Subject programme

1. Subject name / subject module: **Numerical methods**
2. Lecture language: English
3. The location of the subject in study plans:
   - Area or areas of the studies: **Computer Engineering and Mechatronics**
   - Degree of the studies: **1st degree studies**
   - Ftield or fields (implementation of effects standard): **Mechatronics**
4. Supervision of subject implementation:
   - The Institute / Another unit: **Institute of Informatics and Mechatronics**
   - The person responsible for the subject: **Kowalczyk Marta, dr**
   - People cooperating in the development of the programme of the subject:
5. The number of hours and forms of teaching for individual study system and the evaluation method:

Mode of study		SOW	ECTS	Laboratory work	SOW	ECTS	…	SOW	ECTS	…	SOW	ECTS	…	SOW	ECTS	…	SOW	ECTS	…	SOW	ECTS	Total ECTS
Full-time studies				15	35	2																2
Part-time studies																						
Credit rigor			Graded assignment																			

6. Student workload – ECTS credits balance:

   1 ECTS credit corresponds to 25-30 hours of student work needed to achieve the expected learning outcomes including the student's own work

Activity (please specify relevant work for the subject)	Hourly student workload (full-time studies/part-time studies)
Participation in lectures	-
Participation in laboratory classes	15
Preparation to laboratory classes	25
Independent study of the subject	10
Participation in an exam / graded assignment	-
Total student workload (TSW)	50
ECTS credits	2
* Student's workload related to trainings	50
Student's workload in classes requiring direct participation of academic teachers	15

7. Implementation notes: recommended duration (semesters), recommended admission requirements, relations between the forms of classes:
   - Recommended admission requirements – none.
   - Recommended duration of the subject is taken from the course plan.
8. Specific learning outcomes – knowledge, skills and social competence:

Specific learning outcomes for the subject		Form	Teaching method	Methods for testing of (checking, assessing) learning outcomes
Outcome symbol	Outcome description			
Knowledge				
K_W04	The student has basic knowledge of which is essential for analyzing experimental and numerical results.	Workshop	Inquiry methods	Student learning activities.
K_W06	The student has good knowledge of: linear algebra numerical methods, including methods of solving systems of linear equations, numerical techniques to find the roots of non-linear equations, selected method of numerical integration, and methods of			
Skills				
K_U09	The student knows the MATLAB environment for numerical calculations and can use it for the purposes of solving some engineering issues. The student is able to interpret, analyse and evaluate numerical methods and numerical results, and apply those	Workshop	Inquiry methods	Student learning activities.

9. Assessment rules / criteria for each form of education and individual grades:

0% - 50%	ndst	80% - 86%	db
51% - 70%	dst	87% - 93%	db+
71% - 79%	dst+	94% - 100%	bdb

Activity	Grades	Calculation	To Final
Tasks done during laboratory classes	dst, db, bdb, db (3,4,5,4)	arithmetic mean (2,5,3,4)* 90%	3,6
Attendance	on 70% of all classes	70% * 5 -> 3,5 * 10%	0,35
Final result			3,95
Grade		3,95/5 = 79%	**db (4.0)**

10. The learning contents with the form of the class activities on which they are carried out:

(Laboratory classes)

1. Matlab and Solving Equations;

2. Linear Algebra;

3. Functions and Data;

4. Differential Equations.

11. Required teaching aids:

a. Lecture - multimedia projector

b. Laboratory classes - specialist laboratory

12. Literature:
   a. Basic literature:
   - Stormy, MATLAB. A practical introduction to programming and problem solving, Oxford, 2017.

   b. Supplementary literature:
   - S. T. Karris, Numerical Analysis Using MATLAB and Excel, Orchard Publications, 2007.
   - B. Hunt, R. Lipsman, J. Rosenberg, K. Coombes, J. Osborn, G. Stuck, A Guide to MATLAB: For Beginners and Experienced Users, Cambridge University Press, 2001.

13. Available educational materials divided into forms of class activities (Author's compilation of didactic materials, e-learning materials, etc.)

14. Teachers implementing particular forms of education:

Form of education	Name and surname
1. Lecture	
2. Laboratory classes	Kowalczyk Marta, dr
3. Training	
4. Project classes	
5. Workshop classes	
6. Simulation game	
7. Language classes	