



Course guide

230387 - LABUE - Laboratory on Ultrasonic Electronics

Last modified: 19/06/2023

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering.

Degree: MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Optional subject).
MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Optional subject).
MASTER'S DEGREE IN ELECTRONIC ENGINEERING (Syllabus 2022). (Optional subject).

Academic year: 2023 **ECTS Credits:** 3.0 **Languages:** English

LECTURER

Coordinating lecturer: Jordi Salazar Soler
Others: Antoni Turó Peroy
Juan Antonio Chávez Domínguez

TEACHING METHODOLOGY

- Application classes
- Laboratory practical work
- Individual autonomous work

LEARNING OBJECTIVES OF THE SUBJECT

The aim of this course is to train students in the design, dimensioning and evaluation of ultrasonic systems, putting considerable emphasis on the specific instrumentation and the applications of these systems.

STUDY LOAD

Type	Hours	Percentage
Self study	51,0	68.00
Hours small group	24,0	32.00

Total learning time: 75 h

CONTENTS

Session 1. Course presentation and introduction to ultrasonic systems

Description:

There will be a presentation of the subject and then a brief introduction to ultrasonic systems and their particularities and different applications.

Full-or-part-time: 4h

Laboratory classes: 4h



Lab 1. Design and simulation of an immersion transducer for non destructive testing

Description:

The laboratory practical work consists of the simulation by means of PSPICE electrical simulator of the design steps in the construction of a 5 MHz piezoelectric transducer for water-immersion non-destructive testing applications. The analysis of the simulation results has to permit the transducer performance evaluation and the improvement of the transducer design.

Full-or-part-time: 6h

Laboratory classes: 6h

Lab 2. Acoustic fields simulation

Description:

This lab assignment consists of the simulation of acoustic fields in different applications using the stand-alone computer software package called Wave2000 Pro.

Full-or-part-time: 6h

Laboratory classes: 6h

Lab 3. Experimental ultrasonic characterization of materials

Description:

The aim of this laboratory part is the measurement and characterization of a list of materials using ultrasonic transducers. Different transducers and materials will be used.

Full-or-part-time: 8h

Laboratory classes: 8h

GRADING SYSTEM

Laboratory assessments: 100%

BIBLIOGRAPHY

Basic:

- Kinsler, Lawrence E. Fundamentals of acoustics. 4th ed. New York [etc.]: Wiley, 2000. ISBN 9780471847892.
- Lynnworth, Lawrence C. Ultrasonic measurements for process control. Theory, techniques, applications. Academic Press, 1989. ISBN 9780124605855.
- Auld, Bertram Alexander. Acoustic fields and waves in solid. 2nd ed. Malabar, Fla: Krieger, 1990. ISBN 9780898747836.
- Cheeke, J. David N. Fundamentals and applications of ultrasonic waves. 2nd ed. Boca Raton: CRC Press, 2012. ISBN 9781439854945.