Modelling and simulation of mechatronic systems
01PCYQW

• Schedule
  
  Mon  14:30-17:30 room 11T
  Wed  08:30-11:30 room 2D
  Thu  11:30-13:00 room 10

• No labs

• Textbooks & handouts
  
  • B. Bona “Modellistica dei Robot Industriali” CELID, used also in the Robotics course, available @CELID Bookstore
  • B. Bona “Modellistica dei Sistemi Multicorpo”, notes, available @CELID Bookstore

• Written examination (open books)

• Web page

http://www.ladispe.polito.it/corsi/Meccatronica/
The course is divided into two parts

1. First part: Prof. Bona
   October 2012 → November 2012
   Lagrange approach to modelling

2. Second part: Prof. Tonoli
   December 2012 → January 2013
   Bond-Graph approach to modelling
Mechatronic systems examples
Mechatronic systems examples
To understand mechatronic systems

- Mechanics
- Electronics
- Electrical machines
- Control theory and technologies
  - Modelling
  - Identification
  - Control
  - Applications
Prerequisites

• Vectors
• Matrix calculus
• Physics/basic kinematics, forces and torques
• Electrical circuits
Topics part 1

Vectors, rigid motions, roto-translations, matrix representation
Linear and angular velocities and accelerations, kinematic functions
Generalized coordinates, degrees of freedom
Geometrical and kinematical constraints, holonomous and non holonomous constraints
Inertia moments and inertia matrix

Rigid body dynamical equations
   Newton-Euler approach
   **Lagrange approach**: kinetic and potential energies
Mechanical, electrical and electromechanical systems
Electromechanical bipoles
State equations
Exams

Examinations are written; textbooks, handouts and other written materials are allowed.

Time duration: 3 hours

(Lagrange 1.5 h, Bond Graph 1.5 h)

It will be possible to take the exam on Lagrange equations and on Bond-graphs in different sessions.

The mark obtained will be kept until the end of the academic year (three exam sessions)

If you have doubts, contact prof. Bona by email.
Textbooks (1)

- **Modellistica dei Manipolatori Industriali**
  Basilio Bona
  CELID 2002 (1a ristampa, settembre 2005)
  Available @ CELID bookstore

- **Dinamica dei sistemi multicorpo**
  Basilio Bona
  Course notes
  Available @ CELID bookstore

- **System Dynamics: A Unified Approach**
  D.C. Karnopp, D.L. Margolis, R.C. Rosenberg
  Wiley Interscience 1990
  Available @ Central Engineering Library
• L. Meirovitch
  *Methods of analytical dynamics*
  McGraw-Hill
  *available at the Central Engineering Library, code 045.101, 045.101a, 045.101b*

• J. S. Török
  *Analytical mechanics with an introduction to dynamical systems*
  Wiley
  *available at the Central Engineering Library, code 116.060*
Textbooks (3)

- F. C. Moon
  *Applied dynamics: with applications to multibody and mechatronic systems*
  Wiley
  *available at the Electronic Library, code P8-N98C*

- James H. Williams, Jr.
  *Fundamentals of applied dynamics*
  Wiley
  *available at the Electronic Library, code w1.128*
http://www.ladispe.polito.it/corsi/meccatronica/01PCYQW/2012-13/

Master Degree in Mechatronic Engineering

Modelling and Simulation of Mechatronic Systems — 01PCYQW
2012-2013
Prof. Basilio Bona

The Modelling and simulation of mechatronics systems module (10 ECTS) takes place during the first semester of the first year of the Master Degree in Mechatronic Engineering.

Click on the left table to reach the related links.

The teacher answers to your emails at basilio.bona at polito.it