Stochastic modeling in inventory and production control

Subject area: Electrical Engineering

University: TU/e
Level: MA all years
Teaching mode: completely online, not time-specific
Instructor(s): Prof. Ivo Adan

Short description

This course offers an introduction to mathematical topics that are used in Operations Management and introduces some production and inventory topics that are important in Operations Management.

Full description

Students from other bachelors than Industrial Engineering lack basic knowledge about topics such as production and inventory control and the theory of probability and stochastics. This course covers a range of topics that are highly recommended to study in preparation for the courses that are offered in the Operations Research/Operations Management master programs.

On the one hand this course exists of an introduction to a number of mathematical techniques/areas such as probability theory, Markov chains, queueing theory and renewal theory. These techniques are introduced in the available reader for the course and can be practiced with the associated exercises. Additional explanation can be obtained through watching available video lectures/material.

On the other hand, we give a brief introduction into a few main topics in Operations Management, which are assumed to be known in the master phase. We discuss the solution of inventory problems in situations of both certain and uncertain demand. Furthermore, we treat dynamic lotsizing heuristics that optimize cases with varying demand. Finally, we give a brief introduction into production control methods.

The acquired knowledge can be seen as a first toolbox that contains methods and techniques to be used to solve simple logistic company problems. The exercises of this course contain multiple examples of such problems and require you to solve them.

The course is fully based on self study. Students are supposed to study the topics themselves and practice with the available material. For further questions the student is expected to be able to find relevant scientific literature independently, possibly using the provided academic sources.

Learning outcomes

After finishing this course, students will be able to:

•   Use the basics of probability theory to deduce insights in problems with uncertainty.

•   Use Markov chains and Markov processes to solve simple problems in which they can be applied.

•   Calculate performance characteristics of basic queues using queueing theory.

•   Explain under which circumstances renewal theory can be applied and show what are the advantages of doing so.

•   Model basic inventory problems and calculate what is the optimal solution for problems with a known constant future demand.

•   Model an inventory problem with demand uncertainty and calculate the minimum cost.

•   Apply the important heuristics and solutions in the area of dynamic lotsizing and production control for easy problem instances.

General information

Contact hours per week:	0, the student is supposed to self study. Any questions can be asked via the Discussions forum.
Total workload:	70 (in student hours for the whole course)
ECTS credits:	2.5
Language:	English

Course start date:	24 April 2023
Course end date:	09 July 2023
Add. info about start date:	Course can still be started later in the quartile or semester.
Weekly teaching day/time:	Selfstudy
Time zone:	CET (Denmark, Germany, France, Netherlands, Switzerland, Czech Republic)
Further information:	

Prerequisites:	Basic Probability
Activities and methods:	Self-study, Exercises
Presence on campus:	Not required

Final examination

Form:	written
Date:	03/07/2023

Location/format:	online
Re-sit possibility:	yes
Transcript available:	on request
Add. info/requirements:	Quiet working space required!

Registration

To register for this course, follow the registration requirements of your **home university** as specified here: www.euroteq.eu/courses-registration.

Administration

Number of places:	20
Minimum participants:	
Internal course code:	1CM210
Contact:	i.adan@tue.nl

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