

**Title: System informatics and logistics**

**Lecturer:** Prof. Dr. Gasper Music

**Aim of the course:**

The aim of the subject is to upgrade theoretical knowledge and functional understanding of modelling and simulation in the study of information, production and logistic systems, to learn principles of planning and scheduling in project management, to present planning and scheduling fundamentals in production and service operation management, to present applications of artificial intelligence methods in planning and scheduling.

**Required (pre)knowledge:**

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**Contents:**

Modelling of information, production and logistic systems. Continuous, hybrid and discrete-event models. Modelling with automata, Petri net modelling. Reactive systems, state char modelling. Unified modelling language (UML). Simulation of information, production and logistic systems. Discrete-event simulation. Basic concepts, simulation execution and interpretation of results. Discrete-event simulation software. Visualization in animation in simulation. production and logistic system simulation examples.

Project management. Planning and scheduling principles in project management. Critical path method (CPM), PERT method. Project management software. Application of project management principles.

Planning and scheduling in production and services. Planning and scheduling models. Planning algorithms. Linear and mixed integer linear programming, dynamic programming, applications in planning and scheduling. Heuristic scheduling, Petri net scheduling. Planning and scheduling software. Application examples.

Artificial intelligence methods in planning and scheduling. Application of data mining. Historical production data driven scheduling rules extraction. Intelligent heuristics and multi-agent systems in planning and scheduling.

**Selected references:**

- T. Boucher, A. Yalcin, Design of Industrial Information Systems, Academic Press, 2006.
- C. G. Cassandras, S. Lafortune, Introduction to Discrete Event Systems, Kluwer, 1999.
- D. Harel, M. Politi, Modeling Reactive Systems with Statecharts, McGraw-Hill, 1998.
- M. L. Pinedo, Planning and scheduling in manufacturing and services, New York, Springer, 2005.