



# Faculté des sciences appliquées

**FSA**

**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:** 2nd cycle course

## 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

## Content and teaching methods

1. Devices and electronic circuits :
  - Principles of conductivity :  
Solids and semci-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 bahavior - podels 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 (exercises), during the session, with personal documents

For more information :

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### Other credits in programs

<b>ELME21/E</b>	Première année du programme conduisant au grade d'ingénieur (5 credits) civil électro-mécanicien (énergie)	
<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 (électricité)	(5 credits)