Robust and Adaptable Production Systems

Module code:	Workload:	Semester:
MRPS	150 h	(WiSe) Sem.
Credits:	**Duration:**	**Frequency:**
5	1 Sem.	each winter term
Independent study:	**Class size:**	**Contact hours:**
90 h		4 SWS / 60 h
Module-No.:	**Exam.-No.:**	**Percentage of final score:**
7957	9999	PEM: 4,39; HI: 5,55
Language of instruction:	**Vers. BPO/MPO min.:**	**Internal: Code/Status**
english	MPO-2017	771 / aktiv

Type of course:

Seminaristic lecture: 2 hours per week / 30 h Practical part: 2 hours per week / 30 h

Learning outcomes/Competencies:

The course enables students to identify, analyze and develop models for stochastic work processes. Therefore, students learn to understand the impact of stochastic in production systems. After this course students are familiar with the theory and practice of the analysis of stochastic production processes. They learn to adapt and apply simulation methods of discrete event systems and robust planning methods. Thus, the students are able to develop, evaluate and deploy algorithms to describe or predict the behavior of such systems.

Deterministic approaches

- Languages, various kinds of automata, automata-generated languages
- Properties and relations of state charts

- Petri nets and coverability trees
- Timed models

Stochastic approaches

- Stochastic timed models
- Markov Chains and Variable Length
- Queuing models
- Bayesian Networks and Dynamic Bayesian Networks
- Event scheduling schemes and output analysis with terminating and non-terminating simulations

Content/subject aim:

Production systems often operate in an uncertain environment due to uncertain demand, the behavior of humans, unreliable machines or random processing capacities. This equally applies for service management and physical goods production. In order to support decisions for such uncertain production systems, the course apply analytical solution approaches as well as discrete event simulation. Therefore a starting point is the definition of Discrete Event Systems and fundamentals of simulation, modeling and application in the field of Industrial Engineering. The basic concepts of the analysis of Markovian queueing systems and Bayesian networks are developed in detail. Advanced topics such as queueing systems with general distributions, heterogeneities and time-dependent input parameters are analyzed with the help of simulation software. Additionally, activity and actor-oriented simulation models are discussed to describe standardized and weakly structured work processes. This includes the development and the implementation of algorithms. Several methods and performance measures of robust planning and optimization are introduced.

Teaching methods:

Use Case Teaching, Project work

Prerequisites for participation:

none

Assessment methods / First Examinator / Second Examinator:

written draft and colloquium / Prof. Tackenberg / Prof. Glatzel

Requirements to get the credit points:

passed examination

This module is used in the following degree program: (in semester-no.)

(WiSe) M.Sc. Production Engineering and Management (P)

(WiSe) M.Sc. Wirtschaftsingenieur der Holzindustrie (P)

Weight of grade for final grade:

5/90: M.Sc. Wirtschaftsingenieur der Holzindustrie

5/114: M.Sc. Production Engineering and Management

Responsibility for module / Teacher of the submodule:

Prof. Dr. Sven Tackenberg

Other information / literature:

Literature:

Selected journal articles or book chapters