In higher category theory, it is often productive to think of morphisms \textit{algebraically}: equipped with some particular structure, rather than satisfying some defining property. Exploring this perspective in algebraic topology, we introduce \textit{algebraic model structures}, which augment Quillen’s model categories. Despite the plethora of familiar examples, this new theory has some peculiar features, which we describe. We also “algebraicize” classical results: for instance, defining an \textit{algebraic Quillen adjunction} and proving they exist in common situations. (Received August 10, 2010)