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| Soggetti | Differential & Riemannian geometry<br>Relativistic quantum mechanics & quantum field theory<br>Global analysis, analysis on manifolds<br>Functional analysis<br>Quantum theory |
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| Sommario/riassunto | Noncommutative geometry, inspired by quantum physics, describes singular spaces by their noncommutative coordinate algebras, and metric structures by Dirac-like operators. Such metric geometries are described mathematically by Connes' theory of spectral triples. These lectures, delivered at an EMS Summer School on noncommutative geometry and its applications, provide an overview of spectral triples based on examples. This introduction is aimed at graduate students of both mathematics and theoretical physics. It deals with Dirac operators on spin manifolds, noncommutative tori, Moyal quantization and tangent groupoids, action functionals, and isospectral deformations. The structural framework is the concept of a noncommutative spin geometry; the condiditons on spectral triples which determine this concept are developed in detail. The emphasis throughout is on gaining understanding by computing the details of specific examples. The book provides a middle ground between a comprehensive text and a narrowly focused research monograph. It is intended for self-study, enabling the reader to gain access to the essentials of noncommutative |

geometry. New features since the original course are an expanded bibliography and a survey of more recent examples and applications of spectral triples.