

# Modelling and Simulation of Technological Processes - opis przedmiotu

| Informacje ogólne   |                                                     |
|---------------------|-----------------------------------------------------|
| Nazwa przedmiotu    | Modelling and Simulation of Technological Processes |
| Kod przedmiotu      | 06.1-WM-ER-MiBM-06_18                               |
| Wydział             | <a href="#">Wydział Mechaniczny</a>                 |
| Kierunek            | WM - oferta ERASMUS                                 |
| Profil              | -                                                   |
| Rodzaj studiów      | Program Erasmus                                     |
| Semestr rozpoczęcia | semestr zimowy 2018/2019                            |

| Informacje o przedmiocie        |                                                                         |
|---------------------------------|-------------------------------------------------------------------------|
| Semestr                         | 1                                                                       |
| Liczba punktów ECTS do zdobycia | 3                                                                       |
| Typ przedmiotu                  | obowiązkowy                                                             |
| Język nauczania                 | angielski                                                               |
| Sylabus opracował               | <ul style="list-style-type: none"><li>dr inż. Joanna Cyganiuk</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    |
| Wykład       | 30                                      | 2                                      | -                                          | -                                         | Zaliczenie na ocenę |
| Laboratorium | 30                                      | 2                                      | -                                          | -                                         | Zaliczenie na ocenę |

## Cel przedmiotu

The aim of the course is to familiarize students with the methods of mathematical and physical modeling as well as with methods and techniques of processes simulation. To familiarize students with the options of the use of the modelling and simulation techniques for technological processes.

## Wymagania wstępne

Mathematics, Physics, Engineering Mechanics, Fundamentals of Machine Design, Construction Notation, Operation of Machines

## Zakres tematyczny

The content of the lecture:

Basic concepts connected with modelling and simulation of processes: model, system, simulation, process. Model construction. Types of models and algorithms of modelling processes. Issues connected with mathematical and physical modelling and simulation of processes: data types and their collection, define parameters and variables, define a problem. Issues: apparatus of dimensional analysis, modelling with the use of dimensional functions. Methods of formalization of description of process and object. Queuing models. Network models. Petri network. Scheduling. Modelling of tools and appliances with the use of FEM. Practical examples of using discussed modelling methods for technological processes like: shaping products and organization processes involving with manufacturing preparation and production. Computer tools in modelling and simulation of processes.

The content of the laboratory:

Create virtual models, dimensional analysis and simulation of appliances used in metal working. The use of queueing models – queueing systems with or without queue. The use of FEM in modelling of tools and elements used in shaping. The use of network models in analysis of work centers including Petri network. Scheduling - planning of working and shaping appliances for chosen products.

## Metody kształcenia

Lecturers are given with the use of multimedia technics. Work with specialist literature – textbooks, professional journals.

Laboratories are given with the use of computer software – methods: problem tasks, solution analysis. Individual and group job during the realization of laboratory exercises. Presentation of solutions, discussion about obtained solutions and possibilities of its modernizations.

## Efekty uczenia się i metody weryfikacji osiągnięcia efektów uczenia się

| Opis efektu                                                                                                                                                                                    | Symbole efektów | Metody weryfikacji                                           | Forma zajęć                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------------------------------------------|--------------------------------------------------------|
| The student knows computational methods, basic tools and techniques of informatics needed in solving engineering tasks which are essential in modeling and technological processes simulation. |                 | <ul style="list-style-type: none"><li>test końcowy</li></ul> | <ul style="list-style-type: none"><li>Wykład</li></ul> |

| Opis efektu                                                                                                                                                                                                      | Symbole efektów | Metody weryfikacji                     | Forma zajęć    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------------------------|----------------|
| The student has an elementary knowledge of the modelling and simulation as well as analysis of mechanical systems, appliances working and shaping material, processes manufacturing and technological designing. |                 | • test końcowy                         | • Wykład       |
| The student is able to plan and carry out computer simulations, to interpret the results and to draw conclusions.                                                                                                |                 | • wykonanie sprawozdań laboratoryjnych | • Laboratorium |
| The student uses modern simulation and analytical computational methods for modeling and simulation of processes like engineering problems.                                                                      |                 | • wykonanie sprawozdań laboratoryjnych | • Laboratorium |
| The student can make a critical analysis of the way of functioning of processes of modeling and simulation including used in processes appliances, operations, and planning methods.                             |                 | • wykonanie sprawozdań laboratoryjnych | • Laboratorium |
| The student is able to identify aims and priorities used for tasks set by him and others.                                                                                                                        |                 | • wykonanie sprawozdań laboratoryjnych | • Laboratorium |
| The student is able to demonstrate the ingenuity and skill in selection of appropriate modeling and simulation methods, depending on considered problem.                                                         |                 | • wykonanie sprawozdań laboratoryjnych | • Laboratorium |

## Warunki zaliczenia

To get a credit the student has to pass all course forms.

## Literatura podstawowa

1. Severance F. W., System modeling and simulation - an introduce, Wiley, West Sussex 2001,
2. Totten G. E. , Xie L., Funatani K., Modeling and simulation for material selection and mechanical design, Marcel Dekker INC, New York Basel 2004,
3. Miranda F., Abreu C., Handbook of research on computational simulation and modeling in engineering, IGI Global, USA 2015,
4. Banerjee S., Mathematical modeling: models, analysis and applications, CRC Press, USA 2014,

## Literatura uzupełniająca

1. Hübl, A., Stochastic Modelling in Production Planning, Springer Gabler, Wiesbaden 2018,

## Uwagi

Zmodyfikowane przez dr inż. Joanna Cyganiuk (ostatnia modyfikacja: 27-04-2018 01:44)

Wygenerowano automatycznie z systemu SylabUZ