

University of Pretoria Yearbook 2018

Quantum field theory 717 (PHY 717)

Qualification Postgraduate

Faculty [Faculty of Natural and Agricultural Sciences](#)

Module credits 10.00

Prerequisites Admission only by permission of the Head of the Department of Physics

Contact time 2 lectures per week

Language of tuition Module is presented in English

Department Physics

Period of presentation Semester 2

Module content

Special relativity. Representation of transformations in quantum physics. Canonical quantisation of free scalar fields. Interactions, scattering and the reduction formula. Path integrals in quantum mechanics; the harmonic oscillator. Free fields. Interacting fields, perturbation theory and Feynman diagrams. Scattering amplitudes and the Feynman rules. Renormalisation: Dimensional analysis, the exact propagator, the exact three point vertex, higher order corrections and perturbation theory to all orders. Symmetry: Continuous symmetries and conserved currents, discrete symmetries. The renormalisation group: Infrared divergences, different renormalisation schemes and asymptotic freedom, the renormalisation group. Spontaneous symmetry breaking: A discrete example, a continuous example, the Goldstone boson.

The information published here is subject to change and may be amended after the publication of this information. The [General Regulations \(G Regulations\)](#) apply to all faculties of the University of Pretoria. It is expected of students to familiarise themselves well with these regulations as well as with the information contained in the [General Rules](#) section. Ignorance concerning these regulations and rules will not be accepted as an excuse for any transgression.