Quantum Mechanics

Unit Title	Quantum Mechanics
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	Quantum mechanics. The Schrodinger equation. The general theory of quantum mechanics. Central forces. Theory of angular momentum. Spins. Introduction to symmetries in quantum physics. Perturbation theory. Radiation. Scattering theory.
Brief Summary	Introduction. The Schrodinger equation. Quantum mechanics in one dimension. The general theory of quantum mechanics. Central forces. Theory of angular momentum. Spins. Introduction to symmetries in quantum physics. Perturbation theory. Radiation. Scattering theory. While this is mostly a course in quantum theory, some applications, like nuclear magnetic resonance, spin waves, physics of nanomagnets will be introduced as time allows.
Indicative Content	- Introduction. - Corpuscular properties of electromagnetic radiation, wave properties of particles. - The Schrodinger equation. - Wave function, the uncertainty principle. - Quantum mechanics in one dimension. - Energy quantization. Tunneling. Barriers. Trapped particles, vibrating molecules, electrons in solids. Applications to semi-conductors. Quantum microscopes. Linear oscillators. - The general theory of quantum mechanics. - Vector spaces, linear operators, matrix mechanics, second quantization.

	- Central forces. - Spherically symmetric potentials. The hydrogen atom. - Theory of angular momentum. - Spins. - Applications to atomic physics, Zeeman effect. Magnetic resonance. Magnetic properties of materials: paramagnets, ferromagnets. - Introduction to symmetries in quantum physics. - Symmetries and conservation laws. - Perturbation theory. - Stationary and time dependent perturbations. Fermi's golden rule. - Radiation. - Einstein coefficients. - Scattering theory. - Partial wave expansion. Bohr approximation..