

Faculty	Ingegneria
Master	Mechatronic Engineering (La Spezia)
Year/Semester	1/II

Course Title	Structural design of mechatronic systems
ID Course Code	56886
Course Credits (CFU)	6
Scientific-Disciplinary Sector	ING-IND/14
Course Type	mono-disciplinary course
Lecturer-in-charge	REBORA Alessandro

Learning Outcomes:

To provide students with the comprehension of static and dynamic behaviour of the components of a mechatronic system. To optimize the integration of various components into the mechatronic system.

Course Organisation Details

The mechatronic approach to design and construction of machineries. Overview of energy transfer mechanic components and their specific functions. Overview of energy transformation mechanic components and their specific functions. Energy accumulators . Components for mechanic regulation.

Mechatronic components : actuators, sensors, regulators and control devices .

Modelling of mechatronic components and mechatronic systems. Fundamental elements composing a model. Static and dynamic behaviour of mechatronic system. Typologies of software simulation tools.

Finite element simulation. Finite element simulation of mechatronic systems. Structural, thermal, electric, magnetic problems and related element types. Finite element approach to solve multiphysics problems using "coupled field" elements.

The finite element simulation ANSYS code. Input data pre-processing, solution and results post-processing, performed in "ANSYS Classic" environment. The APDL language to generate parametric finite element models organized with codified ANSYS commands. Worked examples concerning simple finite element models used to study the static and dynamic behaviour of a mechatronic system. Design optimization performed in "ANSYS Classic" simulation environment.

Assessment	hours
Lectures	50.0
Practice	10.0
Laboratory	0.0
Integrative activities	0.0

References

R.Nordmann, H. Birkhofer, "Elementi di macchine e mecatronica", McGraw-Hill, 2006

Organization and examinations

Theoretical frontal lectures and application frontal lectures with presentation and discussion of prototypical examples performed by the teacher using ANSYS. Worked examples developed by students working in informatic room under teacher supervision to solve simple problems by means of finite element simulation. Oral final examination concerning the theoretical program, and solution of simple simulation problems.

Pre-requisites

None