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Nota di contenuto	Contents; Preface; A Walk in the Noncommutative Garden A. Connes and M. Marcolli; Contents; 1. Introduction; 2. Handling Noncommutative Spaces in the Wild: Basic Tools; 3. Phase Spaces of Microscopic Systems; 4. Noncommutative Quotients; 5. Spaces of Leaves of Foliations; 6. The Noncommutative Tori; 7. Duals of Discrete Groups; 8. Brillouin Zone and the Quantum Hall Effect; 9. Tilings; 10. Noncommutative Spaces from Dynamical Systems; 11. Noncommutative Spaces from String Theory; 12. Groupoids and the Index Theorem; 13. Riemannian Manifolds, Conical Singularities; 14. Cantor Sets and Fractals 15. Spaces of Dimension $z$ and $\text{DimReg}$ 16. Local Algebras in Supersymmetric QFT; 17. Spacetime and the Standard Model of Elementary Particles; 18. Isospectral Deformations ; 19. Algebraic Deformations; 20. Quantum Groups; 21. Spherical Manifolds; 22. Q-lattices; 23. Modular Hecke Algebras; 24. Noncommutative Moduli Spaces, Shimura Varieties; 25. The Ad`ele Class Space and the Spectral Realization; 26. Thermodynamics of Endomotives and the Tehran Program; References; Renormalization of Noncommutative Quantum Field Theory H. Grosse and R. Wulkenhaar; Contents; 1. Introduction 1.1. Noncommutative geometry 2. Some Models for Noncommutative Space(-Time); 2.1. The Moyal plane; 2.2. The noncommutative torus;

2.3. Fuzzy spaces; 3. Classical Field Theory on Noncommutative Spaces; 3.1. Field theory on the noncommutative torus; 3.2. Classical action functionals on the Moyal plane; 4. Regularization; 5. Renormalization; 5.1. Quantum field theory on the noncommutative torus; 5.2. Quantum field theories on the Moyal plane; 5.3. The power-counting analysis of Chepelev and Roiban; 5.4. -expanded field theories; 5.5. Noncommutative space-time

6. Renormalization of Noncommutative 4-theory to All Orders  
6.1. The 4-action in the matrix base; 6.2. Renormalization group approach to dynamical matrix models; 6.3. Power-counting behavior of the noncommutative 4-model; Acknowledgements; References; Lectures on Noncommutative Geometry M. Khalkhali; Contents; 1. Introduction; 2. From  $C^*$ -algebras to noncommutative spaces; 2.1. Gelfand-Naimark theorems; 2.2. GNS, KMS, and the flow of time; 2.3. From groups to noncommutative spaces; 2.4. Continuous fields of  $C^*$ -algebras; 2.5. Noncommutative tori; 3. Beyond  $C^*$ -algebras  
3.1. Algebras stable under holomorphic functional calculus  
3.2. Almost commutative and Poisson algebras; 3.3. Deformation theory; 4. Sources of noncommutative spaces; 4.1. Noncommutative quotients; 4.2. Hopf algebras and quantum groups; 5. Topological K-theory; 5.1. The K functor; 5.2. The higher K-functors; 5.3. Bott periodicity theorem; 5.4. Further results; 5.5. Twisted K-theory; 5.6. K-homology; 6. Cyclic Cohomology; 6.1. Cyclic cocycles; 6.2. Connes' spectral sequence; 6.3. Topological algebras; 6.4. The deformation complex; 6.5. Cyclic homology; 6.6. Connes-Chern character  
6.7. Cyclic modules

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Sommario/riassunto

This is the first existing volume that collects lectures on this important and fast developing subject in mathematics. The lectures are given by leading experts in the field and the range of topics is kept as broad as possible by including both the algebraic and the differential aspects of noncommutative geometry as well as recent applications to theoretical physics and number theory.

*Sample Chapter(s)*  
A Walk in the Noncommutative Garden (1,639 KB)  
*Contents:*

- A Walk in the Noncommutative Garden (A Connes & M Marcolli)
- Renormalization of Noncommut

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