocatoria ordinaria de mayo, el alumno deberá decidir si desea puntuado por evaluación continua o bien por examen final en dicha convocatoria.
En caso de suspender la asignatura en la convocatoria de mayo, el alumno tendrá la posibilidad de aprobar en la convocatoria de julio. En este último caso, la nota final provendrá únicamente del examen (es decir, se pierde la nota de evaluación continua).

## TYPES OF TEACHING

| Type of teaching | M | S | GA | GL | GO | GCL | TA | TI | GCA |
|---|---|---|---|---|---|---|---|---|---|
| Classroom hours | 30 | | 15 | 15 | | | | | |
| Hours of study outside the classroom | 30 | | 30 | 30 | | | | | |

**Legend:** M: Lecture S: Seminario 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%
- Practical work (exercises, case studies & problems set) 30%

## ORDINARY EXAM CALL: GUIDELINES & DECLINING TO SIT

A lo largo del curso de irán proponiendo tareas, que pueden ser:
- Resolución de problemas numéricos, individuales y en grupo
- Redacción de informes sobre prácticas de laboratorio, individuales y en grupo
- Realización de pequeños trabajos individuales y en grupo
- Exposición de trabajos en grupo

## EXTRAORDINARY EXAM CALL: GUIDELINES & DECLINING TO SIT

La convocatoria extraordinaria consistrira en una prueba de la parte teórica de la asignatura. Si el alumno ha aprobado la parte de tareas y práticas de laboratorio se le conservará esta calificación y la la calificación de esta prueba contará un 50% de la nota final. Es necesario obtener una calificación igual o superior a 4 puntos para aprobar la signatura.
Si no se ha aprobado la parte de tareas y de laboratorio de prácticas deberá realizar una prueba equivalente que contará un 20 y un 30% de la calificación final respectivamente.

## COMPULSORY MATERIALS

## BIBLIOGRAPHY

### Basic bibliography

Architectural acoustics, M. D. Egan, McGraw-Hill (1998)
Architectural acoustics, M. Long, Elsevier (2006)
Acústica de los edificios, M. Meisser, Editores Técnicos Asociados (1973)

### In-depth bibliography

### Journals

### Useful websites

## REMARKS

# 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**

| TYPE OF TEACHING | M | S | GA | GL | GO |
|---|---|---|---|---|---|
| CLASSROOM HOURS | 45 | | 7 | 6 | 2 |
| HOURS OF STUDY OUTSIDE THE CLASSROOM | 60 | | 20 | 6 | 4 |

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:

Vector Mechanics for Engineers: statics, F. Beer, E. R. Johnston Jr., D. Mazurek McGraw-Hill, 2008

Mechanics of Materials, F. Beer, E. R. Johnston Jr., McGraw-Hill, 2009

Mechanics of Materials (Timoshenko), J. Gere, McGraw-Hill, 2006

Fundamentals of Materials Science and Engineering: An Integrated Approach, W. D. Callister D.G. Rethwisch, 3rd edition, Wiley 2007.

In-depth bibliography:

Mechanics of Materiales, R.C. Hibbeler, Pearson, 2006

Foundations of Materials Science and Engineering, W. J. Smith, J. Hashemi, McGraw-Hill, 2014

Introduction to the Mechanics of Solids, S.H. Crandall, N.C. Dahl, T.J. Lardner, McGraw-Hill, 1978

**TEACHING GUIDE** 2018/19

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

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

## SUBJECT

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

## DESCRIPTION & CONTEXTUALISATION OF THE SUBJECT

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

## COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

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

## THEORETICAL/PRACTICAL CONTENT

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

## 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

| Type of teaching | M | S | GA | GL | GO | GCL | TA | TI | GCA |
|---|---|---|---|---|---|---|---|---|---|
| Classroom hours | 30 | 3 | 15 | 10 | | | | | 2 |
| Hours of study outside the classroom | 45 | 4,5 | 22,5 | 15 | | | | | 3 |

**Legend:** M: Lecture S: Seminario 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%
- Practical work (exercises, case studies & problems set) 10%
- Team work (problem solving, project design) 50%

## ORDINARY EXAM CALL: GUIDELINES & DECLINING TO SIT

Written exam: during the course, there will be to theoretical-practical written examns, each of them about parts A and B of the temary. Passing each of these exams will mean that the corresponding part of the temary is passed. It will combine theoretical questions and practical exercises. It will be 40% of the final grade. In order to pass the subject, the students should attend both partial examns, or the final exam. In case the student does not attend the final exam, the grade published will be "Not Presented".
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 EXAM CALL: GUIDELINES & DECLINING TO SIT

In the extraordinary call, the student will be graded following the same criteria. Additionally, the grade obtained in the written exam, the laboratory practices or the group work can be saved from the ordinary call, if any of these has been passed.
In case the student wants to improve the grading of the laboratoru practices or the group work, the new reports should be sent to the teacher the day before the written exam.

## COMPULSORY MATERIALS

There is no mandatory 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

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### In-depth bibliography

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

### Journals

Renewable Energy
Renewable and Sustainable Energy Reviews

### Useful websites

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

## REMARKS

**TEACHING GUIDE** 2018/19

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

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

## SUBJECT

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.

## COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

The subject uses a practical focus in order to explain energy efficiency measures in industry and building sectors. Specifically, we will work these comptences:
* To develope the essential knowledge of energy efficiency, together with the technologies used to take advantage of it
* To coherently use the procedural knowledge associated with scientific methodology, in order to solve the problems associated to these technologies, aiming to select the optimal typologies and working parametres

## THEORETICAL/PRACTICAL CONTENT

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

## 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

| Type of teaching | M | S | GA | GL | GO | GCL | TA | TI | GCA |
|---|---|---|---|---|---|---|---|---|---|
| Classroom hours | 30 | 5 | 15 | | 10 | | | | |
| Hours of study outside the classroom | 40 | 10 | 30 | | 10 | | | | |

**Legend:** M: Lecture S: Seminario 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 theoritcal-practical exam lwill be done. The total percentage of this part in the fainal grade is 40%. The final exam needs to be passed in order to pass the subject.
Group work: Students will have to write two technical reports on energy efficiency in industry and in buildings. It will be

60% of the final grade. This is mandatory.

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

## EXTRAORDINARY 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

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

### Journals

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

### Useful websites

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

## REMARKS

# 27850 – CALCULUS/ CÁLCULO

**TEACHING GUIDE: 2018/19**

**Centre:** 264 - Engineering College of Gipuzkoa. Eibar section **Cycle:** Indifferent

**Plan:** GRENOV20 4-year degree in Renewable Energies Engineering**:** 1st year

**Subject:** 27850 – Calculus

## DESCRIPTION AND CONTEXT OF THE SUBJECT

CALCULUS is a subject of the first term of the first year and has 6 ECTS credits. Presence-based classes are divided into 3 types: lectures (30 hours), practical work (23 hours) and seminars (7 hours). In addition to these classes, students will have another 45 hours of lectures, 34.5 hours of practical work and 10.5 hours of seminars.

## COMPETENCES / LEARNING OUTCOMES OF THE SUBJECT

- Analyse and correctly express ideas, using mathematical terminology.
- Operate with complex numbers in their different forms.
- Carry out a full study of real variable function.
- Calculate the integral of a function and apply it to technological subjects.
- Learn about the concept of a partial derivative and calculate the derivative at a point in certain direction.
- Learn about the concept of double and triple integrals and apply it to different areas.

## THEORETICAL-PRACTICAL CONTENT

Theme 1. The complex number.

Operations with complex numbers.

Theme 2. Real functions - real variable.

Limit and continuity. Derivability. Applications.

Theme 3. Functions of various variables.

Limit and continuity. Partial differential equations. Differentials.

Theme 4. Integral calculus of functions of a variable.

Indefinite integral. Calculus of primitives. Definite integral. Applications.

Theme 5. Multiple integrals.

Double and triple integrals. Applications.

## METHODOLOGY

Grading:

- Seminars: 20%
- Final exam: 75%
- Writing skills: 5%

## ASSESSMENT SYSTEMS

- Continuous assessment
- Final assessment

## GRADING TOOLS AND PERCENTAGES

- Written exam 75%
- Practical work (exercises, cases or problems) 20%
- Writing skills 5%

## ORDINARY CALL: GUIDANCE and WITHDRAWAL

Article 8.

In any event, the student will be entitled to be assessed through the system of final assessment, regardless of whether he/she has participated (or not) in the continuous or combined assessment system. To do this, the student should present his/her withdrawal from continuous or combined assessment in writing to the professor responsible for the subject, within 9 weeks, of the start of the term, as per the centre's academic calendar. In this case, the student will be assessed in a single final exam that will include a theoretical part and a practical part, and which will account for 100% of the grade.

WITHDRAWAL

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 CALL: GUIDANCE and WITHDRAWAL

Article 9

Assessment of subjects in extraordinary calls will only be done through the system of final assessment.

The final assessment exam under the extraordinary call will consist of as many exams and activities as are considered necessary to evaluate and measure the defined learning outcomes, in the same was as if they were evaluated in the ordinary call. The positive results obtained by the students during the year may be retained.

## COMPULSORY MATERIALS

Exercise book.

# 25989: BUSINESS ORGANISATION, MANAGEMENT AND ADMINISTRATION

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 business world.

Theme 0: Introduction to business. General concepts

Theme 1 Company Fundamentals

Learn about different types of companies and the notion of 'company'

Theme 2 Marketing

Strategic marketing Operational marketing. Exercises: allocation of prices based on cost

Theme 3 Finance I

Sources of financing. Balance sheet, operating account. Financial equilibrium. Investments. Profitability

Theme 4: Teamwork

Phases for obtaining results. Necessary functions. Leadership

Theme 5: Strategy and Production

Evolution of a strategy. External analysis: Porter's 5 forces Internal analysis: Value chain General strategies Specific strategies

Oral presentations.

Reading about cases, discussion and sharing.

Problem-solving.

During the practical work the student will produce three projects in a team

Project 1: To be handed in during week 21 of classes. The team will make an oral presentation of an economic subject it considers to be of interest. A report will not be written, the presentation will be done in PowerPoint or a similar program.

Project 2:  To be handed in during week 26 of classes. The team will create a company and develop the points required for the task. Points seen in class in themes 0-1-2. A report will not be written, the presentation will be done in PowerPoint or a similar program.

Project 3. To be handed in during week 30 of classes. The students will apply what they have learned in theme 5 to the company created in project 2. Instead of studying the theme and having it tested in the exam, the idea is that the students should do it in an applied way in the company created, and apply self-directed learning.

Minimum attendance required 80% (practical sessions).

**TEACHING GUIDE** 2018/19

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

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

## SUBJECT

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

## DESCRIPTION & CONTEXTUALISATION OF THE SUBJECT

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

## COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

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

## THEORETICAL/PRACTICAL CONTENT

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

## METHODS

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

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

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

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

## TYPES OF TEACHING

| Type of teaching | M | S | GA | GL | GO | GCL | TA | TI | GCA |
|---|---|---|---|---|---|---|---|---|---|
| Classroom hours | 30 | 5 | 15 | | 10 | | | | |
| Hours of study outside the classroom | 45 | 7,5 | 22,5 | | 15 | | | | |

**Legend:** M: Lecture S: Seminario 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

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

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

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

## EXTRAORDINARY 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

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

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

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

### In-depth bibliography

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

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

### Journals

### 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. Eibar 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 Socrative 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.

# 27849 - Mathematical and Numerical Analysis/ Análisis Matemático y Numérico

**TEACHING GUIDE: 2018/19**

**Centre:** 264 - Engineering College of Gipuzkoa. Eibar section **Cycle:** Indifferent

**Plan:** GRENOV20 - 4-year degree in Renewable Energies Engineering **:** 1st year

**Subject:** 27849 - Mathematical and Numerical Analysis

## DESCRIPTION AND CONTEXT OF THE SUBJECT

The subject of MATHEMATICAL AND NUMERICAL ANALYSIS is taken in the second term of the first year and has 6 ECTS credits. Presence-based classes are divided into 3 types: lectures (30 hours), practical work (15 hours) and practical work with computers (15 hours). In addition to these classes, students will have another 45 hours of lectures, 22.5 hours of practical work and 22.5 hours of practical work with computers.

## COMPETENCES / LEARNING OUTCOMES OF THE SUBJECT

- Analyse and correctly express ideas, using mathematical terminology.
- Identify the different types of differential equations and solve them.
- Apply the Laplace transform to the solving of differential equations.
- Obtain the Fourier series of a periodic function.
- Apply numerical methods to solving mathematical problems that are very complex.
- Handle algorithms, on paper and on the computer.

## THEORETICAL-PRACTICAL CONTENT

Theme 1 Differential equations and in partial differential equations
- First-order differential equations. N-order differential linear equations
. Equations in partial differential equations.
Theme 2 Laplace transform
-Concept. Properties. Application to the solving of differential equations.
Theme 3 Fourier series.
-Trigonometric series. Fourier series. Properties. Applications.
Theme 4 Numerical solving of non-linear equations.
Theme 5 Numerical integration.
-Definition. Properties. Applications

## METHODOLOGY

GRADING:
- Written exam: 75%
- Practical work: 20%
- Writing skills: 5%

## ASSESSMENT SYSTEMS

- Continuous assessment
- Final assessment

## GRADING TOOLS AND PERCENTAGES

- Written exam 75%
- Practical work (exercises, cases or problems) 20%
- Writing skills 5%

## ORDINARY CALL: GUIDANCE and WITHDRAWAL

Article 8.

In any event, the student will be entitled to be assessed through the system of final assessment, regardless of whether he/she has participated (or not) in the continuous or combined assessment system. To do this, the student should present his/her withdrawal from continuous or combined assessment in writing to the professor responsible for the subject, within 9 weeks, of the start of the term, as per the centre's academics calendar. In this case, the student will be assessed in a single final exam that will include a theoretical part and a practical part, and which will account for 100% of the grade.

WITHDRAWAL

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 a pear as "Not Presented"".

## EXTRAORDINARY CALL: GUIDANCE and WITHDRAWAL

Article 9

Assessment of subjects in extraordinary calls will only be done through the system of final assessment.

The final assessment exam under the extraordinary call will consist of as many exams and activities as are considered necessary to evaluate and measure the defined learning outcomes, in the same was as if they were evaluated in the ordinary call. The positive results obtained by the students during the year may be retained.

## COMPULSORY MATERIALS

Exercise book.