The paper under review is a survey on quasideterminants for matrices over a division ring. In the introduction the authors outline the many attempts of defining a determinant for matrices with non-commutative entries in the past 160 years. In the main part of the paper the authors (1) give a definition of quasideterminants and describe their main properties, (2) discuss quasideterminants of quaternionic matrices, (3) give a general definition of determinants of non-commutative matrices based on the notion of quasideterminants and show how to obtain some well-known non-commutative determinants as specializations, (4) introduce non-commutative Plücker and flag coordinates for rectangular matrices over a division ring, (5) discuss how to factorize a non-commutative univariate polynomial into products of linear polynomials (non-commutative Bézout theorem) and how to express the coefficients of a non-commutative univariate polynomial in terms of its roots (non-commutative Viète theorem), (6) give a theory of non-commutative symmetric functions, (7) construct universal quadratic algebras associated with so-called pseudo-roots of non-commutative polynomials and non-commutative differential polynomials, (8) present another approach to the theory of non-commutative determinants by using cyclic vectors and relate this to the results of (3) and (5), (9) give some applications to non-commutative continued fractions, characteristic functions of graphs, factorizations of differential operators and non-commutative variation of constants, non-commutative integrable systems, and non-commutative orthogonal polynomials. The paper concludes with an extensive bibliography on the subject.