FACULTY OF ELECTRONICS

SUBJECT CARD

Name of subject in Polish:	**Programowanie w praktyce inżyniera i naukowca**
Name of subject in English:	**Scientific & Engineering Programming**
Main field of study (if applicable):	**Electronic and Computer Engineering**
Specialization (if applicable):	**……..**
Profile:	**academic**
Level and form of studies:	**1 st level/ full-time**
Kind of subject:	**obligatory**
Subject code:	**ECEA00007**
Group of courses:	**YES**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		90		
Form of crediting	crediting with grade		crediting with grade		
For group of courses mark (X) final course	**X**				
Number of ECTS points	**5**				
including number of ECTS points for practical (P) classes	0		3		
including number of ECTS points corresponding to classes that require direct participation of lecturers and other academics (BU)	1		1		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic programming and object-oriented programming

SUBJECT OBJECTIVES

C1 To acquaint with programming tools and environments utilised in scientific and engineering work.
C2 To develop skills of symbolic computation and numeric simulation tools utilisation.
C3 To explain problems and principles of experiment preparation and implementation in programming environments.

SUBJECT LEARNING OUTCOMES

relating to knowledge:
PEU_W01 – knows the basic of engineer's and scientist's programming tools
PEU_W02 – understands the role of system/experiment specification and implementation phases
PEU_W03 – understands the role of tools selection
PEU_W04 – knows the methods for result visualisation and analysis
PEU_W05 – knows the MATLAB environment and programming language
PEU_W06 – knows the Mathematica environment and programming language

relating to skills:
PEU_U01 – can use MATLAB framework
PEU_U02 – can use Mathematica environment
PEU_U03 – can model and simulate dynamical systems
PEU_U04 – can perform basic symbolic computations
PEU_U05 – can acquire, visualise, and analyse measurement data

relating to social competences:
PEU_K01 – understands the need for self-study and knowledge sharing

PROGRAMME CONTENT

Lecture		**Number of hours**
Lec 1	Introduction to the course. Overview of scientific and engineering tasks	2
Lec 2	System/experiment specification and implementation. Results visualisation and analysis	3
Lec 3	Survey on scientist's/engineer's tools: programming languages and environments, libraries, and physics engines	3
Lec 4	Introduction to Mathematica	4
Lec 5	Differential equations in Mathematica	2
Lec 6	Symbolic computation for dynamical systems modelling in Mathematica	2
Lec 7	Data acquisition and code generation in Mathematica	2
Lec 8	Introduction to MATLAB	4
Lec 9	Introduction do Simulink	2
Lec 10	Differential equations in MATLAB	2
Lec 11	Numerical methods in MATLAB	2
Lec 12	Data acquisition and control in MATLAB	2
	Total hours	30

Laboratory		**Number of hours**
Lab 1	Introduction to the laboratory environment and tools	2
Lab 2	Mathematica basic programming	6
Lab 3	Dynamical systems simulation in Mathematica	4
Lab 4	Dynamical systems modelling with symbolic computation in Mathematica	4
Lab 5	MATLAB basic programming	6
Lab 6	Dynamical systems simulation in MATLAB	4
Lab 7	MATLAB application for measurement data acquisition, visualisation, and	4

	analysis	
	Total hours	30

TEACHING TOOLS USED

N1.Traditional lecture using video projector
N2. Laboratory
N3. Consultation
N4. Independent work – preparation for the laboratory
N5. Independent work – self study

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end)	Learning outcomes code	Way of evaluating learning outcomes achievement
F1	PEU_W01 - PEU_W06; PEU_K01	test
F2	PEU_U01 - PEU_U05; PEU_K02	active participation in classes, test
P =0,4*F1 + 0,6*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Bruce F. Torrence, Eve A. Torrence, "The Student's Introduction to Mathematica and the Wolfram Language", Cambridge University Press, 2019 [2] Edward B. Magrab, "An Engineer's Guide to Mathematica", Wiley, 2014
[3] D. Báez-López, D. A. Baez Villegas, "MATLAB Handbook with Applications to Mathematics, Science, Engineering, and Finance", Chapman & Hall/CRC, 2019
[4] G.P. Syrcos, I.K. Kookos, "Introduction to Control System Design Using MATLAB, 2e", Papasotiriou Inc., 2005
[5] D. J Agans, "Debugging: The 9 Indispensable Rules for Finding Even the Most Elusive Software and Hardware Problems", Amacom, 2002

SECONDARY LITERATURE:

[1] lecture notes
[2] internet resources

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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