



Course Specification Document

Title	Electronics 2
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Credits	3.5 ECTS
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Aims	This course aims to introduce the student to quadrupoles and their modeling, electronic circuits with feedback and the circuits of oscillators, in addition to logical gates circuits, memories and analog-to-digital and digital-to-analogue convertors, in a way that contributes to his study of other specialized courses and later to his work.
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Intended learning outcomes

On successful completion of this course, the student will be able to:

- Understand stable feedback and its characteristics, analyze its circuits and understand and analyze some oscillator circuits.
- Understand and analyze logic gate circuits and compare their manufacturing techniques.
- Understand the methods of quantizing analog signals and their conditions, calculate quantization errors and understand analog to digital converters and digital to analog converters and memory circuits.
- Analyze and design stable feedback circuits and oscillator circuits.
- Analyze and design logic gates with specific specifications from single components.

Syllabus

- **Review of transistor amplifiers, current mirrors and operational amplifiers:** Single transistor amplifier configurations CE, CB, CC, CS, CG, CD, differential amplifier, operational amplifier and its applications.
- **Quadrupoles:** Z, Y parameters, hybrid parameters H and G, transfer parameters T and t, examples of connecting quadrupoles.
- **Feedback (Feedback and its general principle, feedback properties):** Gain, bandwidth, noise effect, feedback types: voltage - voltage, voltage - current, current - voltage, and current - current.
- **Signal acquisition, analog-to-digital and digital-to-analog converters:** Digitizing signals, sample and hold circuit, digital-to-analog converters, analog-to-digital converters.
- **Logic gate circuits and electronic memories:** Characteristics of logic circuits, CMOS inverter and CMOS logic gates, pseudo-NMOS logic gates, Pass Transistor Logic gates PLT, dynamic logic gates, ECL logic gates, R-S flip-flop circuit, RAM, Read-only memories ROM, PROM, EPROM and FAMOS transistors, TTL logic gates.
- **Introduction to oscillator:** Unstable feedback, the design of oscillator from narrow bandpass filters, the design of phase-shifted oscillators, the design of general oscillators using operational amplifiers (Colpitts and Hartley oscillators).