SUBJECT TEACHING GUIDE

G759 - Experimental Techniques in Mechanical Engineering

Degree in Mechanical Engineering

Academic year 2026-2027

1. IDENTIFYING DATA					
Degree	Degree in Mechanical Engineering			Type and Year	Optional. Year 4
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Design and Manufacturing Optional Module: Mechanical Engineering				
Course unit title and code	G759 - Experimental Techniques in Mechanical Engineering				
Number of ECTS credits allocated	6	Term		Semester based (2)	
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERIA ESTRUCTURAL Y MECANICA
Name of lecturer	ALFONSO FERNANDEZ DEL RINCON
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Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 2. DESPACHO (S2042)
Other lecturers	JESUS PASCUAL GARCIA CARLOS AGUILAR QUINTANA

3.1 LEARNING OUTCOMES
- The student will be able to understand and evaluate the instrumentation used to measure mechanical quantities such as vibrations, noise, and strain.
- The student will understand and use the techniques and tools for analyzing and processing recorded data both in the time domain and in the frequency domain.
- The student will apply the measurement of the aforementioned quantities in condition-based maintenance and experimental modal analysis.
- The student will acquire advanced knowledge of durability testing.

4. OBJECTIVES

The objectives of this course are to ensure that the student acquires undergraduate-level training in the following areas related to experimental dynamics problems in machinery:
Instrumentation for vibration measurement
Instrumentation for noise measurement
Instrumentation for strain measurement
Acquisition, analysis, and processing of dynamic signals
Vibration testing

6. SUBJECT PROGRAM

CONTENTS	
1	COURSE INTRODUCTION
2	INTRODUCTION TO EXPERIMENTAL TECHNIQUES IN MECHANICAL ENGINEERING
3	EXPERIMENTAL MEASUREMENT AND ANALYSIS OF VIBRATIONS - Vibration signals - Measurement chain - Seismic Mass Transducer - Accelerometers
4	ADQUISITION AND PROCESSING OF DYNAMIC SIGNALS - Dynamic Signals adquisition - Time domaine analysis - Frequency domaine analysis
5	MACHINERY CONDITION MONITORING - Preditive Maintenance - Vibration analysis techniques for machinery fault detection
6	NOISE MEASUREMENT AND CONTROL - Introduction to noise - Noise Measurement - Noise measurement and control in machinery
7	OTHER EXPERIMENTAL TECHNIQUES - Vibration tests - Strain gauges measurement - Fotoelasticity

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Exercices and activities carried out at classroom	Others	No	No	30,00
Laboratory practices	Laboratory evaluation	No	Yes	30,00
Final exam	Written exam	No	Yes	40,00
TOTAL				100,00

Observations

Disruption of Teaching Activity Due to the Health Situation:
In the event of a partial or total suspension of in-person teaching activities, this evaluation structure will be appropriately adapted according to the circumstances.

Remote Assessment:
If, due to the health situation, it is not possible to carry out any assessment activity in person, a remote evaluation method will be adopted using online tools.

Observations for part-time students

Part-time students who are unable to follow continuous assessment and have communicated this at the beginning of the course may be evaluated on that part through an exam.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

An Introduction to Random Vibrations, Spectral & Wavelet Analysis. 3rd Ed.
D. E. Newland
Longman (1993), Dover Publications Inc, New York (2006)

Instrumentación aplicada a la ingeniería
Jesus Fraile Mora, Pedro García Gutierrez, Jesús Fraile Ardanuy
ISBN 978-84-1545-233-1 (2010)

Mechanical Vibration and Shoks Measurements
Brüel and Kjaer (1980)

Noise and Vibration Analysis
A. Brandt
John Wiley & Sons (2011)

Vibration Testing
Kenneth G. McConnell (1995)

Machinery Vibration
V. Wowk
McGraw-Hill (1991)

Engineering applications of correlation and spectral analysis
J. Bendat, A. Piersol
J. Wiley & Sons. (1980)