

# 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-ZiIP-IJ-ANG-D-17_20                                     |
| Wydział             | <a href="#">Wydział Mechaniczny</a>                             |
| Kierunek            | Management and Production Engineering                           |
| Profil              | ogólnoakademicki                                                |
| Rodzaj studiów      | drugiego stopnia z tyt. magistra inżyniera                      |
| Semestr rozpoczęcia | semestr zimowy 2022/2023                                        |

| Informacje o przedmiocie        |                                                                                      |
|---------------------------------|--------------------------------------------------------------------------------------|
| Semestr                         | 2                                                                                    |
| Liczba punktów ECTS do zdobycia | 3                                                                                    |
| Typ przedmiotu                  | obowiązkowy                                                                          |
| Język nauczania                 | angielski                                                                            |
| Sylabus opracował               | <ul style="list-style-type: none"><li>dr hab. inż. Sławomir Kłos, prof. UZ</li></ul> |

| 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 |

## 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.

L1. Introduction to modeling production processes in Tecnomatix Plant Simulation.

L2, L3 - Modeling and simulation of discrete processes.

L4, L5 - Modeling of production processes with the use of AGV trucks.

L6, L7 - Analysis of the efficiency of production processes.

L8, L9 - Modeling of production processes carried out with the participation of employees (machine operators).

L10, L11 - Modeling of production logistics processes with the use of pallets. Production flow models for different production batch sizes.

L12, L13 - Modeling and simulation of energy consumption in production systems.

L14, L15 - Designing simulation experiments.

## Metody kształcenia

Laboratory – practical classes carried out with the use of Tecnomatix Plant Simulation..

## Efekty uczenia się i metody weryfikacji osiągnięcia 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. | <ul style="list-style-type: none"><li><a href="#">K_W09</a></li></ul> | <ul style="list-style-type: none"><li>kolokwium</li></ul> | <ul style="list-style-type: none"><li>Laboratorium</li></ul> |

| Opis efektu                                                                                                                                                                                                                                                                                                                                                                              | Symbole efektów                                                                                            | Metody weryfikacji                                                                       | Forma zajęć                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| 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. | <ul style="list-style-type: none"> <li>• <a href="#">K_W04</a></li> <li>• <a href="#">K_U04</a></li> </ul> | <ul style="list-style-type: none"> <li>• kolokwium</li> <li>• projekt</li> </ul>         | <ul style="list-style-type: none"> <li>• Laboratorium</li> </ul> |
| 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.                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>• <a href="#">K_U12</a></li> </ul>                                  | <ul style="list-style-type: none"> <li>• kolokwium</li> <li>• projekt</li> </ul>         | <ul style="list-style-type: none"> <li>• Laboratorium</li> </ul> |
| The student is able to think and act both creatively and entrepreneurially.                                                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>• <a href="#">K_K06</a></li> </ul>                                  | <ul style="list-style-type: none"> <li>• wykonanie sprawozdań laboratoryjnych</li> </ul> | <ul style="list-style-type: none"> <li>• Laboratorium</li> </ul> |
| The student has knowledge of development trends and new developments in manufacturing engineering.                                                                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>• <a href="#">K_W16</a></li> </ul>                                  | <ul style="list-style-type: none"> <li>• kolokwium</li> </ul>                            | <ul style="list-style-type: none"> <li>• Laboratorium</li> </ul> |

## Warunki zaliczenia

Laboratory – final grade is the weighted sum of grades obtained for the completion of individual laboratory classes.

## Literatura podstawowa

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

## Literatura uzupełniająca

1. Tecnomatix on-line documentation

## Uwagi

Zmodyfikowane przez dr hab. inż. Sławomir Kłos, prof. UZ (ostatnia modyfikacja: 25-04-2022 10:33)

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