

**1. General information****Course:** NOISE AND VIBRATIONS**Type:** CORE COURSE**Degree:** 385 - DEGREE IN TELECOMMUNICATIONS TECHNOLOGY ENGINEERING**Center:** 308 - SCHOOL POLYTECHNIC OF CUENCA**Year:** 3**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 59624**ECTS credits:** 6**Academic year:** 2023-24**Group(s):** 30**Duration:** C2**Second language:****English Friendly:** Y**Bilingual:** N**Lecturer:** ISABEL GONZALEZ RODRIGUEZ - Group(s): 30

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**2. Pre-Requisites**

Having studied "Fundamentals of Physics I" and "Acoustic Engineering".

In particular, the student must have knowledge of electrical and acoustic magnitudes, sound field and acoustic waves propagation, intensity and sound power, physiological acoustics, laboratory instrumentation and basic analysis of acoustic signals.

**3. Justification in the curriculum, relation to other subjects and to the profession**

Techniques of evaluation and measurement of acoustic signals are developed, and in particular those related to the fields of environmental and occupational acoustics.

Knowledge applicable to studies of acoustic-environmental impact, occupational exposure to noise and vibrations, evaluation of noise and vibrations in the building or techniques of noise control and / or vibration control will be acquired.

**4. Degree competences achieved in this course****Course competences**

Code	Description
E24	The ability to conduct acoustic engineering projects on: isolation and acoustic conditioning of premises; public address system; specification, analysis and selection of electroacoustic transducers; measurement, analysis and control of noise and vibrations systems; environmental acoustics; underwater acoustics systems.
G02	Correct, oral and written, communication skills.
G03	Ethical commitment and professional ethics.
G05	Knowledge, understanding and ability to apply the necessary legislation during the development of the profession of Technical Telecommunications Engineer and being able to easily deal with specifications, regulations and mandatory regulations
G06	Knowledge of basic subjects and technologies, enabling students to learn new methods and technologies, as well as providing great versatility to adapt to new situations
G07	The ability to tackle problems with initiative, making decisions, creativity, and to communicate and transmit knowledge, skills and abilities, including the ethical and professional responsibility of the activity of a Technical Telecommunications Engineer
G08	Knowledge to perform measurements, calculations, assessments, appraisals, surveys, studies, reports, task planning and other similar work in their specific telecommunications field
G09	Being able to easily handle specifications, regulations and mandatory regulations
G10	The ability to analyse and assess the social and environmental impact of technical solutions
G11	Knowing and applying basic elements of economics and human resources management, organisation and planning of projects, as well as legislation, regulation and standardisation in telecommunications
G12	The ability to work in a multidisciplinary group and in a multilingual environment and to communicate, both in writing and orally, knowledge, procedures, results and ideas related to telecommunications and electronics
G13	The ability to look for and understand information, whether technical or commercial in different sources, to relate and structure it to integrate ideas and knowledge. Analysis, synthesis and implementation of ideas and knowledge.

**5. Objectives or Learning Outcomes****Course learning outcomes**

Description

Analysis, synthesis and compression of technical documentation and mastery of specific vocabulary.

Knowledge of acoustic measurement techniques and selection criteria.

Knowledge and selection of the main noise control techniques.

Knowledge of the basic principles of noise source simulation models.

Knowledge of the propagation principles of noise and vibrations.

Knowledge of the physical principles of evaluation of acoustic signals of noise and vibrations and the parameters that characterize them.

Use of mandatory specifications, regulations and standards.

Mastery in the management and configuration of instruments, equipment and systems for acoustic signal measurements.

Interpretation of the general characteristics of acoustic transducers to know their right use and to choose the most suitable for each application.

Modeling of the main environmental noise sources.

Carrying out projects of: noise and vibration control, occupational exposure to noise and vibrations, acoustic characterization of sources and environmental acoustics.

Carrying out practical measurement of acoustic, noise and vibration parameters, insulation and conditioning.

## 6. Units / Contents

### Unit 1: Fundamentals of noise and vibrationsF

**Unit 1.1** Definitions and parameters. Intensity and power

**Unit 1.2** Fundamentals of noise control

**Unit 1.3** Human response to sound and vibration

**Unit 1.4** LAB 1 - Parameters and indicators

### Unit 2: Instrumentation and measurements techniques

**Unit 2.1** Transducers, sonometer and vibrometer

**Unit 2.2** Measuring techniques. Noise

**Unit 2.3** Measuring techniques. Vibration

**Unit 2.4** LAB 2 - Noise and vibration measurements

### Unit 3: Noise and vibration sources

**Unit 3.1** Noise sources classification

**Unit 3.2** Outdoor propagation

**Unit 3.3** Sound power measurements techniques

**Unit 3.4** LAB 3 - determination of sound power

### Unit 4: Environmental noise

**Unit 4.1** Community and environmental noise

**Unit 4.2** Noise prediction models

**Unit 4.3** Noise mapping

**Unit 4.4** LAB 4 - Environmental noise

### Unit 5: Occupational noise

**Unit 5.1** Noise and vibration exposure

**Unit 5.2** Evaluation, prevention and control

**Unit 5.3** LAB 5 - noise and vibration exposure

**Unit 5.4**

### Unit 6: Final project

**Unit 6.1** Planning and measurements

**Unit 6.2** Report and presentation

**Unit 6.3** LAB 6 - Final project

## 7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	E24 G02 G03 G05 G06 G10 G11	0.97	24.25	N	-	
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	E24 G05 G07 G08 G09 G10 G11 G12	0.48	12	N	-	
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	E24 G02 G03 G05 G07 G08 G09 G10 G11 G12	0.8	20	Y	Y	To carry out continuous evaluation it is necessary to attend the laboratory practice sessions, where the correct development of the practices and the presentation of results will be evaluated. Recoverable activity in extraordinary call by means of a theoretical-practical laboratory exam.
Practicum and practical activities report writing or preparation [OFF-SITE]	Group Work	E24 G02 G03 G05 G08 G09 G10 G11 G12	0.8	20	Y	Y	Each of the practical reports is a compulsory activity, having to obtain a minimum mark of 4.0 in each one of them. Suspended memories may be recovered with a new delivery in the extraordinary call. The reports will basically consist of reports and measurement files; the content and format of each report will be detailed in moodle
Writing of reports or projects [OFF-SITE]	Combination of methods	E24 G02 G03 G05 G09 G10 G11 G12	1.2	30	Y	N	Final project of the subject. Planning, taking measurements, report and presentation in class. Recoverable with new delivery in extraordinary call.

Study and Exam Preparation [OFF-SITE]		E24 G02 G03 G06 G07 G08 G09 G10 G11 G12	1.6	40	N	-	
Individual tutoring sessions [ON-SITE]	Combination of methods	E24 G02 G03 G07 G09 G10 G11 G12	0.04	1	N	-	
Mid-term test [ON-SITE]	Assessment tests	E24 G03 G05 G06 G07 G08 G09 G10 G11 G12	0.11	2.75	Y	Y	Two evaluation tests will be carried out throughout the semester, the last one coinciding with the date of the ordinary call. Recoverable in extraordinary call with a new test.
<b>Total:</b>			<b>6</b>	<b>150</b>			
<b>Total credits of in-class work: 2.4</b>				<b>Total class time hours: 60</b>			
<b>Total credits of out of class work: 3.6</b>				<b>Total hours of out of class work: 90</b>			

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System			
Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Fieldwork assessment	20.00%	20.00%	Final project
Laboratory sessions	40.00%	20.00%	Laboratory practices and its reports
Test	40.00%	40.00%	Evaluation test
Other methods of assessment	0.00%	20.00%	Theoretical-practical laboratory exam (only for non-continuous evaluation students)
<b>Total:</b>	<b>100.00%</b>	<b>100.00%</b>	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

#### Evaluation criteria for the final exam:

##### Continuous assessment:

In order to pass the course, it is necessary to obtain a minimum grade of 4.0 points in each of the compulsory activities (assessment tests and laboratory practices), and obtain a minimum of 5.0 in the final assessment of the course.

The reports of suspended practices may be re-delivered in the extraordinary call.

##### Non-continuous evaluation:

The practical reports may be delivered up to the date of the ordinary call. Students who change from continuous to non-continuous assessment will maintain the grade of the mandatory assessable activities presented.

The evaluation of the competences acquired in the development of laboratory practices will be evaluated by means of a theoretical-practical exam.

In the field work your memory will be evaluated, but not the presentation in class.

#### Specifications for the resit/retake exam:

Suspended practical reports or final project may be recovered with a new delivery on the date of the extraordinary call.

#### Specifications for the second resit / retake exam:

The evaluation will be 60% evaluation test (theoretical exam) and 40% theoretical-practical laboratory exam.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Writing of reports or projects [AUTÓNOMA][Combination of methods]	30
Study and Exam Preparation [AUTÓNOMA][ ]	40
Individual tutoring sessions [PRESENCIAL][Combination of methods]	1
Mid-term test [PRESENCIAL][Assessment tests]	2.75
Unit 1 (de 6): Fundamentals of noise and vibrationsF	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	3
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	4
Unit 2 (de 6): Instrumentation and measurements techniques	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	4.5
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	4
Unit 3 (de 6): Noise and vibration sources	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4.25
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	3
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	4
Unit 4 (de 6): Environmental noise	
Activities	Hours

Class Attendance (theory) [PRESENCIAL][Lectures]	6
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	3.5
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	4
<b>Unit 5 (de 6): Occupational noise</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	4.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	3
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	4
<b>Unit 6 (de 6): Final project</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	1.5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	3
<b>Global activity</b>	
<b>Activities</b>	<b>hours</b>
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	20
Writing of reports or projects [AUTÓNOMA][Combination of methods]	30
Mid-term test [PRESENCIAL][Assessment tests]	2.75
Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work]	20
Class Attendance (theory) [PRESENCIAL][Lectures]	24.25
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	12
Study and Exam Preparation [AUTÓNOMA][ ]	40
Individual tutoring sessions [PRESENCIAL][Combination of methods]	1
<b>Total horas: 150</b>	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
1_instrumentación	equipamiento de medida y análisis del laboratorio de acústica (analizadores bicanales, sonómetros, vibrómetros, etc.)					Normas disponibles en biblioteca UCLM
AENOR	Normas ISO-AENOR(NorWeb)					
	<a href="http://biblioteca.uclm.es/bases_datos_lista.html">http://biblioteca.uclm.es/bases_datos_lista.html</a>					
Malcolm J. Crocker	Handbook of noise and vibration control	John Wiley & Sons		978-0-471-39599-7	2007	
Amando García	La contaminación acústica : fuentes, evaluación, efectos y c	Sociedad Española de Acústica	Madrid	84-87985-10-6	2006	
Cyril Harris	Manual de medidas acústicas y control del ruido	McGraw-Hill	Madrid	84-481-1619-4	1998	
Carmen Álvarez Brime	La exposición laboral al ruido	Instituto Nacional de Seguridad e Higiene en el	Madrid	84-7425-461-2	2001	
1_software	porgramas de medida y análisis de señales acústicas (dBTrait, dBTrig, Evaluator, Noise explorer, Samurai, etc)					
Frank Fahy y David Thomspson (ed)	Fundamentals of sound and vibration	CRC Press		978-0-415-56210-2	2015	
AEMA (EEA, en inglés)	Agencia Europea del Medio Ambiente - Topic: Noise					web de la agencia de la Unión Europea (EU), encargada publicar informes que recopilan y validan información sobre el estado del medio ambiente (incluyendo el ruido ambiental), el cambio climático y cuestiones de sostenibilidad.
	<a href="https://www.eea.europa.eu/en/topics/in-depth/noise">https://www.eea.europa.eu/en/topics/in-depth/noise</a>					
M.Carmen Martín Moreno (selección y ordenación)	Código de ruido	Agencia Estatal Boletín Oficial del Estado	Madrid	978-84-340-2344-4	2023	
	<a href="https://www.boe.es/biblioteca_juridica/codigos/codigo.php?id=184_Codigo_del_Ruido&amp;modo=2">https://www.boe.es/biblioteca_juridica/codigos/codigo.php?id=184_Codigo_del_Ruido&amp;modo=2</a>					