Research School for Transport, Infrastructure and Logistics

Research School for Operations Management and Logistics

GP-OML Capita Selecta

Modeling, queueing analysis, simulation and optimization of manufacturing systems

Date:	**28.11, 5.12**
Time:	**10:00 – 16:00**
Location:	**Utrecht, Boswell-Beta**
Course leaders:	**Dr. Yoav Kerner**
Days:	**2**
ECTS:	**0.5 (attendance) / 2 (assignment)**
Course fee:	**Free for TRAIL/Beta/OML members, others please contact the TRAIL office**
Registration:	www.gp-oml.nl **or** www.onderzoeksschool-beta.nl

Objectives
The main goal of the course is to expose the students to these advanced methods and their uses, and show how tackling a complex problem of resource allocation in production systems requires integrating advanced tools from many fields.

Course description
The majority of the course will be devoted to one grand example. In this example, a multi-station production system is examined. The stations share common inspection and maintenance resources. One needs to decide how to allocate these resources between the various stations. We are facing a bi-criteria problem. We want short (and without interruptions) production cycle, but we also want good products. The two major steps are first studying the performance of the system given a maintenance policy and then finding the optimal policy. In the course we take a the main question of finding an optimal maintenance policy and break it into pieces. The solution of the problem brings tool from

- Modeling – to quantify the times and features as variables.
- Stochastic processes - to model the general system, approximate it by a `simple' system, and analyze it
- Simulation - to estimate the goodness of the approximation
- Optimization – to find the optimal resource allocation via a proper optimization algorithm
- Statistical modeling and inference – to validate the effectiveness of the algorithm

Assignment
There will be an assignment after each of the two lectures, i.e., two assignments in total. These assignments may be solved in pairs.

Program
The development of the course will be: introducing the field of each step in the long way; bringing the basic of the field; going from basic concepts to advanced methods and teaching the advance methods.
The exact contents of the lectures will be made available before the course starts.

Course material
https://www.dropbox.com/s/savt44e5wwjfxj1/Inspection%20and%20Repair%20Resource%20Allocation%20in%20Semiconductor%20Operations%20-%2026.05.18.pdf?dl=0

Methodology
During the course we will rehearse briefly the basic concepts of random variables, Markov chain, optimization and statistical tests. We will then study advanced tools that rely on these concepts and extend them.

Prerequisite
Introductory courses in statistical inference, probability and OR.