

MATS8AB PROPERTIES OF SEMICONDUCTORS

MATS8AB		ECTS Credits : 2	Semester : S8	
Properties of semiconductors		Duration : 21 hours		
Person(s) in charge:				
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Keywords:				
semiconductors, doping, diode, transistor, optical properties				
Prerequisites:				
Electrical and thermal properties of materials, Quantum mechanics, Statistical physics				
General objective :				
Understand the underlying physics of semiconductors and the fundamentals of semiconductor devices (diode, transistor, light emitting diode, laser diode, solar cell)				
Program and Contents:				
<p>Semiconductors are ubiquitous in our everyday life and are at the root of our information technology. Controlling their electrical properties through doping enables combining these materials to obtain electronic devices found in integrated circuits. Their peculiar properties, halfway between metals and insulators, drive these materials as materials of choice for emitting or detecting electromagnetic waves.</p> <p>The purpose of this course is to understand how the transport properties of semiconductors can be tuned by impurity atoms and to learn the fundamentals of semiconductor devices such as diodes, transistor and optoelectronic devices (LED, laser diode and solar cell).</p>				
Abilities:				
Level	Description and operational verbs			
Know	The main semiconductors used nowadays in microelectronics – The influence of doping on the transport properties – The fundamentals of the main semiconductor devices			
Understand	The origin of the electronic band structure of semiconductors – The effect of doping on the physical properties of semiconductors – The connection between the transport properties of a device and its constituents			
Apply	Quantum and classical statistics to calculate the carrier concentration in semiconductors – The governing equations of semiconductor devices			
Analyze	The transport properties of doped and undoped semiconductors – The influence of doping elements on the physical characteristics of devices			
Summarize	The influence of doping in order to obtain appropriate physical properties for a given application			
Assess	The physical properties of semiconductors in order to choose the most suitable material to implement in an electronic device			
Assessment:				
<input checked="" type="checkbox"/> Written Test	<input type="checkbox"/> Continuous Control	<input checked="" type="checkbox"/> Oral Report	<input type="checkbox"/> Project	<input type="checkbox"/> Written Report