

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

