Analog Electronics

1. **Course number and name:** 020ELAES1 Analog Electronics

2. **Credits and contact hours:** 6 ECTS credits, 3x1:15 course/lab hours

3. **Instructor's or course coordinator's name:** Fadia Tawil Karam

4. **Text book:**
   a. **Other supplemental materials:**
      Professor textbook and course material

5. **Specific course information**
   a. **Catalog description:**
      This course covers the main low-power electronic components: 1) P-type and N-type semiconductors – P-N junction; 2) diodes: characteristics and application circuits (clipping, rectification…) – Zener diode (regulation) – Light-emitting diode. 3) Bipolar transistor: static operation (polarization, application circuits) – dynamic operation (amplifier circuits) – synthesis of amplifier circuits – Bipolar transistor as switches. 4) FET and MOSFET transistor: characteristics – resistive operation and amplification. 5) Operational amplifier (OA): differential structure and differential amplifier – static and dynamic performances – application circuits (Log amplifier, instrumentation and isolation OA, active filter...). 6) Comparator: characteristics – performances and limitations – application circuits (clock, hysteresis, peak value detector) – digital compatibility

   b. **Prerequisites or co-requisites:** 020SRLNI4 Linear Electrical Systems and Networks or 020SRLCI4 Linear Electrical Systems and Networks

   c. **Required**: Required for CCE students

6. **Specific goals for the course**
   a. **Specific outcomes of instruction:**
      Understand and model the behavior of basic electronic components: diodes, transistors and operational amplifiers.
      Synthesize, simulate and realize voltage amplifications, based on transistors, to meet desired needs.
      Evaluate the performances and limitations of basic electronic components.
      Understand the data sheets of basic electronic components.
      Design and analyze electronic circuits, using basic electronic components, to perform desired functions.

   b. **KPI addressed by the course:**

KPI	a2	b1	b2	b3	c1	c2	i2	k2	k3
Covered	x	x	x	x	x	x			

Assessed	x	x	x	x	x	x	x	x	x
Give Feedback									

7. Topics and approximate lecture hours:

Introduction and reminder on general theorems (1 lecture)
P-type and N-type semiconductors; P-N junction (2 lectures)
Diodes: characteristics and application circuits (5 lectures)
Zener diode (1 lecture)
Applications on diodes (6 lectures)
Lab: Diodes (1 lecture)
Bipolar transistor: static operation (2 lectures)
Applications on bipolar transistors (2 lectures)
Lab: bipolar transistor – static operation (1 lecture)
Bipolar transistor: dynamic operation (2 lectures)
Applications on bipolar transistors (2 lectures)
Lab: synthesis of amplifier circuits – simulation and realization (2 lectures)
FET and MOSFET transistors (2 lectures)
Applications on FET and MOSFET transistors (1 lecture)
Operational Amplifier: differential structure and differential amplifier (2 lectures)
Operational Amplifier: static and dynamic performances (2 lectures)
Application circuits: Log amplifier, instrumentation and isolation OA, active filter... (1 lecture)
Applications on operational amplifiers (2 lectures)
Lab: operational amplifier (1 lecture)
Comparator (+ applications) (2 lectures)
Lab: electronic mini-project (2 lectures)