

## Course guide

### 220051 - M2 - Mechanics II

Last modified: 19/04/2023

**Unit in charge:** Terrassa School of Industrial, Aerospace and Audiovisual Engineering  
**Teaching unit:** 712 - EM - Department of Mechanical Engineering.

**Degree:** BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Compulsory subject).

**Academic year:** 2023    **ECTS Credits:** 6.0    **Languages:** Catalan, Spanish, English

#### LECTURER

**Coordinating lecturer:** JORDI ROMEU GARBI - ROBERT ARCOS VILLAMARÍN

**Others:** Primer quadrimestre:  
ROBERT ARCOS VILLAMARÍN - 11, 12, 13, 14  
JOAN CARDONA GONYALONS - 11, 12, 13, 14  
JORDI ROMEU GARBI - 11, 12, 13, 14

#### PRIOR SKILLS

To properly tackle the present subject, the student should have a solid basis on Newtonian mechanics (statics, kinematics and dynamics) and on the obtention of the independent degrees of freedom of a mechanical system.

#### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

**Specific:**

CE22-GRETA. GrETA - An adequate understanding of the following, as applied to engineering: physical phenomena of flight, flight qualities and control, aerodynamic and propulsive forces, performance and stability.

#### TEACHING METHODOLOGY

#### LEARNING OBJECTIVES OF THE SUBJECT

- To have a good command of the determination of the equation of motion of a mechanical system and know the analytical methods that allow this obtention.
- To be able to understand the vibratory behaviour of a mechanical system in the free case and subjected to different kinds of excitation and, furthermore, know the mathematical expressions and the calculation procedures that allow to address a problem like this.
- To know the experimental techniques used to measure the mechanical vibration in structures and how to use this experimental data to dynamically characterise the particular mechanical system.
- To learn computational methods able to solve the equations of motion of mechanical systems in both time and frequency domains.
- To know the passive control techniques that allow to control the dynamic behaviour of a particular mechanical system.

#### STUDY LOAD

Type	Hours	Percentage
Hours small group	14,0	9.33
Hours large group	46,0	30.67
Self study	90,0	60.00

Total learning time: 150 h

## CONTENTS

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**Description:**

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**Specific objectives:**

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**Related activities:**

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**Full-or-part-time:** 38h

Theory classes: 12h

Laboratory classes: 4h

Self study : 22h

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**Description:**

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**Specific objectives:**

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**Related activities:**

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**Full-or-part-time:** 14h

Theory classes: 3h

Laboratory classes: 2h

Self study : 9h

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**Description:**

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**Specific objectives:**

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**Related activities:**

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**Full-or-part-time:** 32h

Theory classes: 12h

Laboratory classes: 2h

Self study : 18h

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**Description:**

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**Specific objectives:**

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**Related activities:**

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**Full-or-part-time:** 50h

Theory classes: 16h

Laboratory classes: 4h

Self study : 30h

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**Description:**

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**Specific objectives:**

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**Related activities:**

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**Full-or-part-time:** 16h

Theory classes: 3h

Laboratory classes: 4h

Self study : 9h

## ACTIVITIES

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**Full-or-part-time:** 89h

Theory classes: 43h

Self study: 46h

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**Description:**

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**Specific objectives:**

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**Material:**

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**Delivery:**

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**Full-or-part-time:** 3h

Theory classes: 3h



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**Description:**

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**Specific objectives:**

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**Material:**

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**Delivery:**

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**Full-or-part-time:** 8h

Laboratory classes: 1h

Self study: 7h

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**Description:**

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**Specific objectives:**

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**Material:**

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**Delivery:**

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**Full-or-part-time:** 8h

Laboratory classes: 1h

Self study: 7h

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**Description:**

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**Specific objectives:**

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**Material:**

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**Delivery:**

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**Full-or-part-time:** 16h

Laboratory classes: 4h

Self study: 12h



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**Description:**

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**Specific objectives:**

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**Material:**

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**Delivery:**

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**Full-or-part-time:** 26h

Laboratory classes: 6h

Self study: 20h

## GRADING SYSTEM

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## BIBLIOGRAPHY

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**Basic:**

- Den Hartog, J. P. Mechanical vibrations. New York: Dover Publications, 1984. ISBN 0486647854.
- Thomson, William T. Theory of vibration with applications. 4th ed. Cheltenham: Nelson Thornes, cop. 1993. ISBN 0748743804.
- Géradin, Michel [et al.]. Mechanical vibrations: theory and application to structural dynamics. 2nd ed. Chichester [etc.]: Wiley [etc.], cop. 1997. ISBN 0471975249.
- Tongue, Benson H. Principles of vibration. 2nd ed. New York [etc.]: Oxford University Press, cop. 2002. ISBN 0195142462.
- Ginsberg, Jerry H. Advanced engineering dynamics. 2nd ed. Cambridge, US: Cambridge University Press, 1995. ISBN 0521470218.
- Agulló i Batlle, J. Introducció a la mecànica analítica, percussiva i vibratòria. Barcelona: OK Punt, 1998. ISBN 8492085037.

**Complementary:**

- Petyt, Maurice. Introduction to finite element vibration analysis. Cambridge [England]: Cambridge University Press, 1990. ISBN 0521266076.
- Inman, Daniel J. Engineering vibration. 4th ed. Upper Saddle River, N.J.: Prentice Hall, 2014. ISBN 9780273768449.

## RESOURCES

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**Other resources:**

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