*Dyn*LAB project

Leonardo da Vinci

Open course on
Modeling and Control of Multidisciplinary Systems
in a Virtual Lab

at http://virtual.cvut.cz/dynlabcourse/

Computing and Information Centre, Czech Technical University in Prague

Automatisierung und Prozessinformatik, Ruhr Universität Bochum

Fraunhofer Institute Integrierte Schaltungen, Dresden, Germany

University of Sussex, Brighton, England

Institute of Technology, Tallaght, Dublin, Ireland

Target groups:

- students wishing to complement the traditional courses
- distance-education students at different levels of study
- practising engineers as a part of their life-long learning
- teachers intending to innovate the courses they teach

Key features:

- novel methodology for realistic modeling of multidisciplinary system dynamics in a unified, systematic and efficient way
- learners get a better 'feel' for the topic thanks to animated pictures, online simulation and online virtual experiments
- using the DYNAST software, learners can solve realistic problems without even being able to formulate equations, which stimules their interest in dynamics before they are exposed to rigorous mathematics (see http://dynast.net)
- as the learners use the DYNAST Server, their tutors are able to monitor and correct their activities online
- to proceed through the course modules, learners can take individual paths tailor-made to their needs and background
- learners benefit from examples recorded during problem solving in academia and industry
- the course supports both self-study and remote tutoring combined with investigative and collaborative learning

Course outline:

Introduction to dynamics
Mechanical systems
Electrical systems
Fluid systems
Thermal systems
Magnetic systems
Electromechanical systems
Electronics of Semiconductors
Unified approach to modeling
Formulation of system equations
Formulation of transfer functions
The Laplace transform
Transfer functions
Frequency Response
Stability of linear control systems
The root-locus method
Behaviour of linear control systems
PID control and controller types
Compensator design methods
Control with complex loop structures
Design of state-feedback systems
Fuzzy systems
Fuzzy control
Nonlinear Control Systems