SYLLABUS

Name: Modelling and analysis of production systems
Name in Polish: Modelowanie i analiza procesów produkcyjnych
Name in English: Modelling and analysis of production systems

Information on course:

Course offered by department:	Faculty of Organisation and Management
Course for department:	Silesian University of Technology
Study level and form:	Master's degree/~~Bechelor's degree~~, Full-time
Term:	winter semester 2024/2025
Coordinator of course edition:	Magdalena Palacz, Ph.D., D.Sc.

Default type of course examination report:

credit

Language:

English

Course homepage:

[link]

ECTS

4

Short description:

The subject Modelling and Analysis of Production Processes is aimed at providing structured knowledge in the field of production process modelling, as well as the use of simulation tools to analyse the operation of modelled processes. This knowledge allows, among other things, to solve problems in the field of production process optimisation, production process planning, use of IT systems for advanced production planning and scheduling. The content presented in the lectures is also intended to provide students with the knowledge necessary for the laboratory classes.

It is assumed that the student has knowledge of: Automated Manufacturing Systems, Production Control.

Description:

Proposed lecture content:
1. modelling and simulation - introduction
2. basic issues in manufacturing systems
3 Models of mass handling systems
4 Simplex method - introduction and application to manufacturing
5 Introduction to advanced planning systems
6. introduction to FlexSim software

Proposed lab content:
1. use of FlexSim software to model manufacturing systems
2. modelling of a selected manufacturing process
3. Conduct an analysis of the manufacturing process using the developed model.

Proposed project content:
1. Preparation of a document explaining the assumptions and results of the conducted variant analysis of the process model prepared during the laboratory classes.

Forms of teaching, including the number of teaching hours:
Lecture/Laboratory/Project 18/18/9h.

Number of hours with direct participation of academic teachers or other instructors: 45
Number of hours devoted to students' own work:
Preparation of the project to be used in the laboratory: 40 h
Preparation of presentation: 35 h
Total number of hours: 120
Number of ECTS credits: 4
of which
Number of ECTS credits obtained through classes with direct participation of academic teachers or other instructors and students: 1,5

Bibliography:

Basic literature:
Durlik I.: Management engineering. Strategy and design of production systems. Cz. I, II. Gdańsk-Warszawa. 1996-2004.
Durlik I.: Technical and organisational design of industrial plants. PG, Gdańsk 1992.
Lis S., Santarek K.: Designing the arrangement of workstations. PWN, Warszawa, 1980.
Lewandowski J., Skołud B., Plinta D.: Organisation of production systems, PWE, Warszawa 2010

Supplementary literature:
Borkowski S., Ulewicz. R.: Zarządzanie produkcją. Production systems. Humanitas, Sosnowiec, 2009.
Beaverstock M., Greenwood A., Nordgreen W.: Applied Simulation. Modelling and Analysis using FlexSim. Orem, 2017
Brzeziński M. (ed): Production organisation and control: design of production systems and production control processes, PLACET, Warsaw, 2002
Martyniak. Modern methods of production management. AGH, Cracow, 1996
Pająk E.: Production management: product, technology, organisation. PWN, Warsaw, 2009
Web link of the tutorial [link 01].
instructors and students: 1,5

Learning outcomes:

Knowledge: the student knows and understands
K1A _W1: Advanced issues in mathematics, physics, statistics and the field of engineering sciences, useful for formulating and solving tasks in the field of management and production engineering.
K1A _W3: Basic engineering processes and technologies occurring in the life cycle of technical equipment, objects and systems and ways of solving typical engineering tasks, in particular in relation to the organisation of production processes and production management.
Skills: The student will be able to:
K1A _U1: Identify, formulate and solve complex and non-routine engineering problems related to production management and engineering, by applying engineering, scientific and mathematical principles, and perform tasks under conditions that are not fully predictable.K1A _U3: Plan and conduct experiments, including measurements and computer simulations, visualise data and interpret the results obtained, and draw conclusions.
K1A _U3: Plan and carry out experiments, including measurements and computer simulations, visualise data and interpret the results obtained, and draw conclusions.
K1A _U4: In identifying and formulating specifications of engineering tasks and solving them:
- select and use analytical, simulation and experimental methods, including computer-aided methods,
- recognise their system and non-technical aspects, including ethical aspects,
- make a preliminary economic assessment of proposed solutions and engineering actions taken,
- analyse technology transfer and innovation.
K1A _U6: Design - to a given specification - new and supervise existing production and operational facilities, processes and systems, using appropriate methods, techniques, tools and materials in relation to the modelled production process.
Social competence: the student is prepared to:
K1A _K1: Critically evaluate the knowledge he/she possesses and the content he/she receives, recognise the importance of knowledge in solving cognitive and practical problems, and seek expert advice when he/she has difficulty solving problems independently.

Assessment methods and assessment criteria:

Lecture: Students participate in class by learning the subsequent teaching content according to the course syllabus. Students should ask questions and clarify doubts on an ongoing basis. Audio-visual recording of the lecture requires the consent of the instructor. In addition, students solve a subject test prepared for the supplementary content in the Remote Learning Platform.
Project: carry out a written study and presentation of the design of a production system of a selected component. Progress monitored in subsequent classes.
Laboratory: students develop a project and present the results of a variant analysis of the developed production system according to the instructor's guidelines.

A prerequisite for passing the course is obtaining a positive test result from the theoretical (lecture) part and presentation of the project during the last classes. Project assessment is carried out in accordance with the criteria specified in the Quality Assurance Book of the Silesian University of Technology. Both the content part, the editing part and the so-called soft competences are evaluated.

Practical placement:

Not applicable