

## Faculty of Applied Sciences



### ELEC2755 Electricity : Advanced topics

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

**Teacher(s):** Anne-Marie Anckaert, Danielle Janvier  
**Language:** French  
**Level:** Second cycle

#### Aims

This course consists of two parts

1. Devices and electronic circuits :
  - understand - and predict - the behavior of semi-conductor devices
  - develop usable model of these devices
2. Electromagnetism

#### Main themes

Identical to the contents of the course

#### Content and teaching methods

1. Devices and electronic circuits :

- Principles of conductivity :

Solids and semi-conductors, doping - effect of potential, temperature, light, Poisson equation and basics of the current equation

- Analysis of the PN junction :

Internal potential - static current computation, dynamic behavior, limits of the modeled behavior - models and use (photodiode)

- Technology :

Basic material - photo-lithography and basic technologic steps - building circuit elements

- Analysis of electronic devices :

Two transistors are analyzed, in order to deduce amplifier and switching properties, the bipolar and the MOS transistors. For each one, the next points are considered :

- . physical structure and principles
- . static analysis of the various functional modes, limits of approximations
- . dynamic behavior
- . models and practical examples

- Integrated circuits :

Principles of bipolar and MOS technologies, critical parameters and limits, comparison - complexity and verification (tests).

2. Electromagnetism

**Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)**

Prerequisites :

First degree of engineering courses or equivalent

Supporting material :

1.Devices and electronic circuits :

The copy of the lecture notes and slides used during the course may be found at :

<http://www.icampus.ucl.ac.be/ELEC2755>

2. Electromagnetism

Assessment :

Written examination (exercices), during the session, with personal documents

For more information :

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<b>ELME21/M</b>	Première année du programme conduisant au grade d'ingénieur (5 credits) civil électro-mécanicien (mécatronique)	Mandatory
<b>FSA3DS/EL</b>	Diplôme d'études spécialisées en sciences appliquées (5 credits) (électricité)	
<b>MAP21</b>	Première année du programme conduisant au grade d'ingénieur (5 credits) civil en mathématiques appliquées	