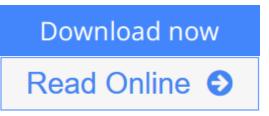# An Introduction to Central Simple Algebras and Their Applications to Wireless Communication (Mathematical Surveys and Monographs)

By Grégory Berhuy, Frédérique Oggier

An Introduction to Central Simple Algebras and Their Applications to Wireless Communication (Mathematical Surveys and Monographs) By Grégory Berhuy, Frédérique Oggier

Central simple algebras arise naturally in many areas of mathematics. They are closely connected with ring theory, but are also important in representation theory, algebraic geometry and number theory. Recently, surprising applications of the theory of central simple algebras have arisen in the context of coding for wireless communication. The exposition in the book takes advantage of this serendipity, presenting an introduction to the theory of central simple algebras intertwined with its applications to coding theory. Many results or constructions from the standard theory are presented in classical form, but with a focus on explicit techniques and examples, often from coding theory. Topics covered include quaternion algebras, splitting fields, the Skolem-Noether Theorem, the Brauer group, crossed products, cyclic algebras and algebras with a unitary involution. Code constructions give the opportunity for many examples and explicit computations. This book provides an introduction to the theory of central algebras accessible to graduate students, while also presenting topics in coding theory for wireless communication for a mathematical audience. It is also suitable for coding theorists interested in learning how division algebras may be useful for coding in wireless communication.

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