Graduate Course Description

Spring 1997

Course Title: Renormalization

Course and unique no.: M393C (51510)

Instructor: Hans Koch **Hour:** TTH 11:00–12:30 RLM 12.166

Brief description: Several important open problems in mathematical physics are at a point where renormalization group ideas provide the best hope for a solution. (The same may eventually happen in other areas of analysis.) This includes the construction of a nontrivial quantum field theory in four dimensions, an explanation of critical phenomena in statistical mechanics, a description of the breakup of smooth invariant tori in classical Hamiltonian systems, etc.

This course covers the basic concepts of renormalization, some of the techniques used (from nonlinear analysis and perturbation theory), and a variety of applications. The applications will be selected from: Period doubling cascades for maps, critical circle maps, KAM theory in Hamiltonian dynamics, hierarchical models in statistical mechanics, central limit theorems and random resistor networks, the sine-Gordon field theory, nonlinear parabolic PDE's.

Prerequisites: Real and abstract analysis will be useful.

Textbook(s): None

Consent of instructor required: No

November 4, 1996