Quantum Field Theory and Quantum Electrodynamics

Unit Title	Quantum Field Theory and Quantum Electrodynamics		
Level of Study			
Credit Value		**ECTS Value**	
Home Department	Department of Theoretical Physics		
Home Faculty	Physics Faculty		
Unit Co-ordinator	Victor K. Henner		
Key Words	Relativistic wave equations. Spin. Field theory. Scalar field. Spinor field. Electromagnetic field. Interaction Representation. Feynman diagrams. Quantum electrodynamics. Main quantum electrodynamics processes. Symmetries. Electro-week theory. Strong interactions theory		
Brief Summary	Relativistic wave equations. Spin. Field theory. Scalar field. Spinor field. Electromagnetic field. Interaction Representation. Feynman diagrams. Quantum electrodynamics. Main quantum electrodynamics processes. Symmetries. Electro-week theory. Strong interactions theory.		
Indicative Content	• Relativistic wave equations. - Klein-Gordon and Dirac equations. • Spin. - A solution of the Dirac equation in a magnetic field demonstrates that spin is an inherent property of an electron. • Field theory. Langrangian formalism. - Noether's theorem. Energy-momentum tensor. Charge conservation. Spin and angular momentum of relativistic particle. • Scalar field. - Field quantization, creation and annihilation operators. • Spinor field. - Field quantization for particles with spin ½. • Electromagnetic field. - Quantization, photons. • Interaction Representation. Interacting fields, normal products of operators, pairings. • Feynman diagrams. - Perturbation theory.		

	• Quantum electrodynamics. - Electron scattering in external field. • Main quantum electrodynamics processes - Compton scattering, electron-electron scattering, electron-positron annihilation, etc. • Symmetries and introduction to electro-week theory. • Introduction to strong interactions theory.