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# ΘΕΩΡΙΑ ΟΥΡΩΝ ΑΝΑΜΟΝΗΣ



## METADATA

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### Abstract

This book presents an introduction to Queueing Theory, which is a multidisciplinary area in the intersection of Applied Mathematics (mainly of Operations Research and Applied Probability), of Engineering (Industrial, Electrical and Mechanical Engineering), of Computer Science, as well as of Management Science. To this end, the book introduces the reader to the study of service systems, using mathematical models that represent input-output systems of customers who receive some form of service from servers that operate under a certain degree of uncertainty. The book starts with a brief overview of the various stages in the study of queueing systems which comprise the mathematical modeling, the performance evaluation, the optimal design, the optimal control, the quantification of the strategic behavior and the comparison with other queueing systems. Then, the book focuses in greater detail on the mathematical modeling and the

performance evaluation of service systems. Towards this direction, we first present some basic mathematical tools of Queueing Theory that comprise concepts, theorems and computational results from Probability Theory and in particular from the theory of Markov chains. Later, we present a systematic study of the most fundamental queueing systems that appear in the literature, starting from systems that are represented by birth-death processes (of M/M/1 type) and moving towards more complex systems that require general Markov chains. Moreover, we study the basic queueing networks of Jackson type that fall within the Markovian framework and the classical non-Markovian models that appear in the literature (of type M/G/1 and G/M/1). Finally, the introduction to the field is completed with an overview of the more advanced topics of optimal design, of optimal control and of the strategic customer behavior in queueing systems.

