Given a directed graph $E$ we define a method for constructing a Leavitt path algebra $L_R(E)$ whose coefficients are in an arbitrary unital ring. We extend Tomford’s work on Leavitt path algebras with coefficients in a commutative unital ring to the context of Leavitt path algebras with coefficients in a noncommutative ring. In particular, we extend Tomford’s proofs of the Graded Uniqueness Theorem and the Cuntz-Krieger Uniqueness Theorem to Leavitt path algebras with coefficients in an arbitrary unital ring. Furthermore, we show that if $K$ is a field and $R$ is a $K$-algebra, then $L_R(E) \cong R \otimes L_K(E)$ as $R$-algebras. (Received September 20, 2009)