Computer methods in engineering - course description

General information

Course name	Computer methods in engineering
Course ID	11.3-WE-AutP-CMinE-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	Automatic Control and Robotics
Education profile	academic
Level of studies	First-cycle Erasmus programme
Beginning semester	winter term 2022/2023

Course information

Semester	1
ECTS credits to win	5
Course type	obligatory
Teaching language	english
Author of syllabus	• dr inż. Marcel Luzar

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	30	2	-	-	Credit with grade
Laboratory	30	2	-	-	Credit with grade

Aim of the course

The goal of the subject is:

- introduction to basic computer methods used in engineering calculations,
- educating students to understand the need for correct engineering calculations with desired accuracy,
- developing basic skills for practical use of Matlab / Octave / Scilab environments in solving common engineering tasks.

Prerequisites

None (1 semester subject)

Scope

Matlab, Octave and Scilab engineering computational environments. Characteristics of each environment, scope of application, main disadvantages and advantages. Rules and guidelines for using extensive help attached to environments. Algebraic operations on vectors and matrices and their transformations. Logical expressions and relational operators. Operations on strings. Basic mathematical trigonometric functions and keywords. Iterative instructions and recursion (*for, while* loops), conditional instructions (*if-else, switch-case*). Definition of the script and functions. File operations and variables in the workspace. Programming basis, debugging. Functions that analyze the data sets. Operations on polynomials. Interpolation and approximation. Create two- and three-dimensional charts. Simple animation. Nonstandard data structures: sparse matrices, structures, cell tables, multidimensional arrays. Symbol operations. Graphical user interface design. Use of external compilers known programming languages (C, C++). Overview of selected toolboxes. Simulink package. Building models with operating blocks, simulating real-time systems, communicating with an OPC server.

Teaching methods

Lecture: Conventional lecture

Laboratory: Laboratory exercises

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Student can use computer methods to solve math problems		• an evaluation test	• Lecture
Student can solve the simple problem of calculating on the basis of literature		• a quiz • an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory
Student knows the basic functions and syntax of Matlab, Octave and Scilab.		• an evaluation test	• Lecture
Student is able to work individually and in teamwork		• activity during the classes • an observation and evaluation of activities during the classes • an ongoing monitoring during classes	• Laboratory

Outcome description	Outcomesymbols	Methods of verification	The class form
Student can write scripts and functions to solve common engineering problems		• a quiz • an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory
Student is able to use his general engineering and mathematical knowledge in calculating and estimating the correctness of their result		• a quiz • an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory

Assignment conditions

Lecture - a condition of pass is to obtain a positive grade in the written test.

Laboratory - a condition of pass is to obtain positive grades from all laboratory exercises that are expected to be performed within the laboratory program.

Components of the final grade = lecture: 50% + laboratory: 50%.

Recommended reading

1. Pratap, R. Matlab 7 dla naukowców i inżynierów. PWN, Warszawa 2007
2. Brzózka, J., Dorobczyński, L., Matlab – środowisko obliczeń naukowo-technicznych. PWN, Warszawa 2008
3. Brozi, A., Scilab w przykładach. Wydawnictwo NAKOM, Poznań, 2010

Further reading

1. Krzyżanowski, P., Obliczenia inżynierskie i naukowe. Szybkie, skuteczne, efektowne. PWN 2011
2. MathWorks, Getting started with Matlab, Version 6. MathWorks 2006
3. Salazar, J.R., Essential Matlab and Octave. Apple Academic Press, Kanada 2014

Notes

Modified by dr hab. inż. Wojciech Paszke, prof. UZ (last modification: 11-04-2022 09:05)