**Syllabus (Tentative) of Introduction to Quantum Field Theory**

(**Borrowed from: QFT in a nutshell [M. Cacciari])**

**A1. Recap of special relativity**

Change of frame, four vectors, boosts

Relativistic kinematics

Decay in two, three bodies

Two-body reactions, phase space and flux, cross section

**A2. Introduction to spin 0, 1/2, 1 particles**

Klein-Gordon lagrangian

Notion of spin, helicity, polarisation

Dirac and Electromagnetism lagrangians

**A3. Dirac equation**

Dirac equation and its solutions

Diracology

Illustration: g-2 (first order)

**A4. QED**

Gauge invariance, covariant derivative

Coupling of photon to fermions

Feynman rules

First applications: e.m. potential

**A5. e+ e- -> mu+ muComputation with trace identities**

Angular analysis

Helicity analysis

Non-relativistic and ultrarelativistic limits

Crossing symmetry

**A6. Electron-photon interaction**

Compton scattering

Bhabha scattering

Soft bremsstrahlung

Infrared and collinear divergencies

**A7. Vacuum polarisation**

Notion of self-energy

One-loop computation

Notion of regularisation

Implementations: dimensional regularisation, alternatives

**A8. Path integral and functional methods**

Path integral in quantum mechanics

Functional quantisation of scalar fields

Anticommuting fields

Dirac field and Path Integrals

Path Integral Quantization of the Free Electromagnetic Field

**Bibliography**

1. An Introduction to Quantum Field Theory, Michael E. Peskin and Daniel V. Schroeder, Addison-Wesley
2. Gauge Theories in Particle Physics (vols I and II), I. J. R. Aitchison and A. J. G. Hey, CRC Press/Taylor and Francis
3. Quantum Field Theory in a Nutshell, A. Zee, Princeton Univ Press
4. An introduction to Quantum Field Theory, G. Sterman, Cambridge Univ. Press
5. The Quantum Theory of Fields (vols 1 and 2), S. Weinberg, Cambridge Univ. Pres

(Reemplazar Weinberg por 6 y 7-Sugerencia de Anamaria Font)

1. M. Srednicki, Quantum Field Theory
2. M. Schwartz, Quantum Field Theory and the Standard Model
3. Field Theory: A Path Integral Approach, Ashok Das, World Scientific Lecture Notes in Physics.

COMENTARIO DE ANAMARIA FONT

Supongo que en discusiones de la comisión acordaron incluir integrales de camino? Hay buenas razones para aprender esto en un curso de QFT, pero si el objetivo es preparar a los estudiantes para el área de física de partículas quizás el punto A.8 del programa de Cacciari sea más útil.