Title: Human body modelling for ergonomics and design: theory and hand-on practice

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Indicative period: planned on request

ABSTRACT.

The 'human factor' can be a major input in the design of devices that have to be interfaced with the human body, having to fulfill ergonomics, usability and safety requirements.

Physical dummies and in-silico models represent valuable tools to provide a benchmark to test and optimize design solutions.

The course illustrates methodologies currently employed for these aims, moving from 3D CAD drawings to validated numerical models. Major emphasis will be given to 'tailor-made' or 'subject-specific' models.

PROGRAM

- Anthropometry and standard body landmarks (2h): definition and landmarks identification on living subjects
- Dummies for crash tests (2h)
- Statistical 3D CAD models and Principal Component Analysis for design (2h): PCA theory and exercise
- Articulated Total Body (ATB) for numerical in-silico analyses (2h): theory and illustration of forensic applications. Hands-on exercise: numerical simulations on MSC Adams (3h)
- Musculo-skeletal models' description and practice (2h): evaluation of muscle forces required to perform a given task.
  Hands-on exercise (3h): numerical simulations on OpenSim
- ATB and musculo-skeletal models' validation (2h): electromyography and gait analysis techniques