The object of this thesis is a theory of stochastic integration, i.e., an integration of a stochastic process with respect to a stochastic process. First, the Ito integral with respect to processes with finite quadratic variation is presented. This integral is then used to define the Stratonovich integral and both integrals are subsequently compared in terms of a martingale property and so-called chain rule. The core of this work is then a comparison of these two integrals as limits of aproximating sums. A third variant of an integral, first introduced in Stratonovich (1966), is then defined as a limit of sums of a different type. The resulting integral is equivalent to the original Stratonovich integral when the integrand is the Wiener process, however, it may differ if even when integrating with respect to a continuous process (a counterexample Yor (1977) is provided). A sufficient condition for an equivalence of these two integrals from Protter (2004) is presented.