

Workshop: Electronics and Signal Processing

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The electronics and signal processing (lab) course is an elective course for third year *physics* students and *biotechnical technology and physics* masters students.

The following topics are covered:

- Getting familiar with the basic principles and analysis techniques in AC- and DC-circuits;
 - Network theorems, and replacement networks
 - Complex transfer functions and bode plots of different filters and resonant circuits
- Explain and build Diode Circuits: Single- and full-wave rectifiers
- Explain and build operational amplifier circuits and circuits with negative feedback
- Explain and build active filters: Butterworth filter
- Explain and build basic circuits in the digital logic: Adder (half and full)
- Design, build and investigate Control systems;
 - An analog P controller with a floating ball experiment
 - A digital PID controller
- Design, build and investigate modulation and demodulation techniques
 - Amplitude (de) modulation
 - Synchronous detector; Examining a lock-in detector
- The course is offered as combined lectures, simulations and labs using NI-Elvis systems and Multisim. During the workshop some student activities will be illustrated and some hands-on activities will be available for participants.
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