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Equivariant K-theory and freeness of group actions on C^*-algebras, by N. Christopher Phillips. Lecture Notes in Math., vol. 1274, Springer-Verlag, Berlin and New York, viii + 371 pp., $32.90. ISBN 3-540-18277-2

K-theory for C^*-algebras is also known under the name of "noncommutative" topology. A C^*-algebra is a Banach algebra that has the same abstract properties as the algebra $\mathscr{C}(X)$ of continuous complex-valued functions on a compact space X except for the fact that the multiplication is not necessarily commutative.

Noncommutative C^*-algebras arise naturally from group actions on topological spaces, foliated manifolds, pseudodifferential operators, etc., and they also formalize the noncommuting variables of quantum mechanics.

Even if one is only interested in spaces, one often has to extend the frame to the noncommutative category as certain natural constructions in K-theory automatically lead to noncommutative algebras. One might go as far as to compare this to the passage from real to complex numbers in analysis.