

29745 - Vibration and Noise at Machines

Syllabus Information

Academic year: 2023/24

Subject: 29745 - Vibration and Noise at Machines

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 434 - Bachelor's Degree in Mechanical Engineering

ECTS: 6.0

Year: 4

Semester: First semester

Subject type: Optional

Module:

1. General information

The objective is to present the fundamental concepts of vibration and noise, instrumentation and measurement techniques. The student should be able to identify, describe and analyse the physical phenomena that generate vibration and noise in mechanical systems, apply a methodology to analyse their generation and apply solutions for their reduction. Previous knowledge of Physics, Mathematics and Mechanics is required.

This goal is aligned with the Sustainable Development Goals (SDGs) of the United Nations Agenda 2030

In such a way that the acquisition of the learning results of the subject will contribute, to some extent, to the achievement of Objectives 3.d, 8.8 and 9.4

2. Learning results

- Models a mechanism and/or machine as a discrete system, defining the fundamental parameters that characterize its vibratory behaviour
- Makes a vibroacoustic model of a machine.
- Applies noise and vibration concepts in the design of a machine.
- Uses numerical simulation programs suitable for dynamic analysis of mechanisms and machines, being able to analyse and discuss the results obtained
- Understands the assembly and operation of measuring chains, and acquires the ability to use them.
- Prepares reports on the measures: objective, procedure, results, analysis and recommendations.
- Knows the sources that generate vibrations in machines.
- Calculates the actions generated by dynamic unbalances in machines.
- Knows the standards that evaluate the severity of vibrations in a machine.
- Applies corrective measures to minimize noise and vibration transmission.

3. Syllabus

The program of the subject is structured in three thematic blocks:

Theoretical introduction

- Introduction to vibration theory.
- Vibrations in discrete systems.
- Vibrations in continuous systems.
- Fundamental concepts of noise.

Measuring chain

- Instrumentation for noise and vibration measurement.
- Signal analysis

Predictive maintenance

- Sources of vibration and noise in machines.
- Troubleshooting

4. Academic activities

- **Master classes** (45 hours): The theoretical bases on noise and vibration and systems of measurement are presented and illustrated with examples.

- **Laboratory practices** (15 hours): They are carried out in small groups and the student experimentally verifies the theoretical bases and performs measurements and simulations by means of numerical methods and computer programs.
- **Supervised work** (30 hours): Work is proposed to deepen in the different concepts seen in the subject.
- **Study** (55 hours).
- **Evaluation tests** (5 hours).

5. Assessment system

Continuous evaluation is carried out by means of:

- Subject work (40%): It will be developed in small groups. Their evaluation is based on the reports submitted and an oral presentation.
- Practices (30%). A report is made for each session. If the minimum grade of 4/10 is not reached, this part will be assured by means of questions in the global evaluation.
- There are two partial knowledge tests (30%): These are voluntary written tests. If the student do not pass them, they can demonstrate their learning in the official calls.

The **overall evaluation** of the subject, in the two official calls is done by means of a written test (the tests corresponding to the parts not passed by the continuous evaluation)

- Knowledge test (30%): The complete content of the subject will be evaluated by means of theoretical-practical questions and problems.
- Practical exam (30%): questions related to the activities of the practical sessions are developed
- Questions on the activities developed in the subject work (40%).

Note: A minimum grade of 4/10 is required for averaging the different sections.