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## Cad tools for electronics

### Finalità

The course provides the basic knowledge required for the usage of the most common CAD for the electronic design.

### Programma

#### Part 1

Introduction to technical computing and technical design with MATLAB. Matrix creation and matrix operations: matrix arithmetic, linear equations and linear equation systems, eigenvalues, singular values and matrix factorizations. Plotting data and working with images

Standard polynomial operations: polynomial roots, evaluation and differentiation. Curve fitting and fraction expansion.

Experimental data analysis: transformer current analysis at no-load conditions, current gain vs collector current in bipolar transistors, Schottky diode barrier height extraction.

Numerical integration (quadrature) and numerical solution of differential equations. Complex numbers.

An introduction to Simulink. Bode plot, Fast Fourier and Laplace transforms. Stability analysis.

Practical examples: dynamic behavior of closed loop systems.

#### Part 2

Simulation of electronic circuits using PSPICE. Drawing the circuit schematic with the schematic capture tools. Basic components (resistor, capacitor, inductor, diode, etc.), instantiation and parameters setting. Building sub-circuits (schematic and symbol views); hierarchical schematic.

Simulation analysis: DC-OP (bias point), DC-sweep, transient, AC (small-signal) and parametric.

Using the waveform display tool.

Components with custom models: how to import, create and instantiate them in a simulation schematic.

Practical examples: design and simulations of simple electronic circuits.

### Attività d'esercitazione

Modelling and simulation of simple circuits and systems with Matlab e PSPICE.

### Modalità d'esame

The exam is based on a laboratory test and an oral discussion.

### Testi consigliati

Matlab manual (<a href="http://www.mathworks.com">www.mathworks.com</a>)