An approach to the study of diffusion semigroups kernels based on the usage of Wiener path integral representation will be discussed. Within this approach explicit formulas for heat invariants are established and two-sided estimates for the heat trace are obtained. In the case of diffusion with a drift we make use of Feynman-Kac-Ito formula to specify short-time asymptotics. A semigroup generated by potential perturbation of biLaplacian is treated as a model in non-diffusion case. Parametrix expansion will be applied then to study short-time asymptotics of the corresponding integral kernel and its regularized trace.