Computer-Aided design and simulation of manufacturing processes - opis przedmiotu

Informacje ogólne

Nazwa przedmiotu	Computer-Aided design and simulation of manufacturing processes
Kod przedmiotu	06.9-WM-ZIP-ZL-ANG-D-14_20
Wydział	~~Wydział Mechaniczny~~
Kierunek	Management and Production Engineering
Profil	ogólnoakademicki
Rodzaj studiów	drugiego stopnia z tyt. magistra inżyniera
Semestr rozpoczęcia	semestr zimowy 2021/2022

Informacje o przedmiocie

Semestr	2
Liczba punktów ECTS do zdobycia	4
Typ przedmiotu	obowiązkowy
Język nauczania	angielski
Sylabus opracował	• dr hab. inż. Sławomir Kłos, prof. UZ

Formy zajęć

Forma zajęć	Liczba godzin w semestrze (stacjonarne)	Liczba godzin w tygodniu (stacjonarne)	Liczba godzin w semestrze (niestacjonarne)	Liczba godzin w tygodniu (niestacjonarne)	Forma zaliczenia
Laboratorium	30	2	-	-	Zaliczenie na ocenę
Wykład	15	1	-	-	Zaliczenie na ocenę

Cel przedmiotu

The aim of the course is to acquaint students with the method of computer simulation and familiarization with the techniques of building simulation models of processes and production systems. After completion of the course students should be able to use the selected software to simulate production processes (eg. Tecnomatix Plant Simulation, Enterprise Dynamics, Arena, etc.), model building (mapping the actual system in a form of a simulation model), Designing of simulation experiments and analysis of research results.

Wymagania wstępne

Knowledge of basic production processes implemented in enterprises.

Zakres tematyczny

Computer simulation as a research method - introduction. Stages of the construction of a simulation model. Generating pseudorandom data based on various probability distributions. Basic objects needed to build the simulation model of the production system. Planning of a simulation experiment. Modelling and simulation of discrete manufacturing processes. Modelling and simulation of assembly processes. Analysis of the efficiency of utilization of production resources. Analysis of the efficiency of logistics processes and inventory levels of work in progress. Analysis of the effectiveness of employees on the basis of a simulation model of the production system.

Lecture 1. Introduction to modeling and simulation of production processes.

Lecture 2. Methodology of building a simulation model of the production system.

Lecture 3. Tecnomatix Plant Simulation system functionality - production flow.

Lecture 4. Tecnomatix Plant Simulation system functionality - production resources.

Lecture 5. The functionality of the Tecnomatix Plant Simulation system - analysis and reports on the course of simulation studies.

Lecture 6. Tecnomatix Plant Simulation system functionality - entering operation times, stochastic distributions.

Lecture 7. Tecnomatix Plant Simulation system functionality - user interface and the most important tools.

Lecture 8. Designing simulation experiments. 3D modeling.

Laboratories

Lab 1. Introduction to modeling production processes in Tecnomatix Plant Simulation.

Lab 2, Lab 3 - Modeling and simulation of discrete processes.

Lab 4, Lab 5 - Modeling of production processes with the use of AGV trucks.

Lab 6, Lab 7 - Analysis of the efficiency of production processes.

Lab 8, Lab 9 - Modeling of production processes carried out with the participation of employees (machine operators).

Lab 10, Lab 11 - Modeling of production logistics processes with the use of pallets. Production flow models for different production batch sizes.

Lab 12, Lab 13 - Modeling and simulation of energy consumption in production systems.

Lab 14, Lab 15 - Designing simulation experiments.

Metody kształcenia

Lecture – Conventional lecture with the use of a videoprojector.

Laboratory– practical classes carried out with the use of a selected simulator.

Efekty uczenia się i metody weryfikacji osiągania efektów uczenia się

Opis efektu	Symbole efektów	Metody weryfikacji	Forma zajęć
The student has an orderly, theoretical knowledge of computer-aided management in an enterprise.	• K_W09	• kolokwium	• Wykład
The student is able to obtain, integrate and interpret knowledge, draw conclusions and formulate opinions on the basis of catalogue entries issued by manufacturers of appliances, advertising material, information obtained from literature, databases and other modern means of communication, which relate to issues of mechanical engineering and management methods in this field.	• K_W04 • K_U04	• kolokwium • wykonanie sprawozdań laboratoryjnych	• Wykład • Laboratorium
The student is able to choose and use appropriate computer applications for calculation, simulation, designing and verification of solutions related to Management and Production Engineering.	• K_U12	• kolokwium • wykonanie sprawozdań laboratoryjnych	• Wykład • Laboratorium
The student is able to think and act both creatively and entrepreneurially.	• K_K06	• wykonanie sprawozdań laboratoryjnych	• Laboratorium
The student has knowledge of development trends and new developments in manufacturing engineering.	• K_W16	• kolokwium	• Wykład

Warunki zaliczenia

Lecture - a written exam at the end of the semester.

Laboratory – final grade is the weighted sum of grades obtained for the completion of individual laboratory classes. The contribution of individual components of evaluation: grade for laboratories - 50%, grade for the lecture – 50%.

Final grade = 50 % of grade for lecture + 50 % of grade for project classes.

Literatura podstawowa

1. Kłos S., The simulation of manufacturing systems with Tecnomatix Plant Simulation, Wydawnictwo UZ, 2017
2. S. Bangsow, Tecnomatix Plant Simulation: Modeling and Programming by Means of Examples, Springer; 2016
3. S. Bangsow, Manufacturing Simulation with Plant Simulation and Simtalk: Usage and Programming with Examples and Solutions, Springer, 2010
4. G. L. Curry, R. M. Feldman, Manufacturing Systems Modeling and Analysis, Springer, 2010

Literatura uzupełniająca

1. Tecnomatix on-line documentation

Uwagi

Zmodyfikowane przez dr hab. inż. Sławomir Kłos, prof. UZ (ostatnia modyfikacja: 30-04-2021 09:57)