

TCSS5AB QUANTUM PHYSICS

TCSS5AB : Quantum Physics: from the fundamentals towards the new technologies		Duration : 30 hours	Credits : 3.5 ECTS	Half term: S5
Person(s) in charge :				
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Keywords: Quantum Physics				
Prerequisites : The acquired scientific level during both undergraduate years are enough to have an appropriate approach to this course ,except for special relativity which is not tackled during undergraduate courses. Thus, a brief introduction will tackle this aspect of the course. It is not necessary to have been already following quantum physics courses to follow this course.				
Objective: Quantum physics are the theory which allowed the scientific community to put a link between all the acquired knowledge until the 20th century on the electromagnetic radiation and matter. The aim of this course is to provide students with notions about this theory that is at the foundations of all of modern physics in order to have all the prerequisites for a world in which innovation is the only way to go.				
Program and Contents :				
The electronic devices that we use on a daily basis, mobile phone, cars, media players, and computers are all a product of the use of semi-conductors which is a direct consequence of the understanding of quantum physics. Same as lasers that are used in metallurgy or in medical fields. Moreover, in criminology, samples detection is merely atoms that are resonating due to X lasers emissions. Thanks to the quantum theory, we are able to manipulate atoms one at a time, as well as electrons. This has opened the doors to a new world: nano-technology. And the nano world is not ruled by classical physics but by quantum physics.We will apprehend revolutionary concepts during this course, which are and were impossible to imagine in the classical physics context. These concepts will be tackled during class according to a specific methodology: the important notions will be apprehended during class and will be explained with concrete examples. These examples will be then tackled in the second part of class (in small groups) as exercises which will be presented by two-students groups. References Physique Quantique : de la base aux nouvelles technologies, S. Andrieu, ENSMN-2008 réf. incluses Matière et Rayonnement, P. Mangin ENSMN-1998 www.lpm.u-nancy.fr/webperso/mangin.p/Mat-Ray/				
Abilities:				
Levels	Description and operational verbs			
Know				
Understand				
Apply				
Analyse				
Summarise				
Assess				
Evaluations :				
☒ Written tests	☒ Continuous Control	☒ Oral report	☐ Project	☐ Report