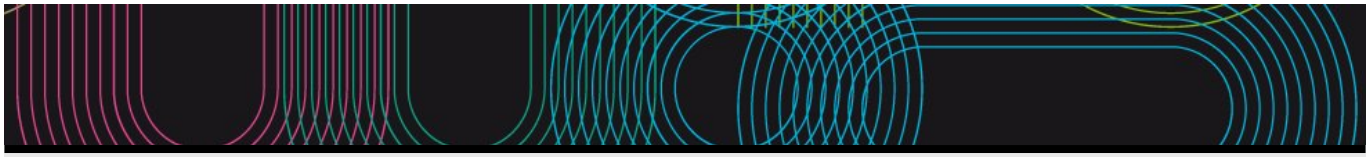

| IDENTIFYING DATA | | | | |
|---|---|---|---|---|
| **(*)Fundamentos de enxeñaría acústica** | | | | |
| Subject | (*)Fundamentos de enxeñaría acústica | | | |
| Code | V05G300V01531 | | | |
| Study programme | (*)Grao en Enxeñaría de Tecnoloxías de Telecomunicación | | | |
| Descriptors | ECTS Credits | Choose | Year | Quadmester |
| | 6 | Mandatory | 3rd | 1st |
| Teaching language | Spanish | | | |
| Department | | | | |
| Coordinator | Torres Guijarro, María Soledad | | | |
| Lecturers | Pena Giménez, Antonio<br>Torres Guijarro, María Soledad | | | |
| E-mail | marisol@gts.uvigo.es | | | |
| Web | http://faitic.uvigo.es | | | |
| General description | Concepts covered by the subject: vibratory systems related to the acoustic wave equation, radiation and propagation, mechanisms of acoustic-mechanical-electrical transduction, behaviour and design of speakers and microphones. | | | |

| Competencies | |
|---|---|
| Code | |
| A3 | CG3: The knowledge of basic subjects and technologies that capacitates the student to learn new methods and technologies, as well as to give him great versatility to confront and update to new situations |
| A43 | CE34/SI1The ability to construct, exploit and manage telecommunication services and applications, such as receiving, digital and analogical treatment, codification, transporting and representation, processing, storage, reproduction, management and presentation of audiovisual and multimedia information services. |
| A46 | CE37/SI4 The ability to carry out acoustic engineering projects related to: acoustical isolation and conditioning of rooms, loudspeaker installations, specification, analysis and selection of electro acoustical transducers, measurement, analysis and control of radio vibration systems, environmental acoustics, submarine and acoustical systems. |
| B2 | To approach a new problem considering first the essential and then the secondary aspects |

| Learning aims | | |
|---|---|---|
| Expected results from this subject | Training and Learning Results | |
| Results of learning:<br>□ Evaluate the different types of microphones from the point of view of their technical specifications and their possible applications.<br>□ Describe the acoustic wave radiation phenomenon.<br>□ Understand the basic mechanisms of mechanical-acoustic transduction.<br>□ Analyze electro-mechanical systems using acoustic analogies based on circuit theory.<br>□ Design acoustic systems using speakers, cabinets and horns. | A3<br>A43 | B2 |
| Results of learning:<br>□ Understand the basic mechanisms of vibration of different elements and understand their relationship with sound production.<br>□ Learn the basics of linear acoustics and relate the concepts of pressure, particle velocity, current, power and impedance.<br>□ Explain the sound propagation phenomena and analyze the influence of the medium | A3<br>A46 | B2 |

| Contents |
|---|
| Topic |

| | |
|---|---|
| 1. Sound power measurement tests. | Acoustic variables. Sound field. Propagation. Uses of intensity and power. Sound intensity probes. Power measurement standards using acoustic pressure or intensity. |
| 2. Models of radiation sources. | Directivity. Acoustic impedance. Monopole. Dipole. Monopole on infinite baffle. Baffled circular piston. Directivity measurement standards. |
| 3. Vibrating systems. | Damped and forced oscillatory motion. Vibration of strings, bars, membranes and plates. The sound in tubes. Sound sources. Acoustic filters. |
| 4. Specifications and measurement of electroacoustic systems. | Introduction to loudspeakers: baffles and crossovers. Acoustic measurement tests: measurement of speakers. Measurement of noise and nonlinear distortion. |
| 5.Analogies and transduction. | Electro-mechano-acoustic systems. Equivalent circuits. Transduction |
| 6. Speakers, horns and cabinets. | Equivalent model of an infinite baffle loudspeaker. Equivalent model of a cabinet with speaker. Horns. |
| 7. Cabinet design. | |
| 8. Microphones. | A microphone equivalent model. Tank circuits. |

**Planning**

| | Class hours | Hours outside the classroom | Total hours |
|---|---|---|---|
| Troubleshooting and / or exercises | 3 | 6 | 9 |
| Practice in computer rooms | 11 | 19 | 30 |
| Projects | 7 | 45 | 52 |
| Master Session | 19 | 38 | 57 |
| Short answer tests | 2 | 0 | 2 |

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

**Methodologies**

| | Description |
|---|---|
| Troubleshooting and / or exercises | Given a certain situation, students should obtain the reasoned suitable solution, properly choosing the applicable formulas and arriving to a valid solution. |
| Practice in computer rooms | Handle and adjustment of tools of analysis and algorithms, identifying which is appropriate for a given situation. |
| Projects | Collaborative work in reduced groups. A complex design with a regular monitoring agenda. Role assignments, working in common, planning and oral presentation. |
| Master Session | Oral speech, promoting the critical discussion of the concepts. Theoretical bases of algorithms and procedures used to solve problems are presented. |

**Personalized attention**

| Methodologies | Description |
|---|---|
| Master Session | Tutoring to solve issues related to master sessions or lab practice is implemented: -> Individually or -> in reduced groups (no more than 2-3 students). E-mail confirmation to match the date of the appointment is needed. ---------- During group projects an individualized tracking of the student is developed. Cross-assessment within the group and self-assessment may be used. |
| Troubleshooting and / or exercises | Tutoring to solve issues related to master sessions or lab practice is implemented: -> Individually or -> in reduced groups (no more than 2-3 students). E-mail confirmation to match the date of the appointment is needed. ---------- During group projects an individualized tracking of the student is developed. Cross-assessment within the group and self-assessment may be used. |
| Practice in computer rooms | Tutoring to solve issues related to master sessions or lab practice is implemented: -> Individually or -> in reduced groups (no more than 2-3 students). E-mail confirmation to match the date of the appointment is needed. ---------- During group projects an individualized tracking of the student is developed. Cross-assessment within the group and self-assessment may be used. |
| Projects | Tutoring to solve issues related to master sessions or lab practice is implemented: -> Individually or -> in reduced groups (no more than 2-3 students). E-mail confirmation to match the date of the appointment is needed. ---------- During group projects an individualized tracking of the student is developed. Cross-assessment within the group and self-assessment may be used. |

**Assessment**

| | Description | Qualification |
|---|---|---|
| Practice in computer rooms | Assessment of the reports describing the results obtained in the computer classroom. | 15 |
| Projects | Assessment of the work realised in group along the semester, including the preparation of reports. | 35 |

| | | |
|---|---|---|
| Short answer tests | Written exam, with brief questions and problems | 50 |

**Other comments on the Evaluation**

Following the guidelines of the studies, two evaluation systems will be offered to the students inscribed on this subject:

continuous evaluation (the preferred method, academic activities are linked to this system) and evaluation at the end of the

semester (not recommended).

*** Students who choose continuous evaluation:**

Students follow the continuous evaluation system if they assign a document that will be delivered and collected during weeks 1-3, so the collaborative work can begin. Three tasks are evaluated. The approximate task calendar and the weight of each task in the final grade are listed below.

* Reports / memories of practice (Weight: 15%) collected approximately in week 14-15.
* Written exam (weight: 50%): At the end of the semester, the same day when the final exam is planned.

* Collaborative work in a group C (weight: 35%): during the semester each group develop several reports related to the laboratory tests. These reports must be delivered approximately once per week.

The final grade for students who opt for continuous evaluation will be the sum of the three tasks mentioned above. Five of ten points are needed to pass.

*** Students who choose for evaluation at the end of the semester:**

The possibility of a final examination will be provided to students who do not opt for the continuous evaluation. This final exam will be rated between 0 and 10, and this will be the final grade obtained. It will cover all the activities of the subject. Five of ten points are needed to pass.

***RETAKE***

Two different situations:

**=> Students that are evaluated using continuous evaluation:**

Two options to choose (just before the exam begins):

* repeat the written exam included in the continuous evaluation planning. The final grade will be the sum of this written

exam and the collaborative work scores. Five of ten points are needed to pass.

* be evaluated with the same final exam of students who choose for evaluation at the end of the semester. Five of ten points

are needed to pass. No other activities are considered.

**=> Students who choose for evaluation at the end of the semester:**

A final examination will be provided to students who do not opt for the continuous evaluation. This final exam will be rated

between 0 and 10, and this will be the final grade obtained. It covers all the activities of the subject. Five of ten points are needed to pass.

**Sources of information**

Lawrence E. Kinsler, **Fundamentals of acoustics**,
Basilio Pueo Ortega, Miguel Romá Romero, **Electroacústica : altavoces y micrófonos**,
W. Marshall Leach, Jr., **Introduction to electroacoustics and audio amplifier design**,
Finn Jacobsen et al., **FUNDAMENTALS OF ACOUSTICS AND NOISE CONTROL**,

**Recommendations**

**Subjects that continue the syllabus**

(*)Acústica arquitectónica/V05G300V01635
(*)Tecnoloxía audiovisual/V05G300V01631

**Subjects that are recommended to be taken simultaneously**

(*)Sistemas de audio/V05G300V01532

**Subjects that it is recommended to have taken before**

(*)Física: Análise de circuítos lineais/V05G300V01201
(*)Física: Campos e ondas/V05G300V01202
(*)Física: Fundamentos de mecánica e termodinámica/V05G300V01102
(*)Fundamentos de son e imaxe/V05G300V01405