



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Simulation and Forecasting in the Company

### Course

Field of study

Management and Production Engineering

Area of study (specialization)

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

Jacek Diakun, Ph.D.

Responsible for the course/lecturer:

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Faculty of Mechanical Engineering

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### Prerequisites

Principles of production management and processes improvement. Principles of statistics.

### Course objective

The objective of the course is to familiarize the students with principles of simulation method to processes and forecasting.

### Course-related learning outcomes

Knowledge

Understanding of usage of simulation method for processes. Knows stages of simulation study.

Awareness of advantages and disadvantages of simulation method. Knows principles of forecasting.



### Skills

Simulation model building and its verification and validation. Input data analysis for simulation purposes. Design and conducting of simulation experiment. Output data analysis of stochastic simulation. Decomposition of time series for forecasting purposes. Application of basic forecasting models.

### Social competences

Communication with specialists from the company (i.e. processes owners) in order to acquisition of data necessary for simulation. Presentation of simulation project outcomes for company managers.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: colloquium at the end of the course.

Laboratory: assessments of part of the work according to the simulation study stage.

### Programme content

Lecture:

Introduction to simulation. Simulation as research method. Contextes of term "simulation". Types of simulation. Algorithm of discrete-event simulation. Stages of simulation study. Problem formulation. Types of simulation models. Simulation model building. Verification and validation of simulation model. Input data for production processes simulation. Statistical input data analysis for simulation purposes. Design of simulation experiment. Analysis of simulation output data. Analysis of selected case studies. Introduction to forecasting. Stages of forecast preparation. Basic forecasting models.

Laboratory:

Algorithm of discrete-event simulation. Model building, its verification and validation. Input data analysis for simulation. Output data analysis of stochastic simulation. Design and conducting of factor experiment simulation. Time series analysis for forecasting. Building and assessment of forecasting model.

### Teaching methods

Lecture with on-line examples. Laboratory.

### Bibliography

Basic

Robinson, Simulation. The Practice of Model Development and Use

Banks, Carson, Nelson, Nicol, Discrete-Event System Simulation

Beaverstock, Greenwood, Nordgren, Applied Simulation. Modeling and Analysis using FlexSim, 5th Edition

Cieślak, Prognozowanie



Additional

FlexSim simulation software manual (on-line)

Materials from "Winter Simulation Conference" (sections: "Introductory Tutorials", "Manufacturing Applications")

### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	20	0,5

<sup>1</sup> delete or add other activities as appropriate