Course Title :	**Accelerator Physics**
Number of hours/semester :	30 h, 1st Semester
Number of ECTS :	3
Lecture outline, contents :	In this introduction to the physics of conventional accelerators, we discuss the modelling of the dynamics of charged particles in a particle accelerator. First, acceleration techniques are discussed and a simplified modeling of RF accelerator cavities is described. The dynamics in the longitudinal phase space is then presented. An introduction to collective effects, such as load space effects, is given. In a second step, the magnetic elements for manipulating a charged particle beam are described and modelled. Particle dynamics in the plane transverse to a reference trajectory is modelled ab-nihilo in order to grasp the numerous underlying hypotheses and to introduce the Snyder Current parameterisation and the notion of emittance. This model is applied to a few particular cases. The peculiarities of transverse dynamics in the important case of circular accelerators are discussed and the coupling between longitudinal and transverse effects is addressed by synchrotron radiation. Finally, the notion of luminosity of a particle collider is discussed and all the limitations of the analytical formulas often encountered are addressed.
Pedagogical methods :	Lectures and Tutorials
Prerequisites :	Electromagnetism (Maxwell-equations); Special relativity (Lorentz transformations); Classical mechanics
Modalities of knowledge assessment :	Oral examination.
Bibliography :	1. Accelerator Physics, Lee, World Scientific. 2. Particle Accelerator Physics, Wiedemann, Springer. 3. Classical electrodynamics, Jackson, Wiley.