Abstract: We study the generalization of the $G/G/1$ queue obtained by relaxing the assumption of independence between inter-arrival times and service requirements. The analysis is carried out for the class of multivariate matrix exponential distributions introduced in Bladt & Nielsen 2010. In this setting, we obtain the steady state waiting time distribution and we show that the classical relation between the steady state waiting time and the workload distributions remains valid when the independence assumption is relaxed. We also prove duality results with the ruin functions in an ordinary and a delayed ruin process. These extend several known dualities between queueing and risk models in the independent case. Finally we show that there exist stochastic order relations between the waiting times under various instances of correlation.

Keywords: G/G/1 queue, dependence, waiting time, workload, stochastic ordering, duality, ruin probability, insurance risk, Value at Risk.

2000 Mathematics Subject Classification. Primary 60K25, 91B30.