Canonical Quantisation

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This course of 8 lectures is intended primarily for first year graduate students in Theoretical Physics.It aims to give a short introduction to quantum field theory in the canonical formalism. It is a pre-requisite for Prof. Cardy's course " Quantum Field Theory I" (second half of MT 2000 and first half of HT 2001), which will use the path integral approach. The course will assume basic knowledge of
1) Lagrangian and Hamiltonian formulations of classical dynamics for discrete and continuous systems;
2) the Klein-Gordon and Dirac equations, and 4-vector notation;
3) simple uses of a's and $a^\dagger$'s for the simple harmonic oscillator in quantum mechanics.

The topics I hope to cover are:-
1. Canonical quantisation in the Lagrangian formalism. Free spin-0 and spin-1/2 fields.
2. Global U(1) symmetry: number conservation laws; particles and antiparticles; symmetry generators.
3. Local U(1) symmetry: introduction of electromagnetism.
4. The interaction picture and the Dyson series.
5. The scalar 'ABC' model. The decay C $\rightarrow$ A + B. A + B $\rightarrow$ A + B scattering in lowest order. Propagators. Tree graphs. The Feynman rules for the ABC model. Particle exchange and the Yukawa potential. Differential cross section.
6. Loops, and introduction to renormalisation of the ABC model.
Note: The above sections do not necessarily correspond to single lectures.

Textbooks.
Mandl and Shaw " Quantum Field Theory" provides a practical introduction. The standard q.f.t. text for particle theory students is now Peskin and Schroeder " An Introduction to Quantum Field Theory". Useful for reference is Itzykson and Zuber " Quantum Field Theory" and especially Weinberg " The Quantum Theory of Fields" (2 vols.).