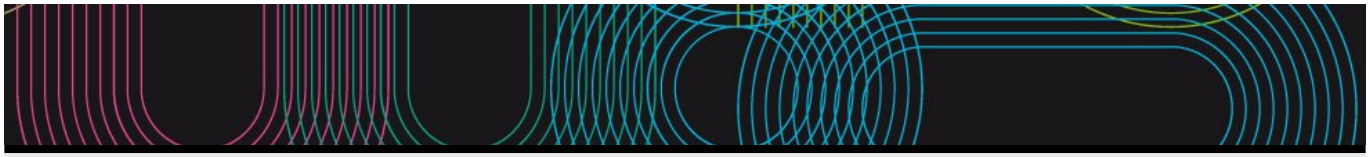

IDENTIFYING DATA				
Noise Measurement Techniques and Regulations				
Subject	Noise Measurement Techniques and Regulations			
Code	V05G300V01934			
Study programme	(*)Grao en Enxeñaría de Tecnoloxías de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language	English			
Department				
Coordinator	Torres Guijarro, María Soledad			
Lecturers	Torres Guijarro, María Soledad			
E-mail	marisol@gts.uvigo.es			
Web	http://faitic.uvigo.es			
General description	In this subject, the main methods of measurement of environmental noise are discussed. The European an national regulations on noise and acoustic insulation are also presented. As part of the measurement process, a guide for the evaluation of the measurement uncertainty in acoustics is also presented. The teaching will be in English.			

Competencies	
Code	
A2	CG2: The knowledge, comprehension and ability to apply the needed legislation during the development of the Technical Telecommunication Engineer profession and aptitude to manage compulsory specifications, procedures and laws.
A5	CG5: The knowledge to perform measurements, calculations, assessments, appraisals, technical evaluations, studies, reports, task scheduling and similar work to each specific telecommunication area.
A7	CG7: The ability to analyze and assess the social and environmental impact of technical solutions.
A8	CG8: To know and apply basic elements of economics and human resources management, project organization and planning, as well as the legislation, regulation and standarization in Telecommunications.
A87	(CE78/OP21) The ability to write essays on environmental, construction and automation acoustics.
A88	(CE79/OP22) The ability to elaborate specific acoustic essay procedures.

Learning aims	
Expected results from this subject	Training and Learning Results
CG2: The knowledge, comprehension and ability to apply the needed legislation during the development of the Technical Telecommunication Engineer profession and aptitude to manage compulsory specifications, procedures and laws, related with acoustic engineering. The specific learning aim are: □ Knowledge of the regulations on the field of acoustic engineering.. □ Knowledge of the usual international standards on acoustic measurements. CG5: The knowledge to perform measurements, calculations, assessments, appraisals, technical evaluations, studies, reports, task scheduling in the field of acoustic engineering (noise and acoustic insulation). CG7: The ability to analyse and assess the social and environmental impact of technical solutions. Specific Learning aims: Ability to write technical and reports, measurement reports on fields related to acoustic engineering. CG8.4 Knowledge on the regulations in telecommunications, mainly those related to acoustic engineering.	A2 A5 A7 A8

CE 78: The ability to write essays on environmental, construction and automation acoustics.	A87
CE79: The ability to elaborate specific acoustic essay procedures.	A88

Learning results:
Ability to design measurement procedures matching the regulations and standard specifications.

Contents

Topic	
Introduction: noise, its description and annoyance.	Classification of noise and descriptors. The assessment of noise. General overview of measurements in acoustics. Nose levels, vehicle noise: pass by measurements, sound power determination.
Description and measurement of environmental noise	Characterization of the noise sources. Influence of the propagation conditions. Noise measurements.
Environmental noise regulations in Europe.	The EU Environmental Noise Directive. Directive 2002/49/EC of the European Parliament and of the Council of 25th June 2002 relating to the assessment and management of environmental noise. National noise regulations.
Acoustic Insulation, description and regulations in Europe.	Acoustic insulation, descriptors. National Code Buildings in Europe, and the regulations on acoustic insulation.
Measurement uncertainty.	The need to assess the measurement uncertainty: quality management in laboratories. The guide for expression of uncertainty in measurement- GUM. Measurement Uncertainty in Acoustics.

Planning

	Class hours	Hours outside the classroom	Total hours
Tutored works	6	24	30
Laboratory practises	12	9	21
Previous studies / activities	0	15	15
Master Session	19	38	57
Short answer tests	2	8	10
Reports / memories of practice	2	10	12
Jobs and projects	1	4	5

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

Methodologies

	Description
Tutored works	The student has to develope in group and write a report on two projects: 1. Procedure to describe and assess environmental noise un a real scenario. 2. An student may choose between: a)Project of acoustic insulation according to the simplified method described in the CTE-DB HR (Spanish Building Code, document for protection against noise). b) Detailed uncertainty budget for some of the measurements carried out. This methodology is targeted to competencies A2, A5, A7, A8, A87 and A88.
Laboratory practises	Laboratory practises on: 1. Characterisation and assessment of noise annoyance. 2. Noise measurements in closed spaces. 3. Measurement of pass-by noise. 4. Measurement of acoustic insulation in buildings. This methodology is targeted to competencies A2, A5, A7, A8, A87 and A88.
Previous studies / activities	The students must study and prepare with the sources of information given before the lectures and the practical sessions. This methodology is targeted to competencies A2 and A5, A7, A8, A87.
Master Session	Lectures will be given, developing the main concepts of the subject. This methodology is targeted to competencies A2, A5, A7, A8, A87 and A88.

Personalized attention

Methodologies	Description
Master Session	The doubts, questions and discussions on topics related to the subject can be carried out in tutoring sessions which can be attended either individually or in small groups (maximum 3 students) Previous appointment with the professor is needed. The appointment will be requested and agreed by email, preferably in the hours and places previously scheduled and officially published.

Tutored works	The doubts, questions and discussions on topics related to the subject can be carried out in tutoring sessions which can be attended either individually or in small groups (maximum 3 students) Previous appointment with the professor is needed. The appointment will be requested and agreed by email, preferably in the hours and places previously scheduled and officially published.
Laboratory practises	The doubts, questions and discussions on topics related to the subject can be carried out in tutoring sessions which can be attended either individually or in small groups (maximum 3 students) Previous appointment with the professor is needed. The appointment will be requested and agreed by email, preferably in the hours and places previously scheduled and officially published.

Tests	**Description**
Short answer tests	The doubts, questions and discussions on topics related to the subject can be carried out in tutoring sessions which can be attended either individually or in small groups (maximum 3 students) Previous appointment with the professor is needed. The appointment will be requested and agreed by email, preferably in the hours and places previously scheduled and officially published.
Reports / memories of practice	The doubts, questions and discussions on topics related to the subject can be carried out in tutoring sessions which can be attended either individually or in small groups (maximum 3 students) Previous appointment with the professor is needed. The appointment will be requested and agreed by email, preferably in the hours and places previously scheduled and officially published.
Jobs and projects	The doubts, questions and discussions on topics related to the subject can be carried out in tutoring sessions which can be attended either individually or in small groups (maximum 3 students) Previous appointment with the professor is needed. The appointment will be requested and agreed by email, preferably in the hours and places previously scheduled and officially published.

Assessment

	Description	Qualification
Tutored works	Tutored practical project, with the delivery of a final report. (Learning Aims:A2, A5, A7, A8, A87, A88)	30
Short answer tests	Written test, with short questions on the theory of the subject. (Learning Aims; A2, A5, A7, A87, A88)	40
Reports / memories of practice	Questions and report of the practical tasks. (Learning Aims; A2, A5, A7, A87, A88)	30

Other comments on the Evaluation

Following the guidelines of the degree, two systems of evaluation are offered: continuous assessment (recommended) and a final examination. Evaluation with only a final examination will be only allowed in situations in which it is imposible to follow the recommended system.

LANGUAGE: The student can choose the language to use during the assessment process between english and spanish.

CONTINUOUS ASSESSMENT:

The continuous assessment will be based in the evaluation of practical task, projects and two tests. Once a student has signed a document of agreement with the process of continuous assessment, the final degree will be obtained by the application of the criteria described bellow.

The subject is assessed in a 0 to 10 points scale and it is considered "passed" if each activity is graded equal or greater than 4, and the final grade obtained is equal or greater than 5. The final grade with be obtained from the weighted sum of the grade obtained in the following tasks with the given weights.

1. Tutored works: 30 % of the final grade. Two reports will be delivered: the first during the 6th week and the second during the 11th week
2. Reports of practical tasks(Weight: 40 %).
3. Short answer tests : Two short answer tests are included in the process of continuous assesment, (test 1 is scheduled on the 5th week and test 2 on the 11th week) (Total weight :20% each, with a total weight of 40% on the final grade).

FINAL EXAMINATION:

A final examination is available for those students that for some reason could not follow the continuous evaluation assessment process. In this case there is date scheduled and officially published for final examination. The final examination will consist in two short answer tests, and some additional questions related with the practical tasks and projects.

The subject is assessed in a 0 to 10 points scale and it is considered "passed" if the final grade obtained is equal or greater than 5.

RETAKE IN JULY:

There is scheduled date in july for a final examination retake, for those students that either dropped out during the semester or failed. Prior the examination, a student can choose to follow the continuous assessment or the final examination. In the former selection, the grades obtained in the projects and practical tasks will be taken into account and the student will only answer to the short answer tests. If the later, (final examination), the student will have also to answer a full examination as described before.

Sources of information

DIRECTIVE 2002/49/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 June 2002 relating to the assessment and management of environmental noise,

ISO Standard, **ISO 1996-1. Acoustics -- Description, measurement and assessment of environmental noise -- Part 1: Basic quantities and assessment procedures**,

ISO Standard, **ISO 1996-2. Acoustics -- Description, measurement and assessment of environmental noise -- Part 2: Determination of environmental noise levels**,

Birgit Rasmussen, J. H. Rindel, **Sound insulation between dwellings Descriptors applied in building regulations in Europe**,

Birgit Rasmussen, **Sound insulation between dwellings Requirements in building regulations in Europe**,

ISO Standard., **ISO 140-4:1998 Acoustics -- Measurement of sound insulation in buildings and of building elements -- Part 4: Field measurements of airborne sound insulation between rooms.**,

Hyperlinks:

- *Evaluation of measurement data Guide to the expression of uncertainty in measurement.*
- *Evaluation of measurement data An introduction to the "Guide to the expression of uncertainty in measurement" and related documents*
- *Evaluation of measurement data Supplement 1 to the "Guide to the expression of uncertainty in measurement" Propagation of distributions using a Monte Carlo method*

Recommendations

Subjects that it is recommended to have taken before

Mathematics: Probability and Statistics/V05G300V01204
Fundamentals of Sound and Image/V05G300V01405
Room Acoustics/V05G300V01635
Fundamentals of Acoustics Engineering/V05G300V01531