

M1 – Course description **MU4PYA08**

Course:	Code Apogée UE : MU4PYA08	
	Nombre d'ECTS : 6	
Course coordinators:	Sorbonne Université Name: Eli Ben-Haïm Address: LPNHE (Pierre et Marie Curie Campus, office 12-22.221) Phone: 01 44 27 84 24 Email: benhaim@in2p3.fr	Université de Paris Name: José Ocariz Address: LPNHE (Pierre et Marie Curie Campus, office 12-22.216) Phone: 01 44 27 58 60 Email: ocariz@in2p3.fr
Number of hours:	60 hours (30 hours of lectures + 30 hours of practice)	
Semester:	Second	
Lecture localization:	Campus Pierre et Marie Curie (Sorbonne Université)	
Laboratories:	no	
Objectives:	Acquiring introductory and basic knowledge of the theory of nuclear and particle physics, and of the experimental tools at play in these domains.	
Prerequisites:	Good level in quantum mechanics; in particular (but not only): composition of angular momenta, time-dependent perturbations and identical particles. Special relativity	
Topics/program:	<ul style="list-style-type: none"> - Cross sections - Symmetries and conservation laws, discrete symmetries (C, P, T) - Properties of the atomic nucleus - A basic semi-empirical and classical nuclear model (liquid drop) - Basic quantum nuclear models (Fermi, shell model) - Nuclear spectroscopy - Radioactivity - Nuclear energy - The elementary particles and their interactions - Particle accelerators and detectors - Properties of elementary and composite particles; quantum numbers and selection rules - The strong interaction: isospin, hadron phenomenology, the colour charge - Features of the weak interaction - The standard model of particle physics 	
Competences expected after the course:	Knowledge of the subjects presented (see "program" above)	
Bibliography:	Will be provided at the beginning of the course.	
Evaluation:	A single grade (N) over 100 obtained with: <ul style="list-style-type: none"> - A written mid-term exam (M); - A final written exam (E1) at the end of the course. $N = \text{Max}(E1 ; 2/3 \times E1 + 1/3 \times M)$ If failed, the grade of a second chance exam (E2), will replace E1. This exam will be either written or oral, according to the number of candidates.	
Barèmes (Apogée) :	Written exam: 100 /100	