

# Mechatronics 2

## Lecturer

Christophe COLLETTE (Coordinator)

## Course mnemonic

MECA-H524

## ECTS credits

3 credits

## Language(s) of instruction

English

## Course period

Second term

## Course content

The course is organized as follows: (1) Dynamics of structures in view of controlling them (2) Electromagnetic and piezoelectric transducers. (3) Integration of transducers in active structures. (4) Modeling piezoelectric structures. (5) Active damping with collocated pairs. (6) Active isolation. (7) Practical implementation (8) Introduction to advanced control techniques.

## Objectives (and/or specific learning outcomes)

At the end of the course, the student will be capable of modeling electro-mechanical and piezoelectric systems, studying their dynamic behavior, and controlling their vibrations.

## Pre-requisites and co-requisites

### Pre-requisites courses

MECA-Y403 | Mechatronics 1 | 5 crédits

## Teaching method and learning activities

Theoretical lectures and exercise sessions

### Contribution to the teaching profile

This teaching unit contributes to the following competences:

- In-depth knowledge and understanding of exact sciences with the specificity of their application to engineering
- In-depth knowledge and understanding of the advanced methods and theories to schematize and model complex problems or processes
- Reformulate complex engineering problems in order to solve them (simplifying assumptions, reducing complexity)

- Present and defend results in a scientifically sound way, using contemporary communication tools, for a national as well as for an international professional or lay audience
- Work in an industrial environment with attention to safety, quality assurance, communication and reporting
- Think critically about and evaluate projects, systems and processes, particularly when based on incomplete, contradictory and/or redundant information
- Has an in-depth understanding of safety standards and rules with respect to mechanical, electrical and energy systems.

## References, bibliography and recommended reading

Books on Mechatronics:

A. Preumont, Vibration control of active structures, 3rd edition, Springer (2011).

S. Crandall, Dynamics of mechanical and electromechanical systems, McGraw-Hill (1963).

D. Miu, Mechatronics: Electromechanics and Contromechanics, Springer (1993).

Books on automatic control:

B. Lurie and P. Enright, Classical feedback control, Dekker (2000).

G. Franklin and J. Powell, Feedback control of dynamic systems, 7th edition, Pearson (2015).

Books on Vibration Theory:

D. Inman, Engineering vibration, 4th edition, Pearson (2014).

M. Geradin and D. Rixen, Mechanical vibrations: Theory and application to structural dynamics, 3rd edition, Wiley (2015).

## Other information

### Contact(s)

Prof. Christophe Collette: ccollett@ulb.ac.be

## Evaluation method(s)

Other

### Evaluation method(s) (additional information)

Project (100%).

### Determination of the mark (including the weighting of partial marks)

Project (100%).

### Main language(s) of evaluation

English

## Programmes

Programmes proposing this course at the  
Brussels School of Engineering

MA-IREM | Master of science in Electromechanical  
Engineering | finalité Professional/unit 2