Programming for Engineering Applications - course description

General information

Course name	Programming for Engineering Applications
Course ID	06.9-WM-ZiIP-ANG-D-08_22
Faculty	Faculty of Mechanical Engineering
Field of study	Management and Production Engineering
Education profile	academic
Level of studies	Second-cycle studies leading to MSc degree
Beginning semester	winter term 2023/2024

Course information

Semester	1
ECTS credits to win	3
Course type	obligatory
Teaching language	english
Author of syllabus	• dr inż. Grzegorz Pająk • dr inż. Iwona Pająk

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	15	1	-	-	Credit with grade
Laboratory	15	1	-	-	Credit with grade
Class	15	1	-	-	Credit with grade

Aim of the course

Familiarize with the tools for performing engineering calculations on the example of the Matlab package, developing skills in using a specialized tool to solve selected engineering problems.

Prerequisites

Basic computer knowledge.

Scope

Lectures

L01. Introduction to the Matlab environment, basic matrix and array operations, scripts and functions.

L02. Data structures, data processing and visualization.

L03. Overview of libraries and tools available in the Matlab environment.

L04. Modeling and simulation using the Simulink package.

L05. Solving selected engineering problems using artificial intelligence methods.

L06. Introduction to symbolic calculations.

L07. Final test.

Exercises

E01. Introduction to programming in the Matlab environment.

E02. Matrix and array operations, scripts and functions.

E03-04. Solving simple engineering problems using matrix and array operations.

E05. Interpolation and approximation using tools available in the Matlab environment.

E06. Solving optimization problems.

E07. Final test.

Laboratory

L01. Matlab environment.

L02. Matrix and array operations, scripting and functions.

L03. Data processing and visualization.

L04. Solving exemplary engineering problems using specialized Matlab libraries.

L05-06. Modeling and simulation of selected systems using the Simulink package.

L07. Final test.

Teaching methods

Lecture: a conventional lecture

Exercises: problem tasks, case analysis, individual work

Laboratory: practical classes in the computer laboratory

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
The student is able to interact and work in a group accepting various roles	• K_K03	• an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory • Class
The student has detailed knowledge of selected issues of Mechanical Engineering, as broadly understood and associated with Production Engineering and computer-aided management.	• K_W06 • K_W09	• an evaluation test • an ongoing monitoring during classes • carrying out laboratory reports	• Lecture • Laboratory • Class
The student is able to think and act both creatively and entrepreneurially.	• K_K06	• an ongoing monitoring during classes	• Laboratory • Class
The student can work individually as well as in a team; he/she is also able to select team members for a specific task and assign tasks to the members and manage a small team.	• K_U03	• an ongoing monitoring during classes	• Laboratory • Class
The student is able to obtain information from literature, databases and other sources and is able to integrate, interpret and critically evaluate it, as well as draw conclusions, therefrom, both formulating it and sufficiently justify opinions on it.	• K_U01	• an evaluation test • an ongoing monitoring during classes	• Lecture • Laboratory • Class

Assignment conditions

Lecture: a positive result of the assessment via a written test

Exercises: a positive result of the assessment via a written test

Laboratory: completion of laboratory tasks, assessment of the test conducted at the computer.

Final grade: the condition for passing the course is to pass all its forms, the final grade for the course is the arithmetic mean of the grades for individual forms of classes.

Recommended reading

1. Attaway S., *Matlab : A Practical Introduction to Programming and Problem Solving*, Amsterdam : Butterworth-Heinemann, 2012.
2. Dukkipati, R.V., *MATLAB : An Introduction with Applications*, New Delhi : New Age International, 2010.
3. Eshkabilov S., *Beginning MATLAB and Simulink, from Novice to Professional*, Apress, 2019.
4. Gdeisat M., Lilley F., *MATLAB by Example : Programming Basics*, Amsterdam : Elsevier, 2013.
5. Turk I., *Practical MATLAB : With Modeling, Simulation, and Processing Projects*, Apress, 2019.

Further reading

1. Ancau M., *Practical Optimization with MATLAB*, Newcastle-upon-Tyne, UK : Cambridge Scholars Publishing, 2019.
2. Ciaburro G., *MATLAB for Machine Learning : Extract Patterns and Knowledge From Your Data in Easy Way Using MATLAB*, Birmingham, UK : Packt Publishing., 2017.
3. MathWorks, Self-Paced Online Courses, https://matlabacademy.mathworks.com/?s_tid=ln_acad_learn_oc

Notes

Modified by dr inż. Grzegorz Pająk (last modification: 01-05-2023 18:08)

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